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Erecting Homes in Winter

The above illustration shows the residence of William Mills, Cedar Rapids, Iowa, in course of construction. Designed by Architect William J. Brown. Stucco Contractor Charles R. Carpenter. Bishopric Stucco Board was used on this home.

DO NOT permit winter's interfering hand to halt your construction this year—apply Bishopric Stucco and Plaster Board to the studding or sheathing and proceed with the interior finishing.

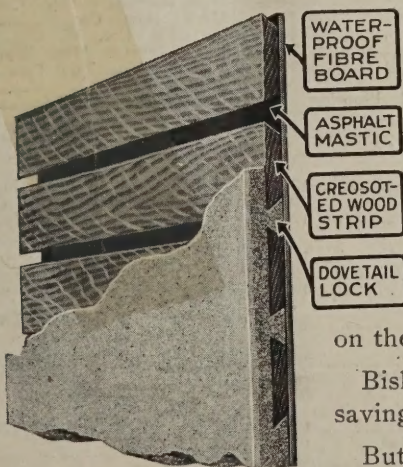
Bishopric Board has in numerous instances, especially in the severe cold of the Northwest, stood exposed to the elements from fall to spring without disintegration or damage. In every instance the buildings have been ready for Stuccoing at the Architect's or Contractor's convenience.

If your clients are in urgent need of a place to live they can occupy a Bishopric Board walled home in considerable comfort until the spring Stuccoing. The insulating qualities of this Board are decidedly extraordinary—it keeps a home extremely warm and dry. Dampness cannot penetrate the Asphalt Mastic and fibre-board and the heavy wood strips are creosoted against exposure. Warmth and comfort are increased when it is used on the interior instead of wood lath.

Bishopric Board's economy should influence contracts at this time. The saving on the average home is about 25%. This is a big point today!

But, best of all, Bishopric Board is a Stucco background you can be sure of. You can apply the Stucco next spring and know that the walls will remain permanently beautiful and crackless—monuments to your judgment.

Tell your clients they can go ahead with their construction and specify Bishopric Board!



We are ready to give you every service in connection with winter construction on Bishopric Board. Write us and get our Booklet.

THE BISHOPRIC MANUFACTURING COMPANY
979 ESTE AVENUE

CINCINNATI, OHIO



National Builder

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NATIONAL BUILDER

Volume 63

Chicago, January, 1920

Number 1

The Building Outlook

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BUILDING costs tomorrow will be lower only through improved methods. Waste must be eliminated, labor saving devices must be used to the utmost. Builders who realize this are going to reap the best profits.

The building situation today is full of promise for tomorrow. There is only one factor that mars the situation. And that is: "Will building costs be lower in the near future?" Upon the uncertain answer to this question hinges the attitude of financial circles. The ordinary channels are loth to loan much on security which may possibly depreciate in value owing to the decreased cost of re-production.

But private investors have plenty of money, and these are willing to lend it or invest it in ventures which are likely to bring a good return.

They realize, as a class, that the shortage of building is now, not five years hence. They know that the house built now will sell more quickly and will very probably bring a better price than the one built five years from now.

This class of investor, wide awake to opportunity, is the one which in all probability will reap most of the financial benefit from the present shortage.

The long-term mortgage is, of course, a different thing entirely. Investors of this class can hardly be blamed for going slowly. They are naturally unwilling to take any chances of the security falling below the value of the mortgage. But, are conditions in the building trade such as to warrant the holding of this attitude? There is perhaps one consideration only which will affect the future cost of building—namely, supply and demand. The demand today is enormous, far beyond what would be expected even in a new country rapidly building up.

This will tend to keep building costs at near their present level for at least ten or fifteen years, or until the supply exceeds the demand. Then, and not until then, will prices begin to fall appreciably. Only in cases where government demand has kept prices at a high level, will they be lower now. Steel, tin plate, glass and like materials will probably fall considerably. Other materials, such as shingles, siding, etc., will fall little, if at all, for their cost has not gone up extravagantly. Most of the present prices have increased

comparatively little compared with those in other lines of business.

This increased cost of building will be with us for a considerable length of time, there being absolutely no likelihood of pre-war prices ever again being enjoyed.

Progressive builders will find in the following pages an unequalled wealth of suggestion for different kinds of buildings. Showing what is being done now—The best that is being done—The work of successful, practical builders classified according to the character of the buildings and fully indexed for this reference number

The only way in which the present cost of building can be materially reduced is: by improved and more economical methods of construction, and by the adoption of labor saving equipment wherever possible.

Cutting costs in this way is entirely feasible and practicable. Elimination of waste and the use of improved equipment suited to the job will do much to put the building industry on a sounder basis than has been the case in the past.

For instance, take concrete work. Only too often is the cement dumped nearest the work, the sand farther away, and the broken stone quite some distance off. The broken stone, being the largest quantity, should, of course, be dumped nearest the work, with the cement as the smallest quantity dumped farther away. This may seem a small and obvious matter, but when one considers the usual waste shoveling involved, with similar waste all through the building, a very considerable saving is possible.

Again, the use of patented scaffold brackets cuts scaffolding costs. A saw rig or hoist may do much to lower costs, if intelligently used.

And it is not the effect on one job alone that must be considered. It is the accumulated effect on the entire year's profits which must be taken into account. Ten dollars saved in handling concrete and fifteen saved on scaffolding may not be very much on one job, but on fifty jobs it will amount to well over \$1,000.

Get in touch with every piece of equipment and every material manufactured. Learn just what the market offers you, even though you may have no immediate use for the information. File it, and be prepared to use this information whenever it will help you to cut costs.

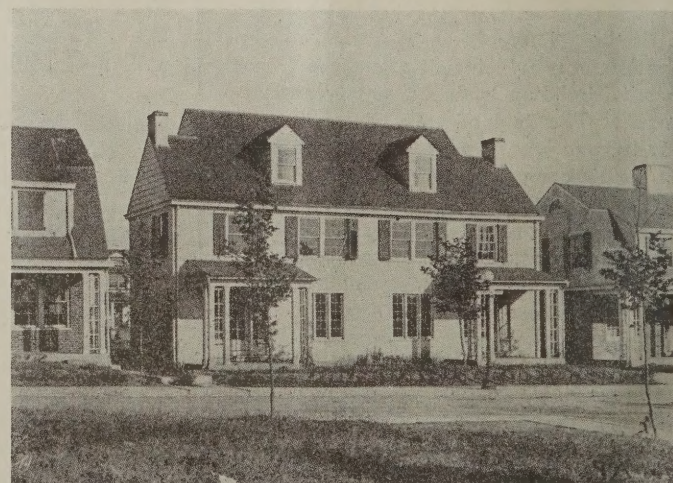
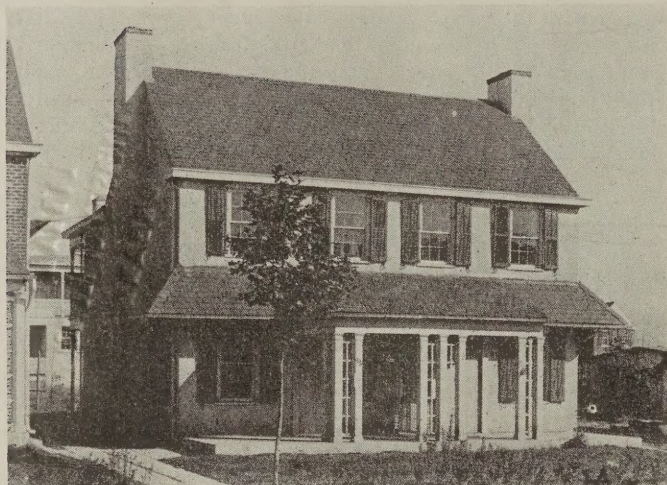
Knowledge is power, and nowhere does this hold more true than in the building business. When a man only half knows his subject, he finds that it is the other half that really would come in handy. You may know quite a bit about equipment, but if you don't know just what is the best equipment or material for your purpose, what you do know doesn't do you as much good as it might.

Lower costs are possible, yes, certain, if the builder who makes his knowledge and ability cut costs. Prices are not likely to be much lower. Work today will therefore go to the man who can cut erection costs by knowing all about his subject.

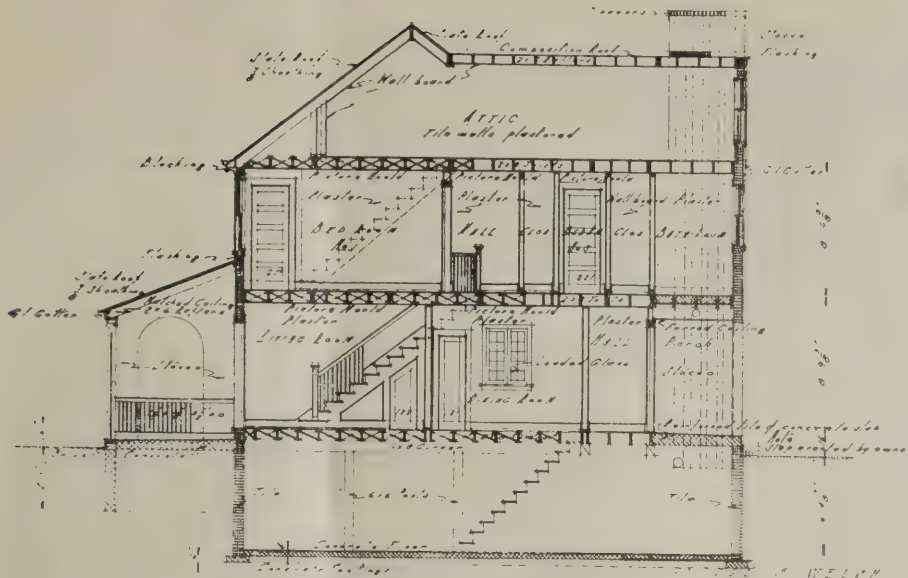
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Development at Elmwood Park, Bethlehem, Pa.

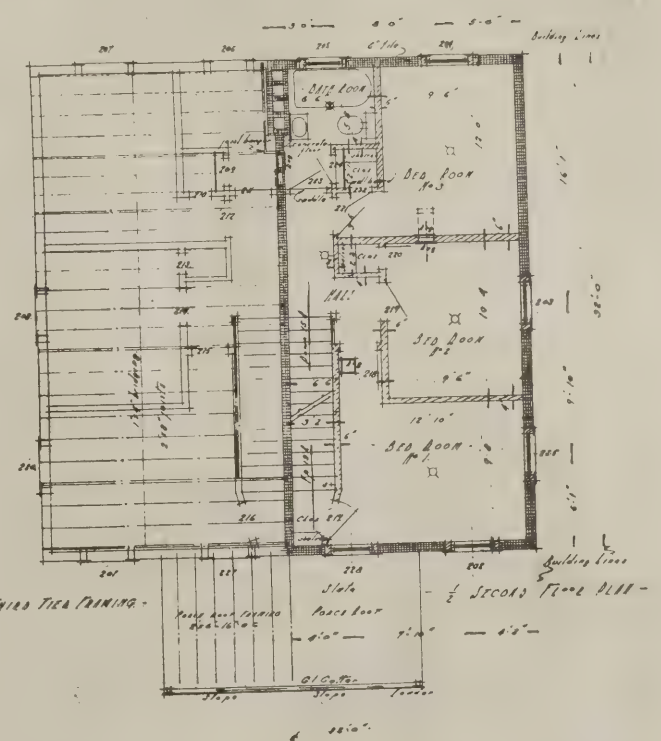
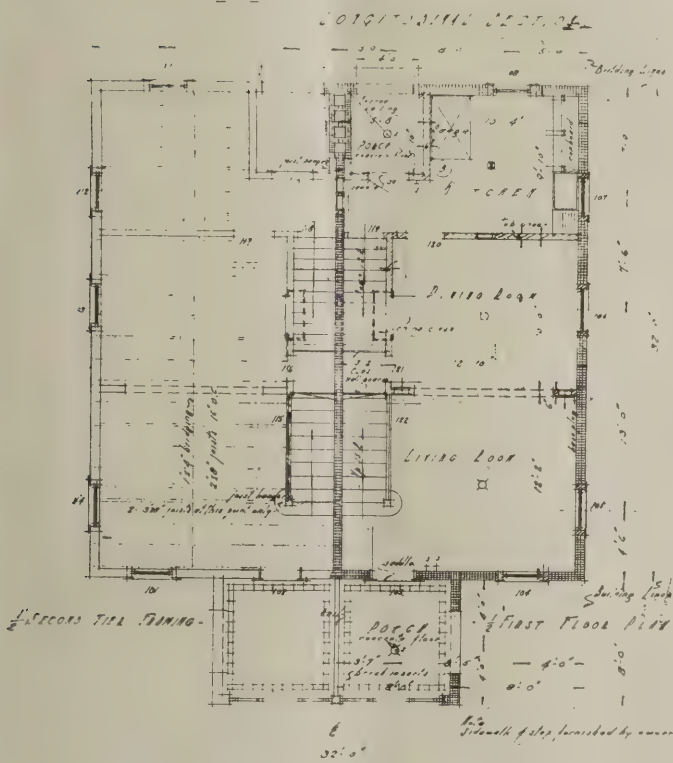
By Dodson Realty Corporation—Geo. S. Welsh, Architect



Two-family houses



Typical section



Typical-two-family house plan



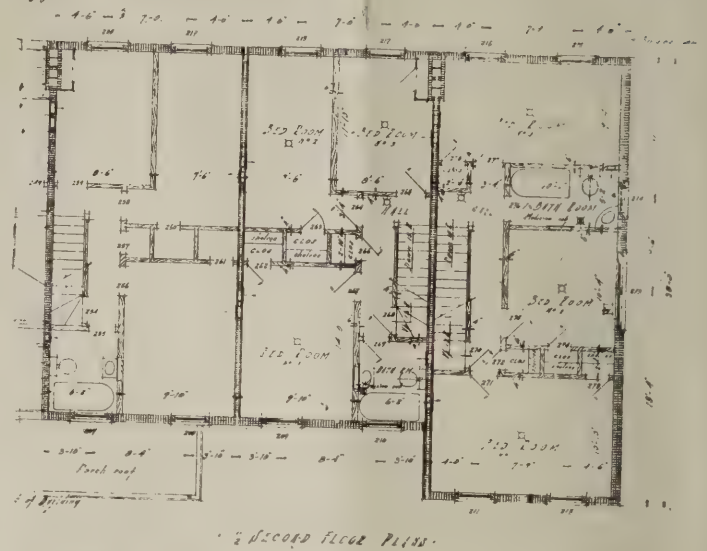
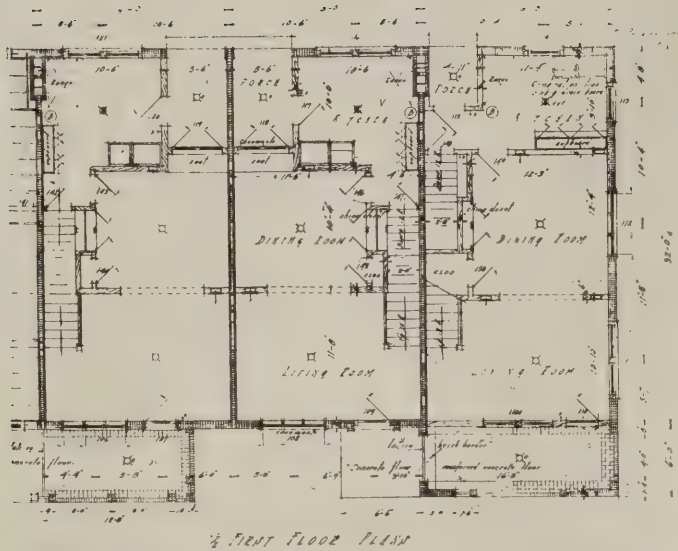
Rear view of two-family house



One-family house



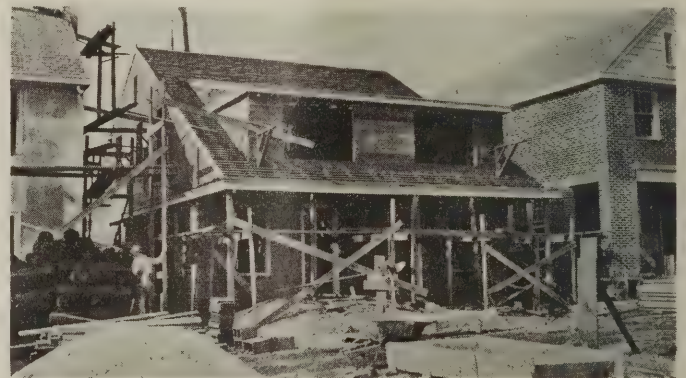
A six-family house



Typical six-family house plans



Brick-faced tile and ordinary tile—the latter ready for stucco



Substantial construction characterizes these houses



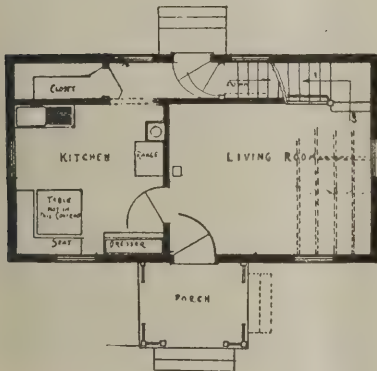
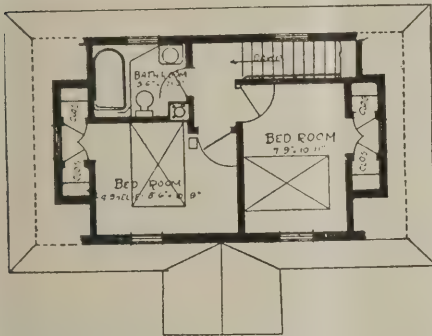
Winding streets give each house all the advantages of a corner location

A Development by the Eclipse Home Makers at Beloit, Wis.

George B. Post & Sons, Architects.



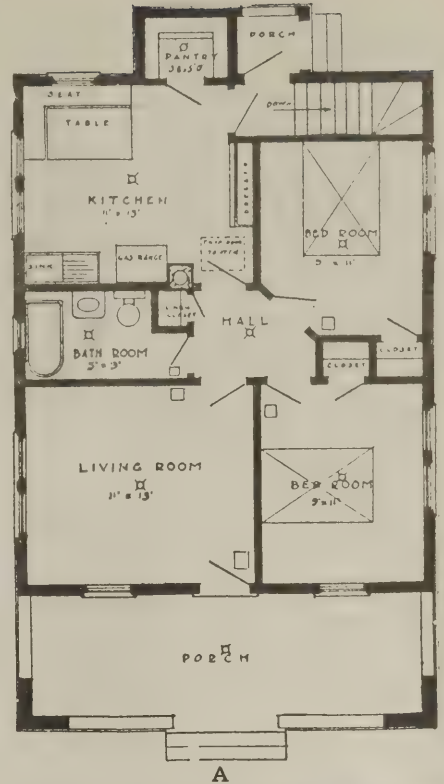
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B



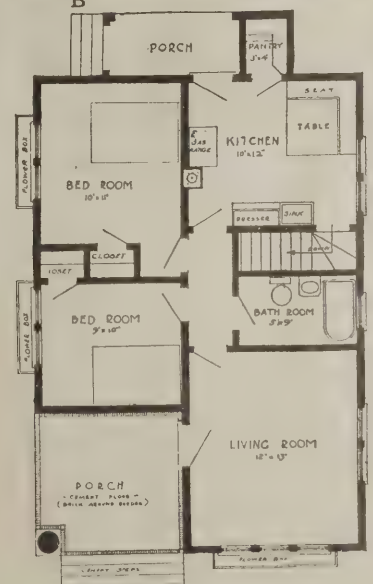
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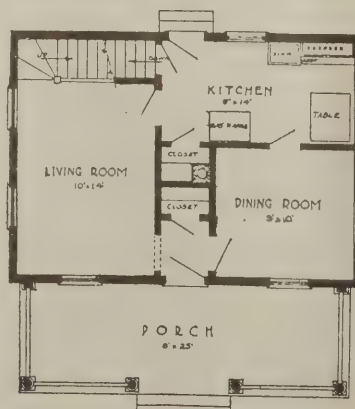
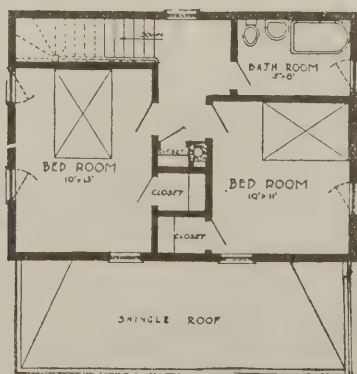
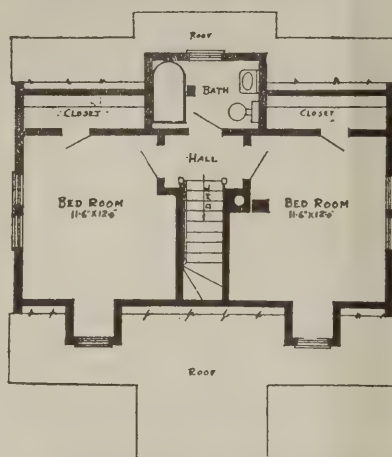
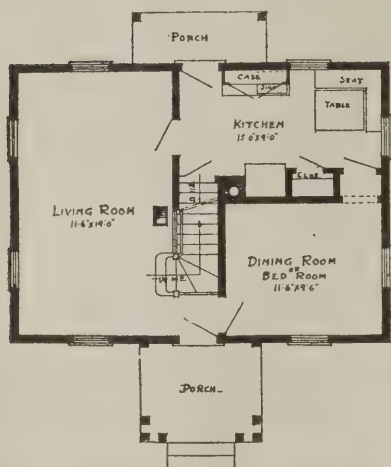
A



B



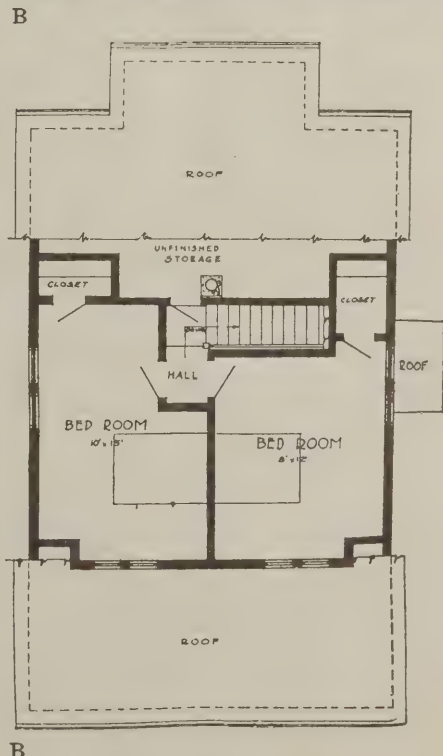
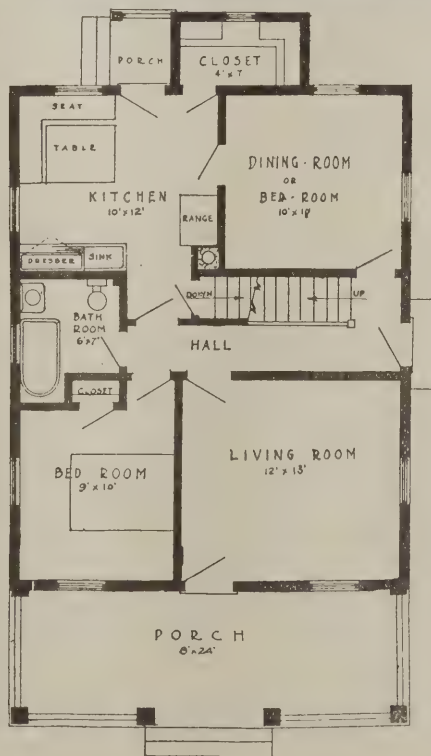
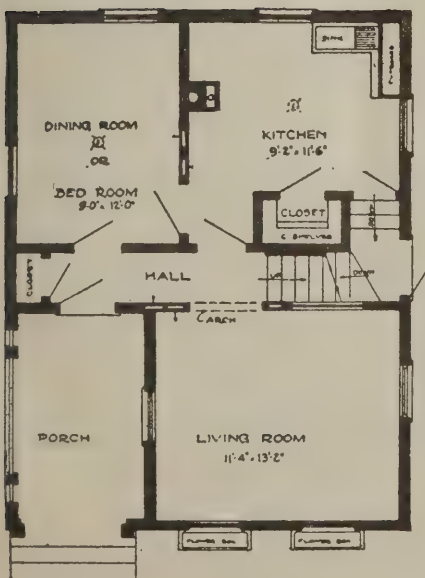
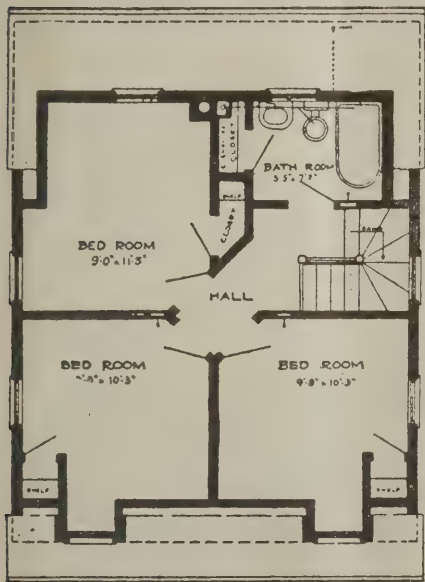
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Two treatments of the same plan

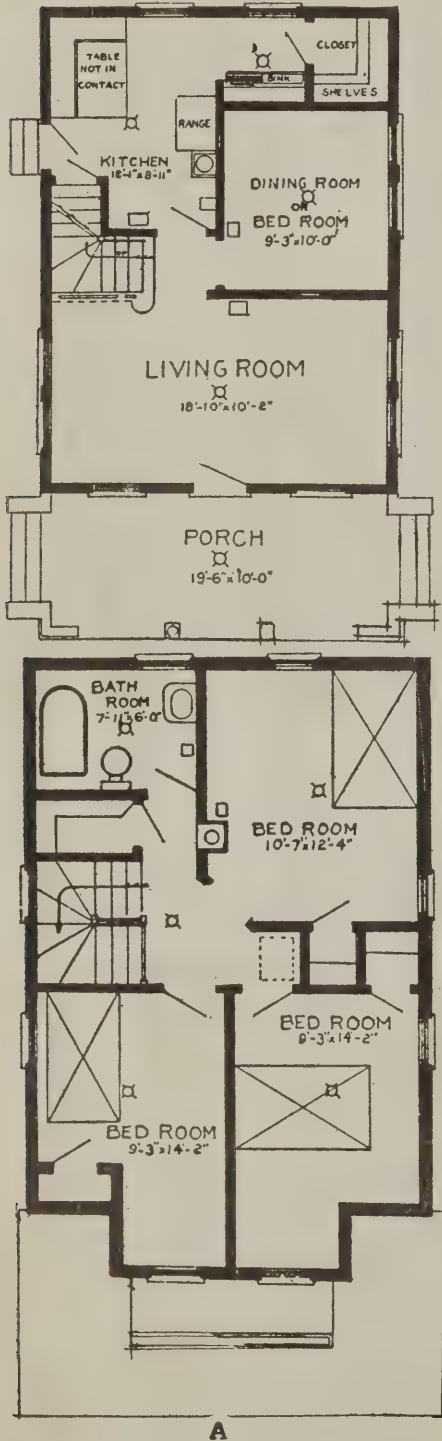


Front and side elevation—A

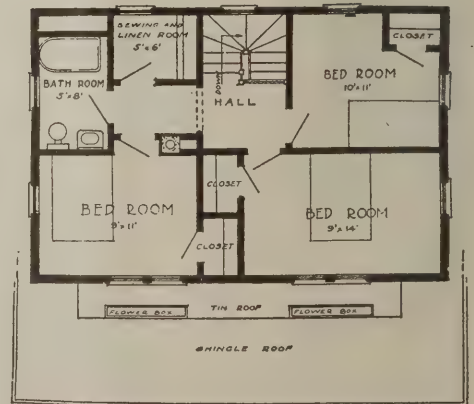
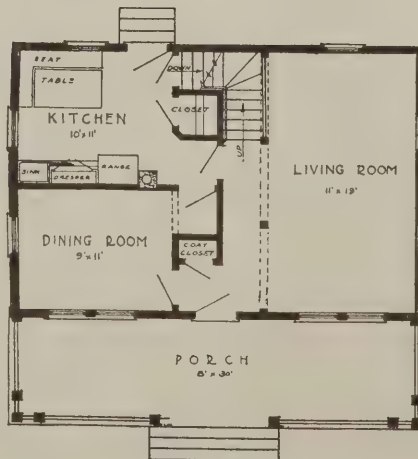




Two treatments of the same plan—A



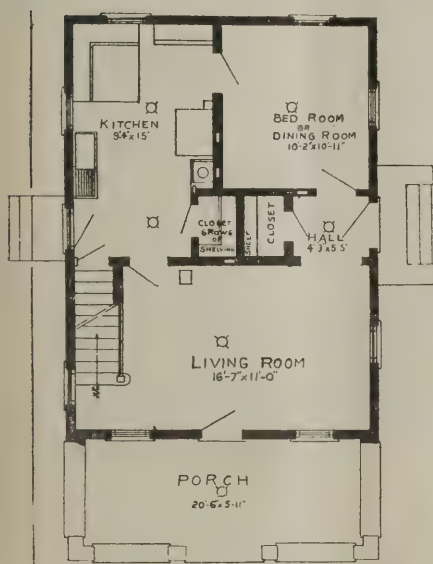
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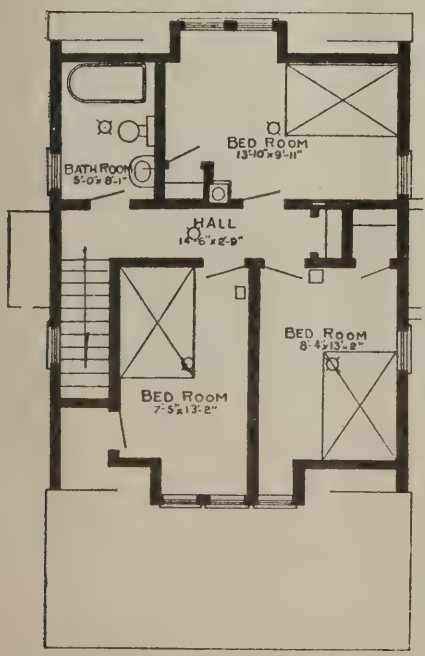
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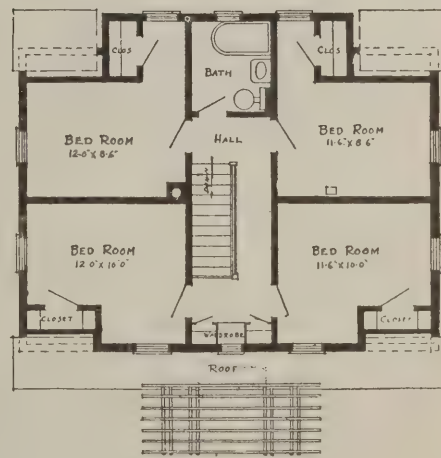
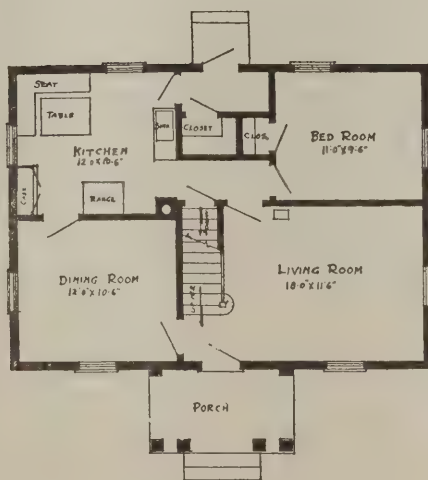
Two treatments of the same plan—A



B



A



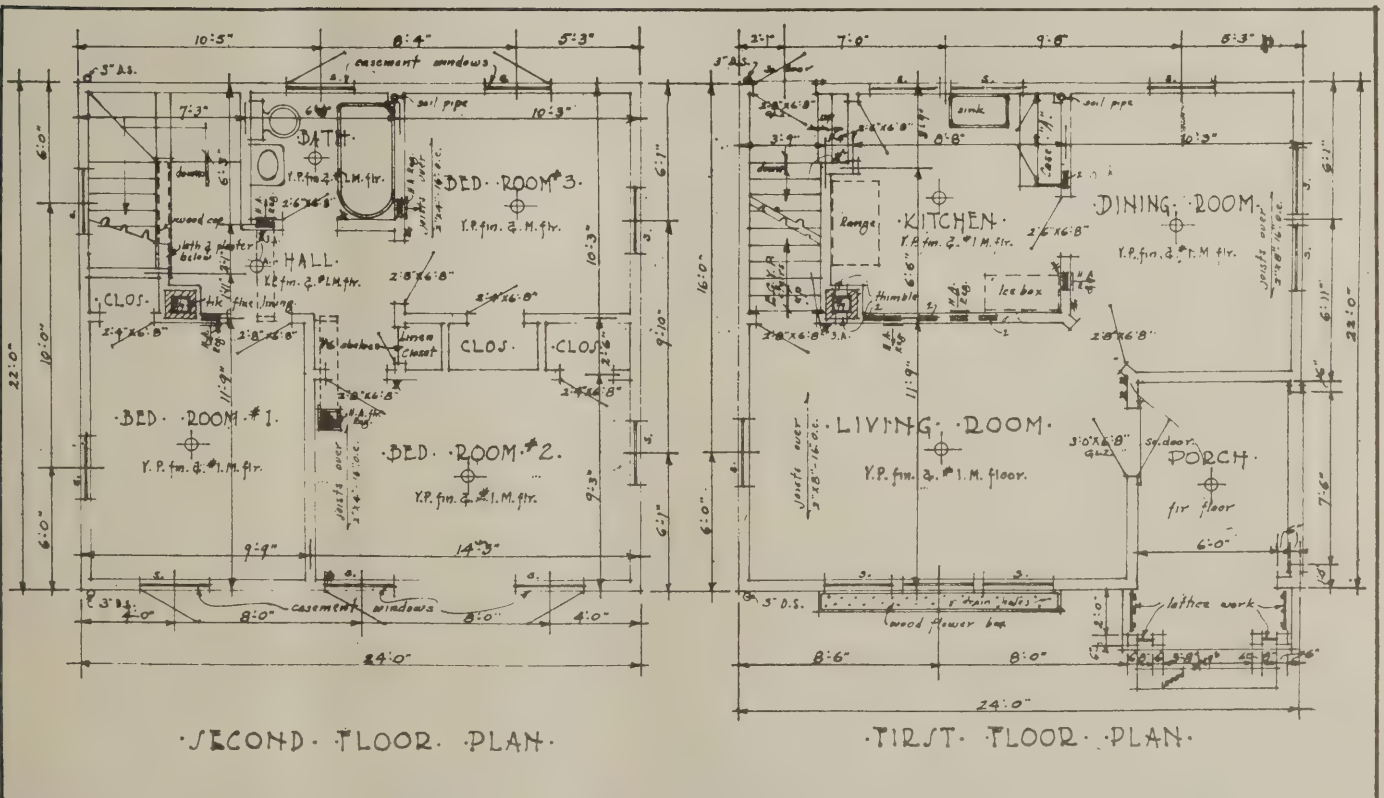
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Development by the Madison Realty Company, Madison, Wisconsin

Capital Construction Company, Contractors

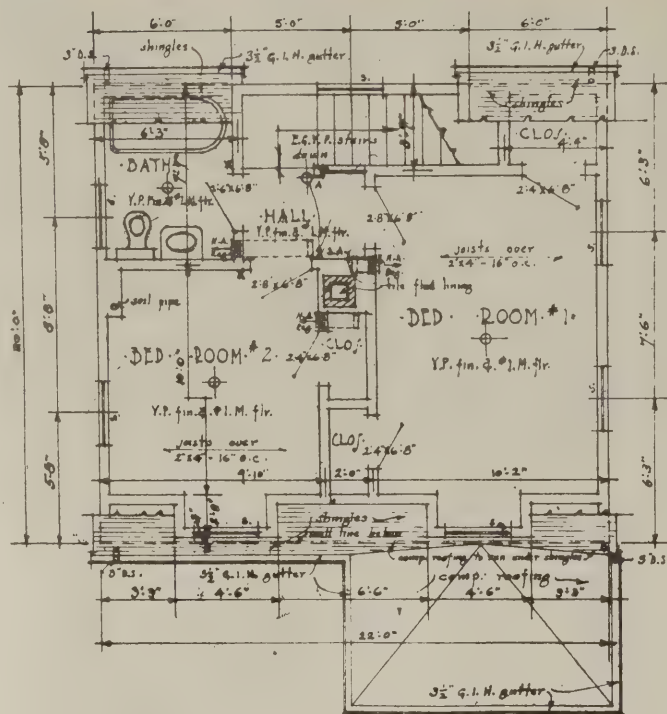


APPEARANCE OF THE HOUSES IN THE ROW
Photographed during construction

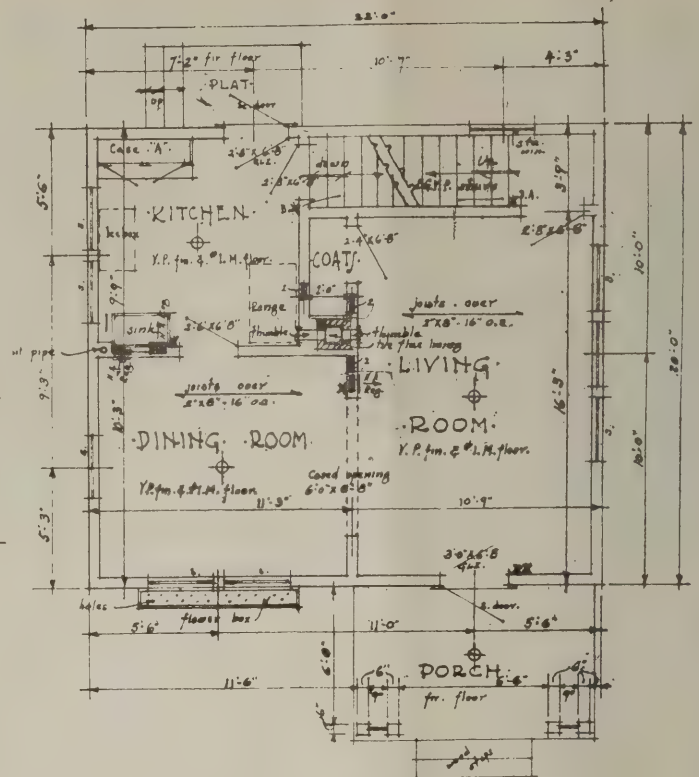


·SECOND· FLOOR· PLAN·

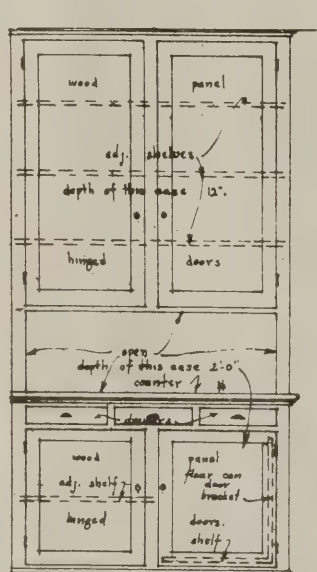
FIRST FLOOR PLAN.



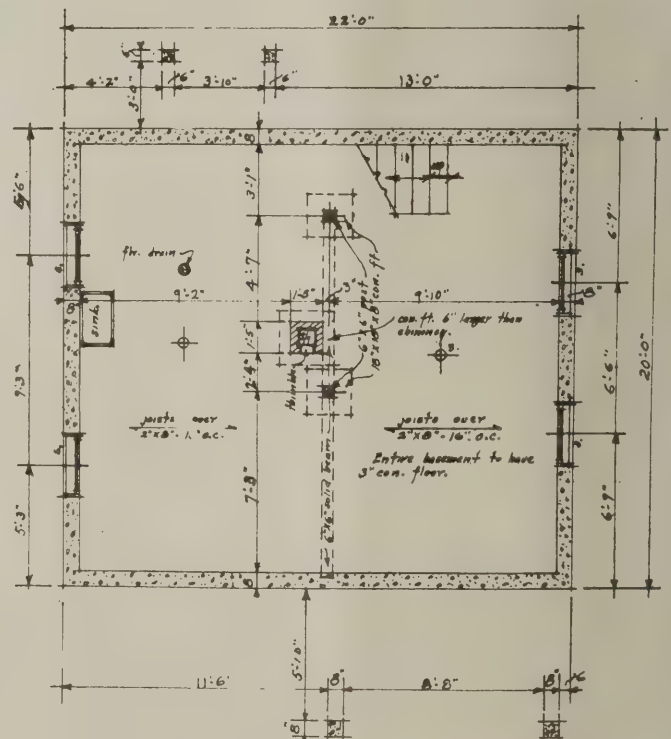
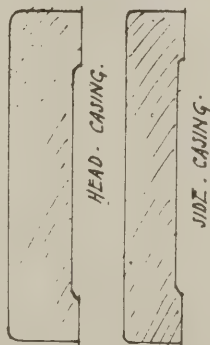
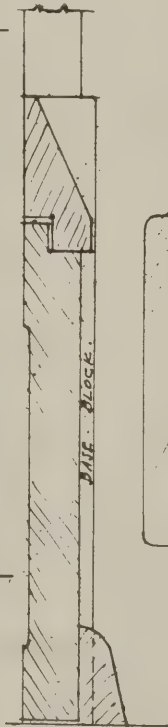
SECOND FLOOR PLAN.



FIRST FLOOR PLAN.



ELEV. OF CASE "A" KITCHEN.

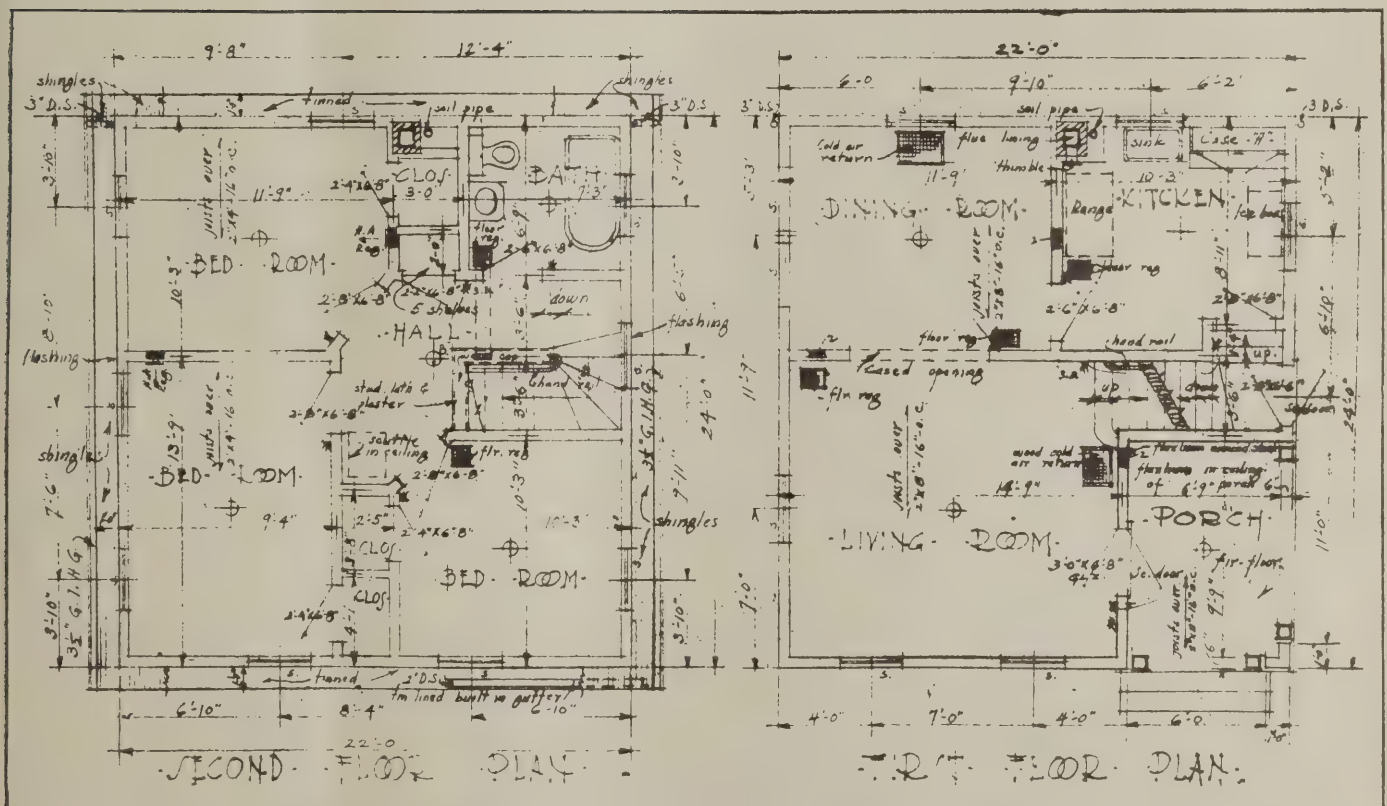


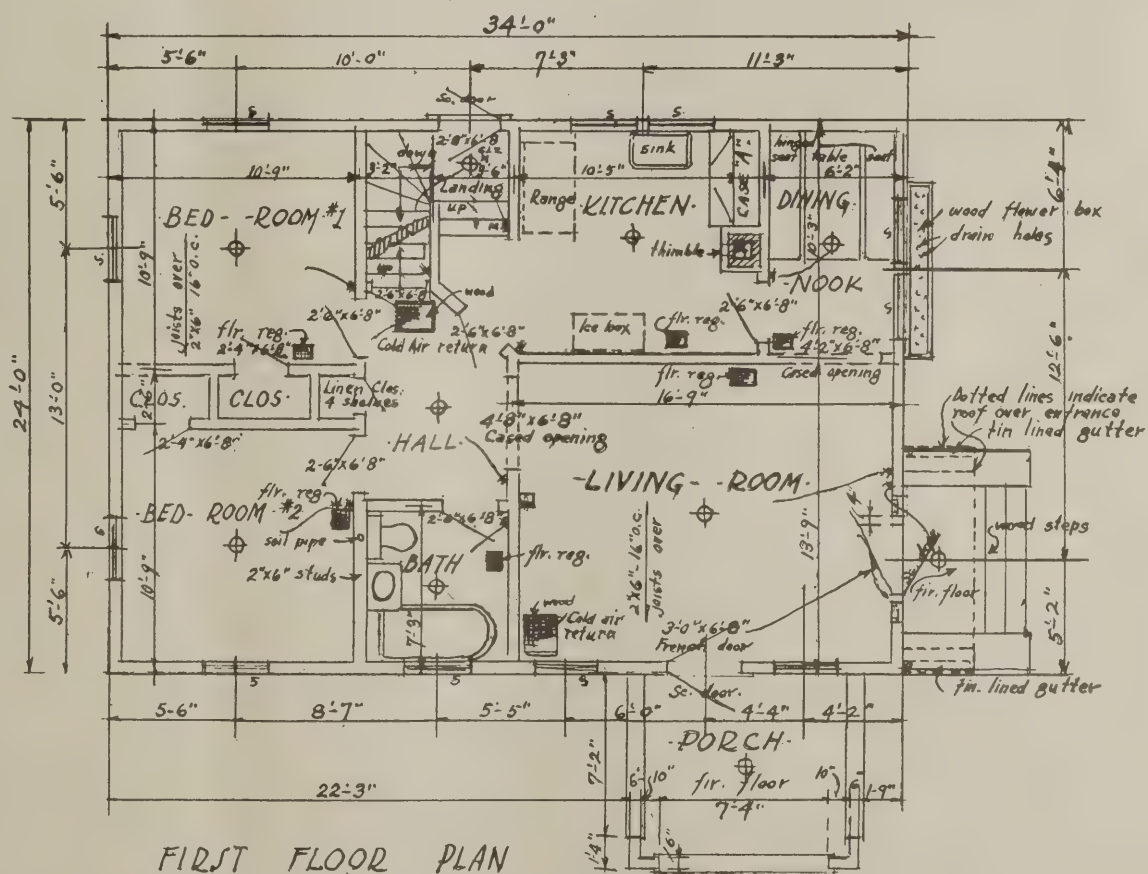
BASEMENT PLAN.

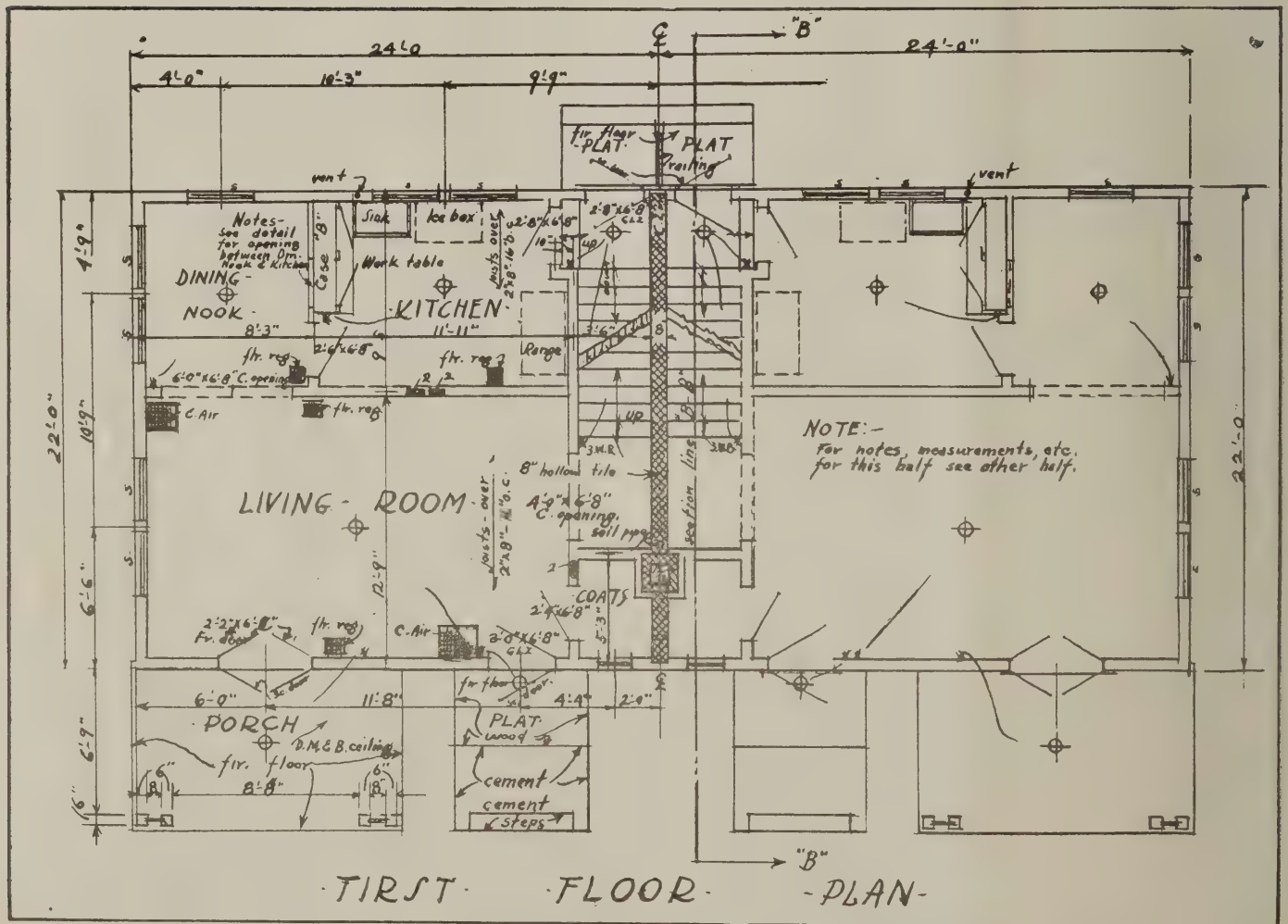


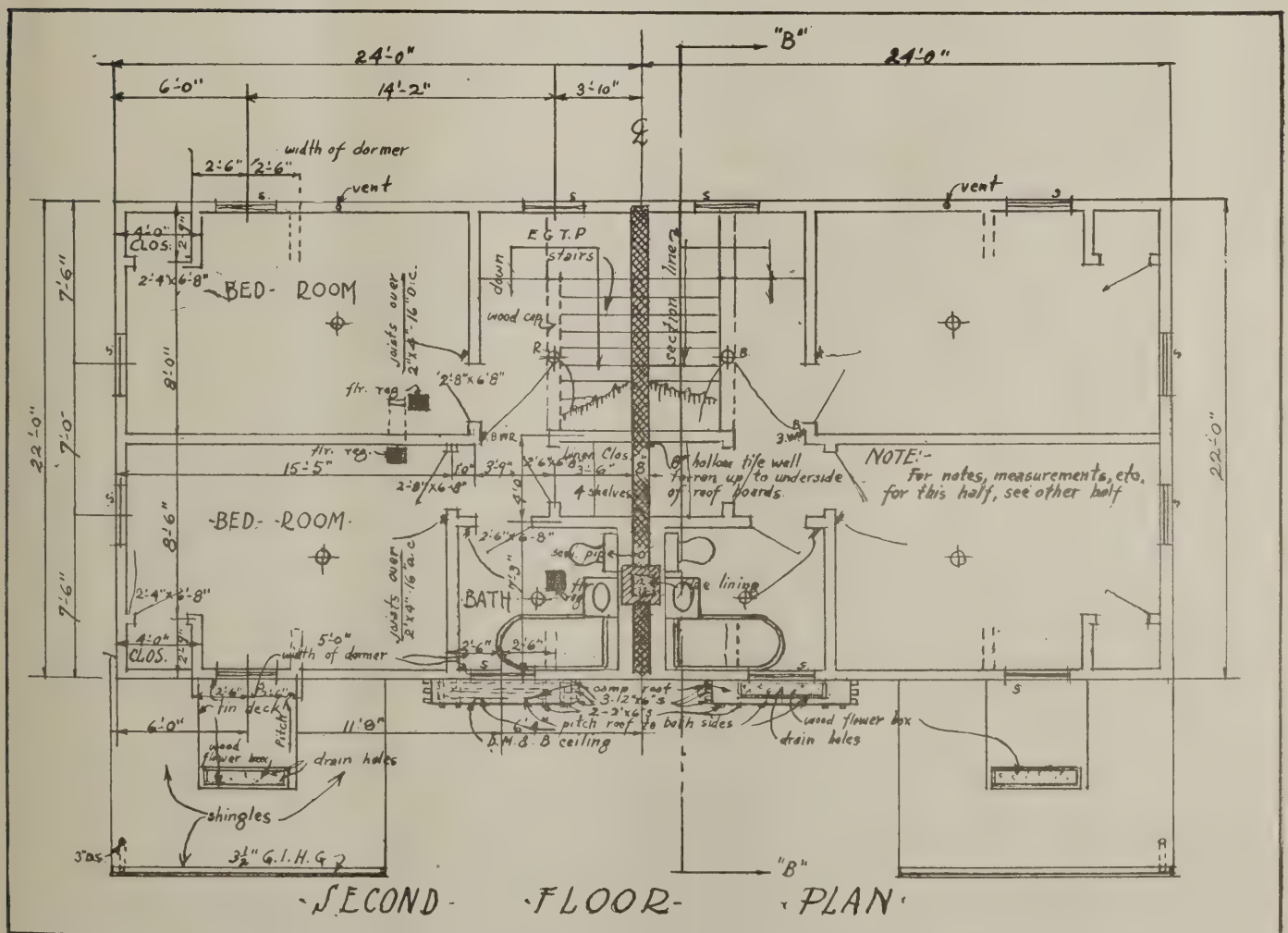
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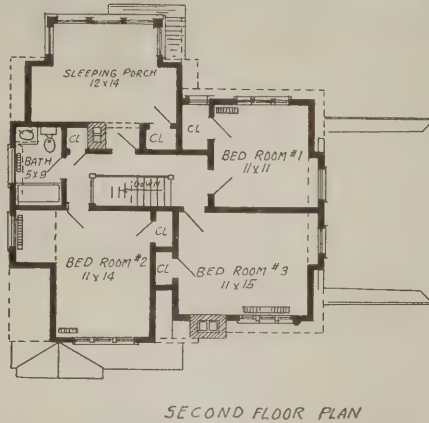
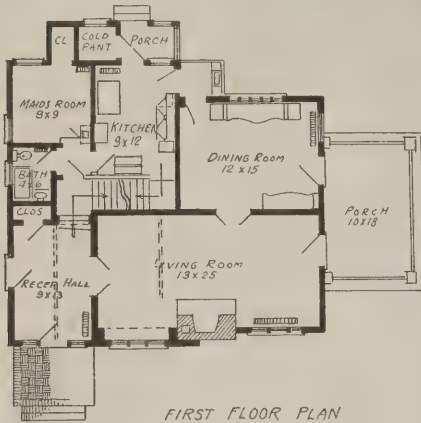




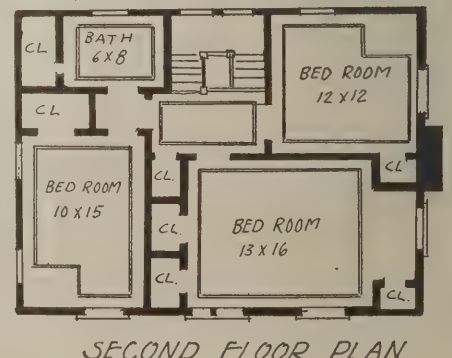
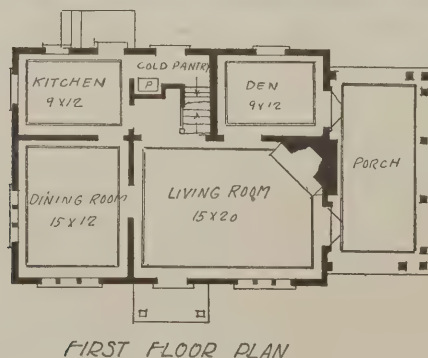


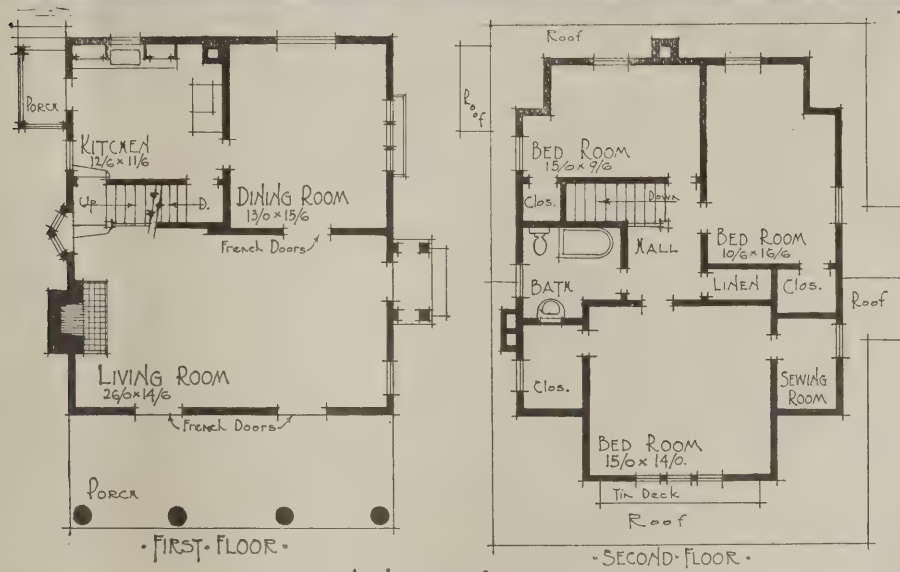


Houses Built by
Tilghman H.
Moyer, Builder
and Designer,
Allentown, Pa.



Dutch Colonial
Type

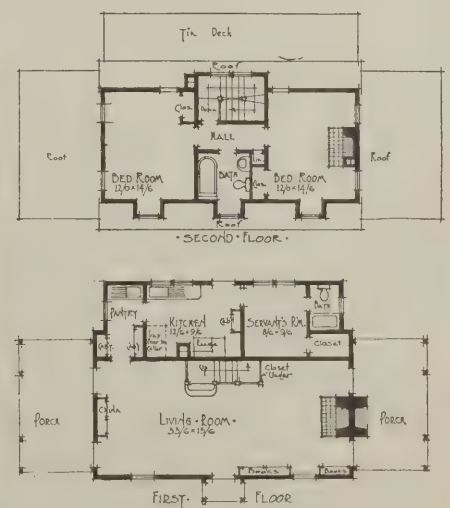


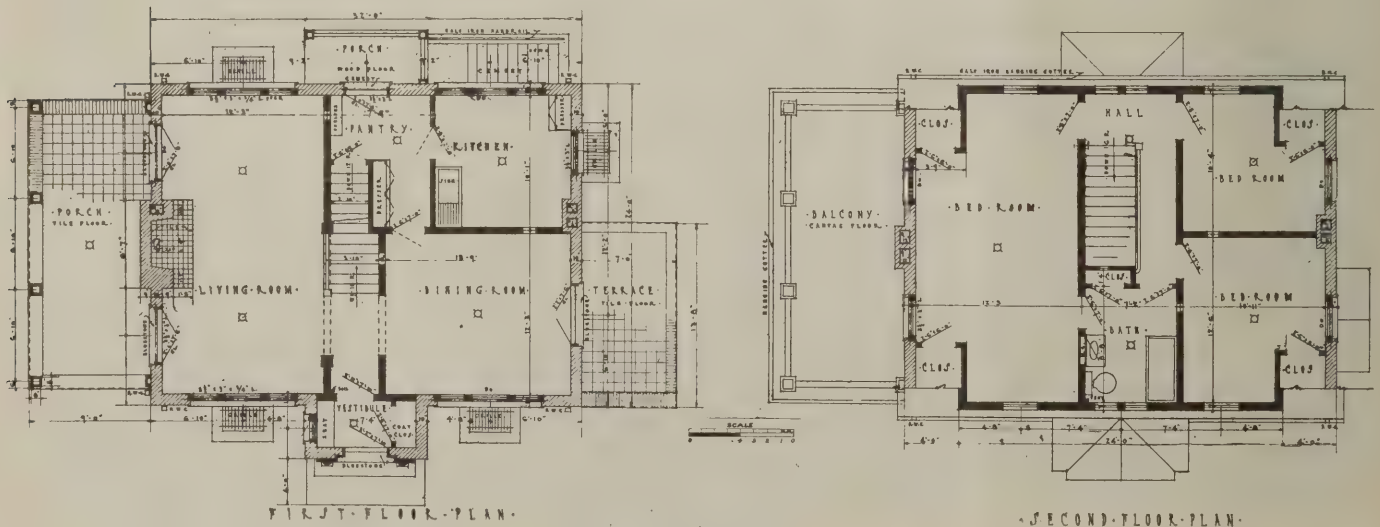
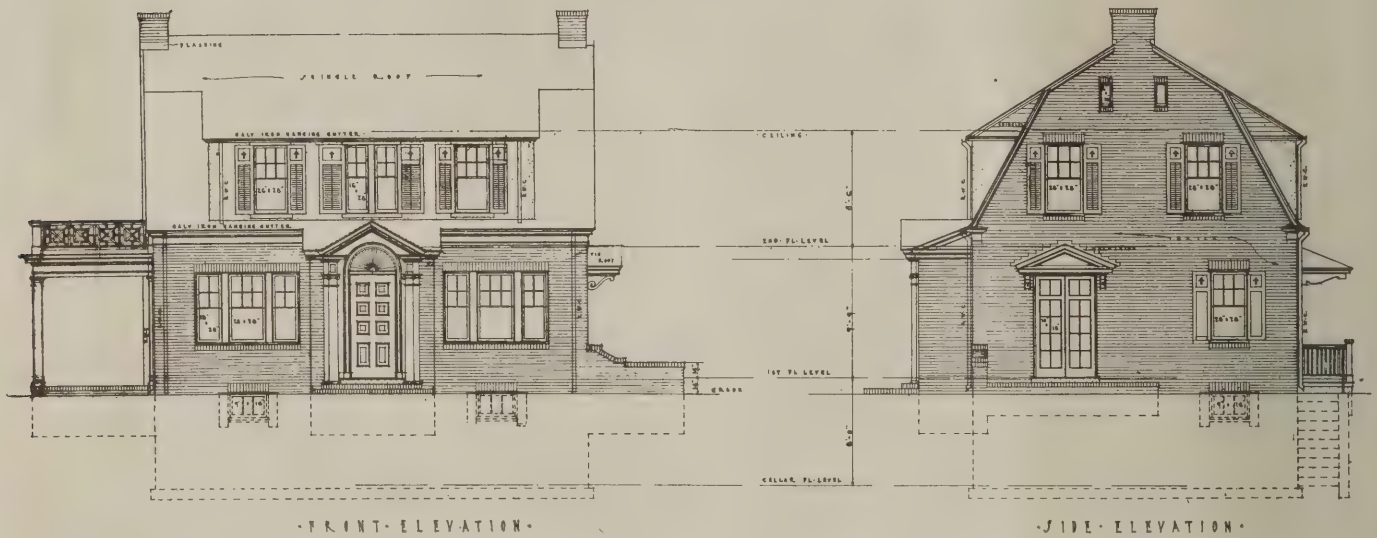


A six-room house

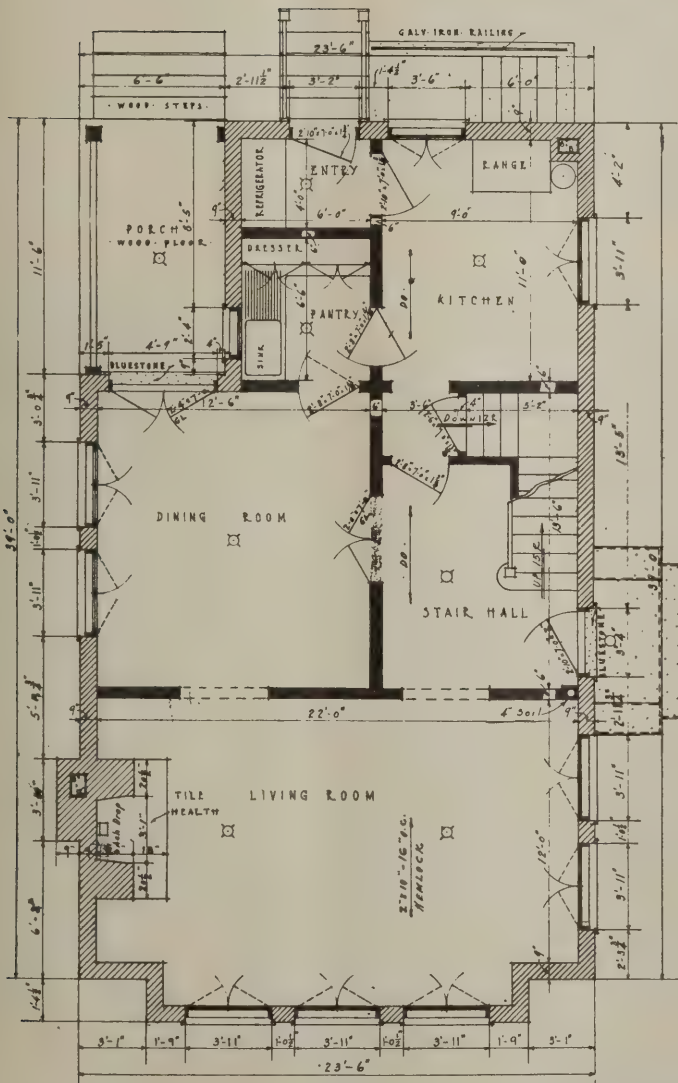
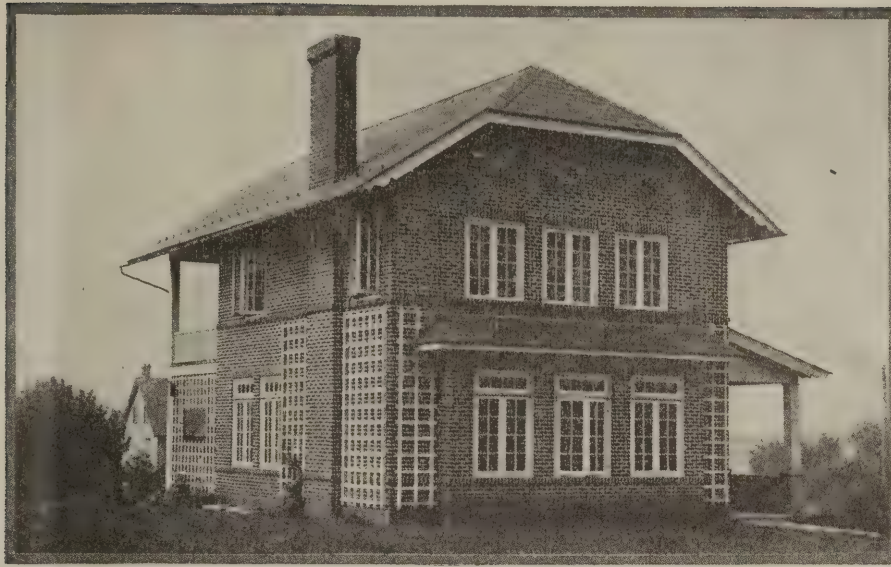


Dutch Colonial type

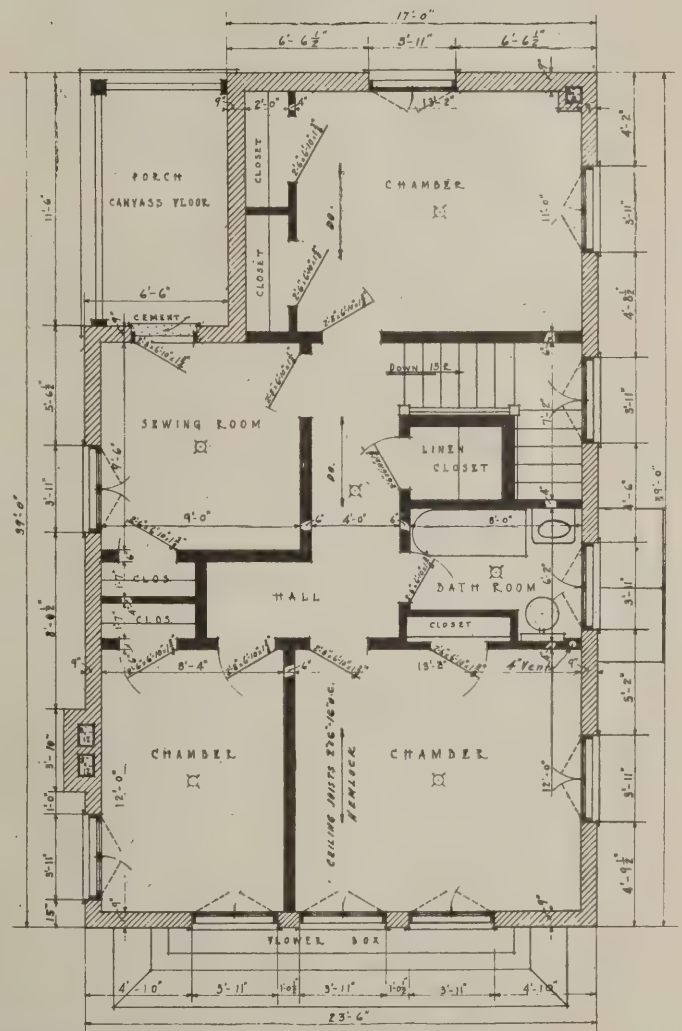




Dutch Colonial type

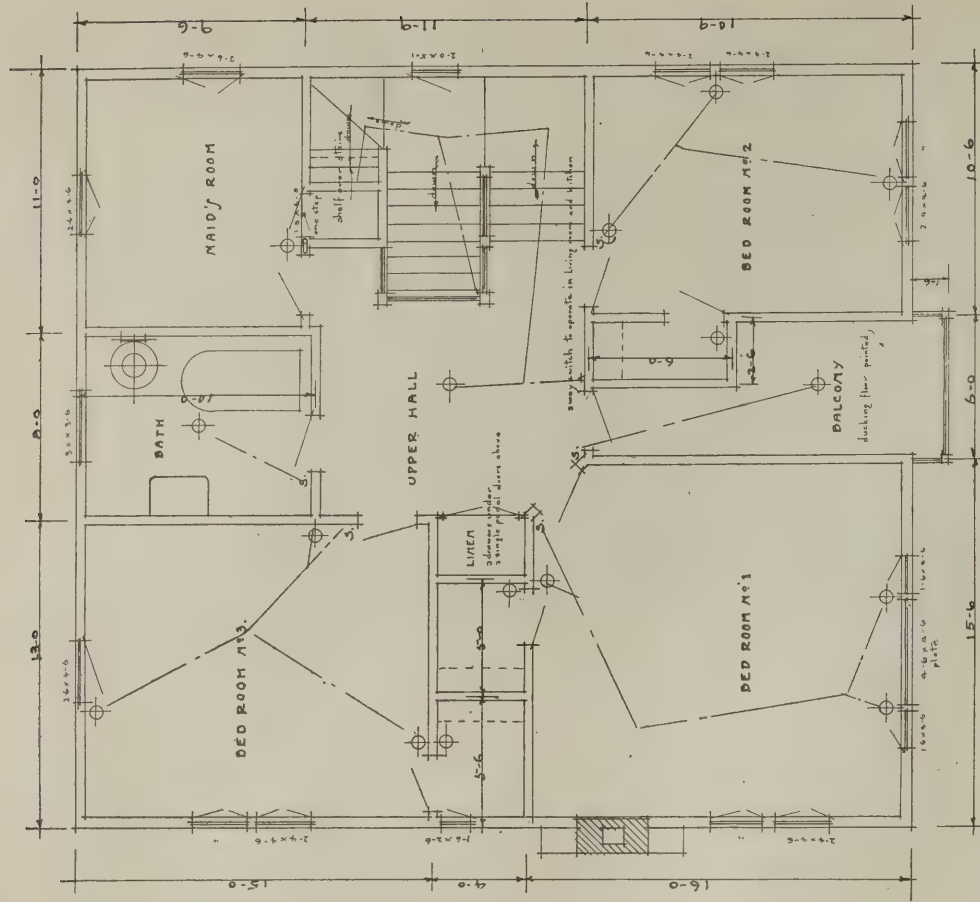


FIRST FLOOR PLAN

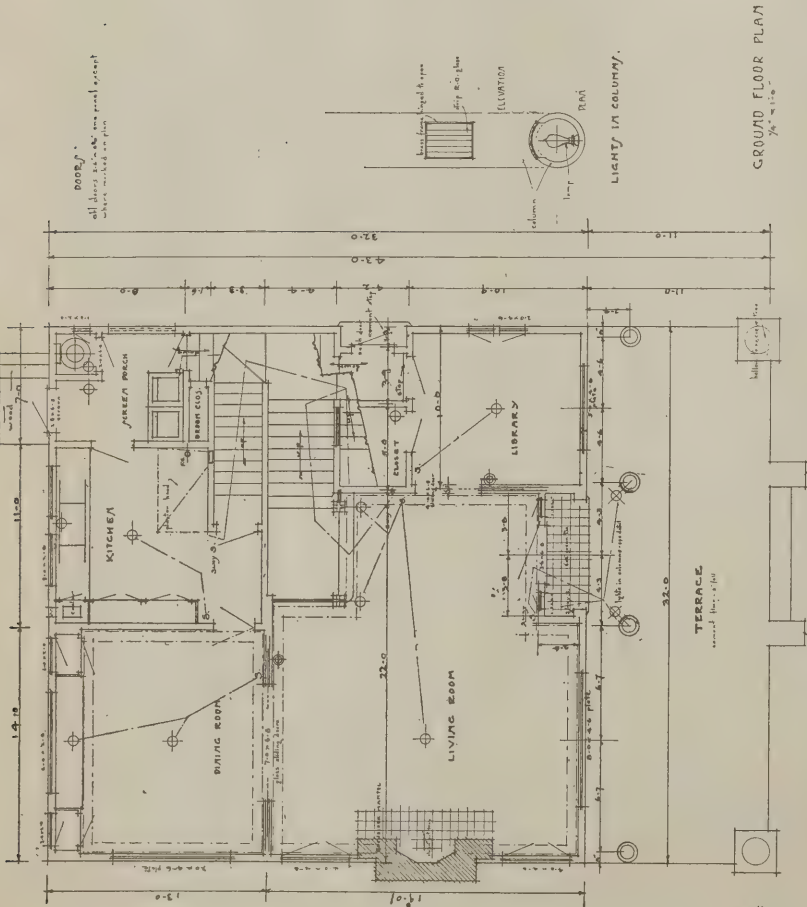


SECOND FLOOR PLAN

Modern English type—Howard J. Wiegner, Architect, Bethlehem, Pa.



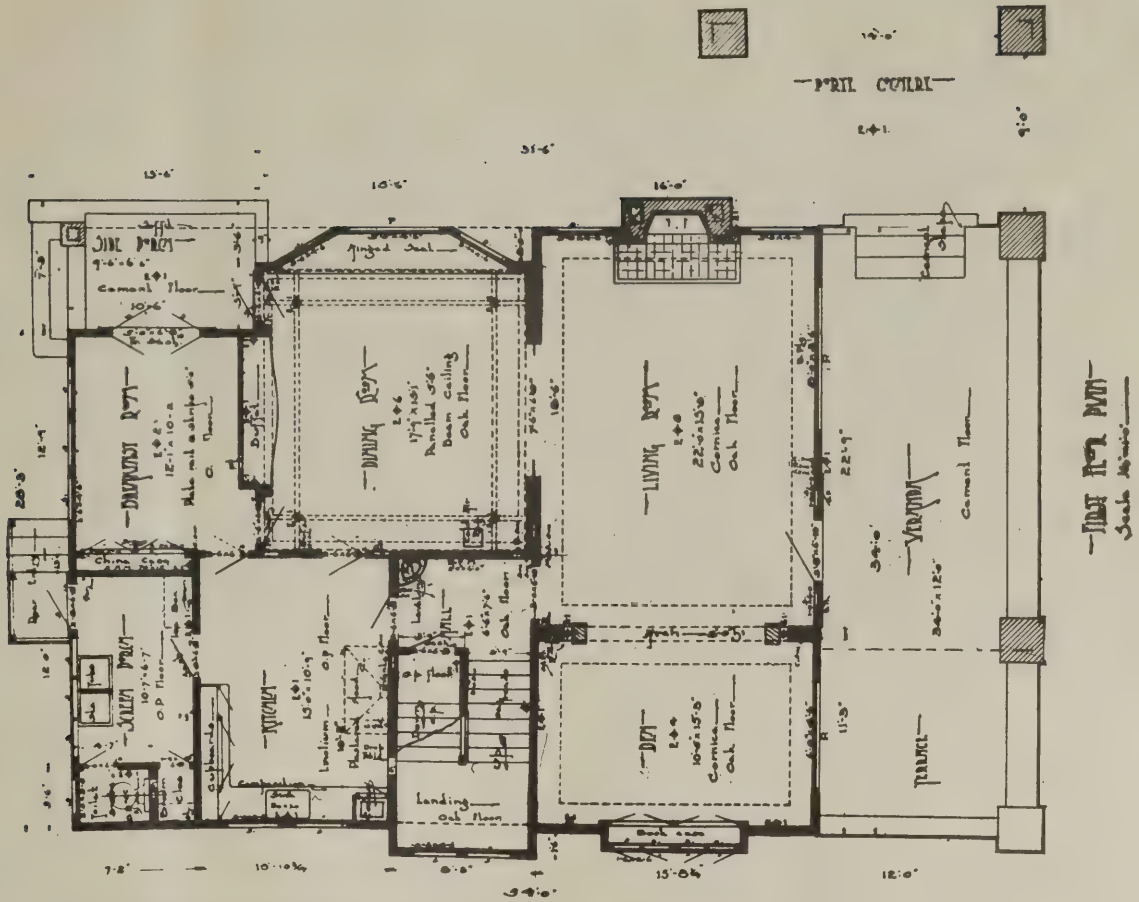
CENTER BALCONY OVER FRONT ENTRANCE



GROUND FLOOR PLAN



Harold Bowles, Architect,
Los Angeles, California

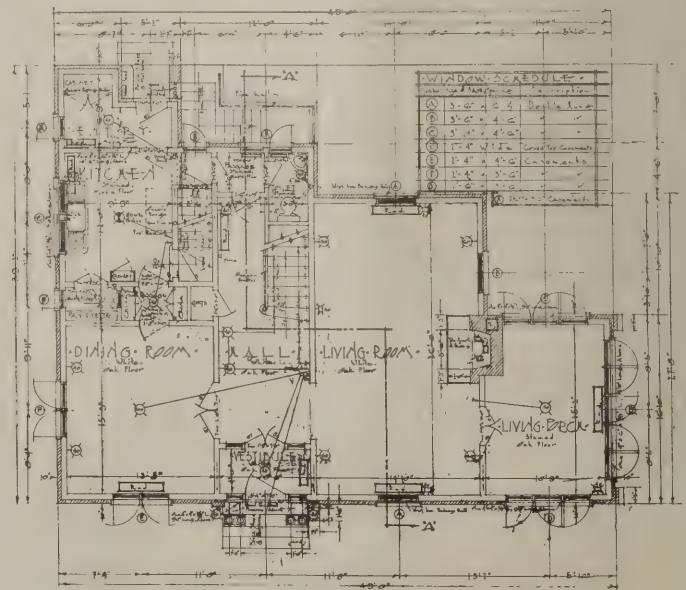
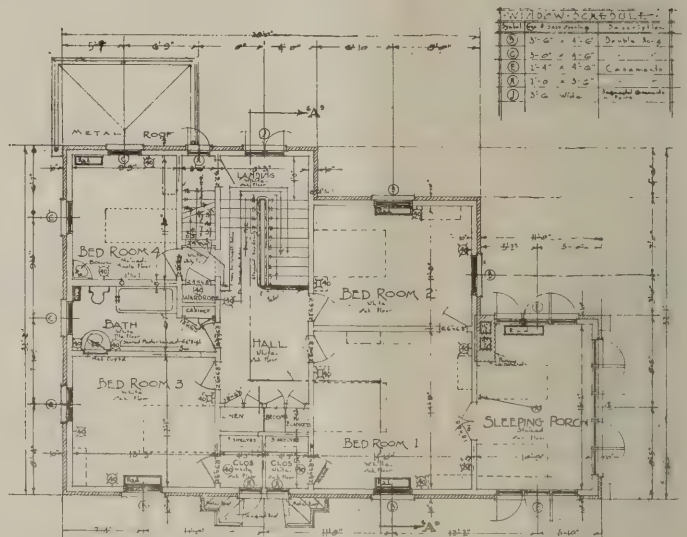
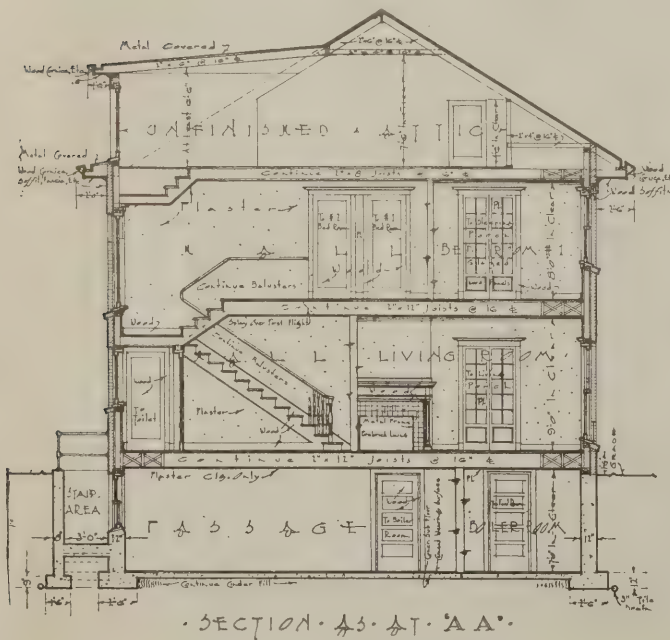


H. H. Whiteley, Architect
Los Angeles, California

(Second-floor plan omitted)

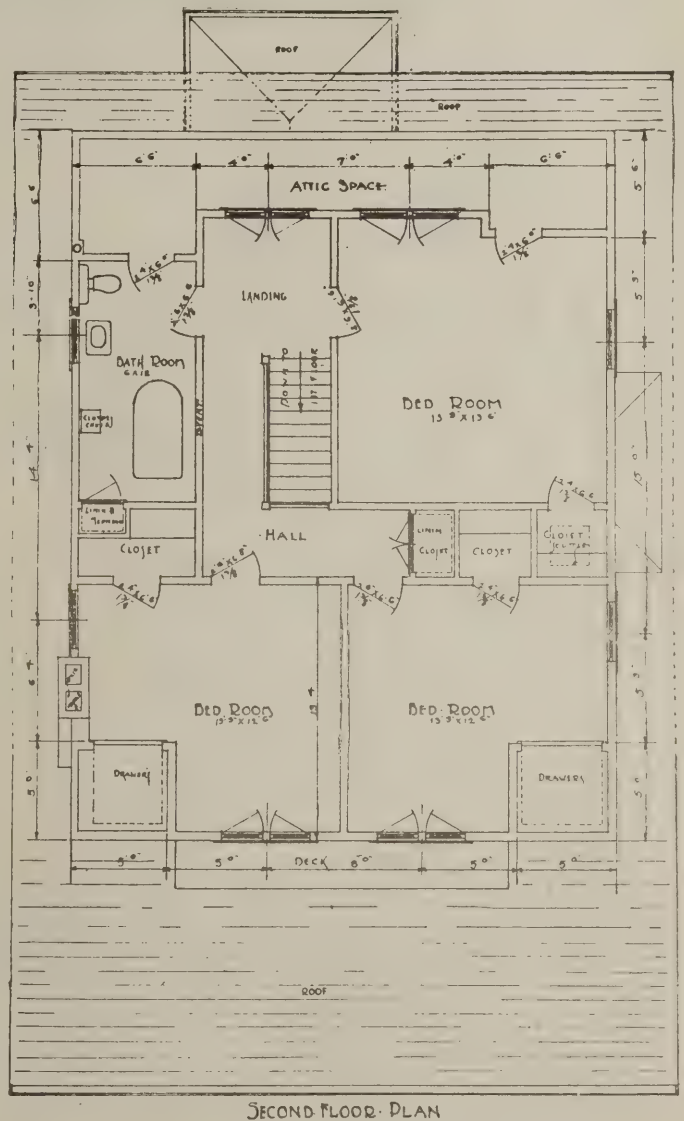
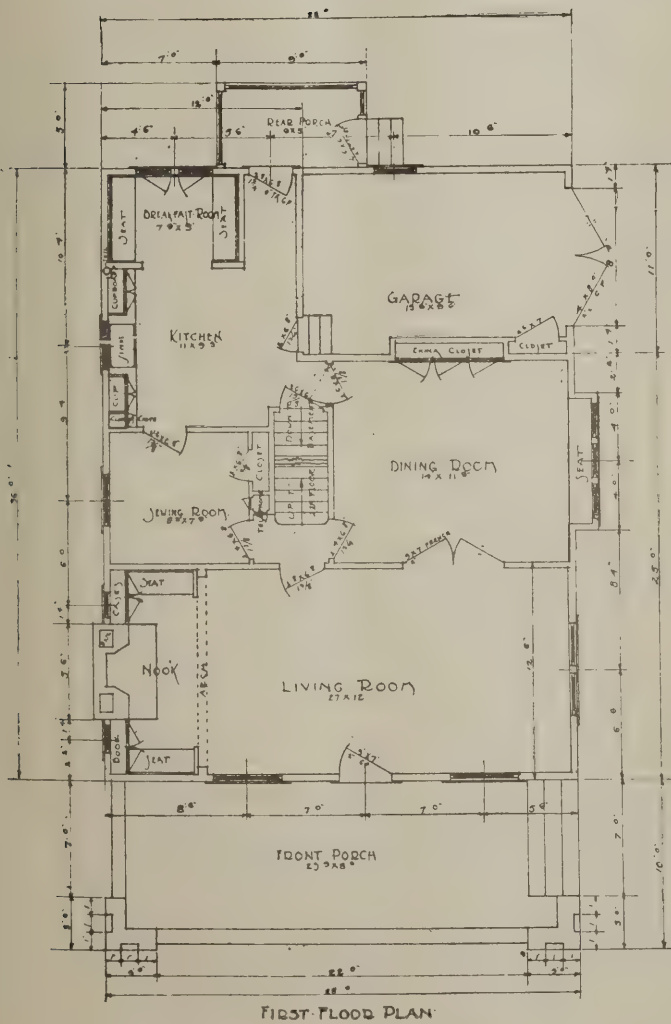


A brick veneered house—Chas. E. White, Jr., Architect, Chicago, Ill.



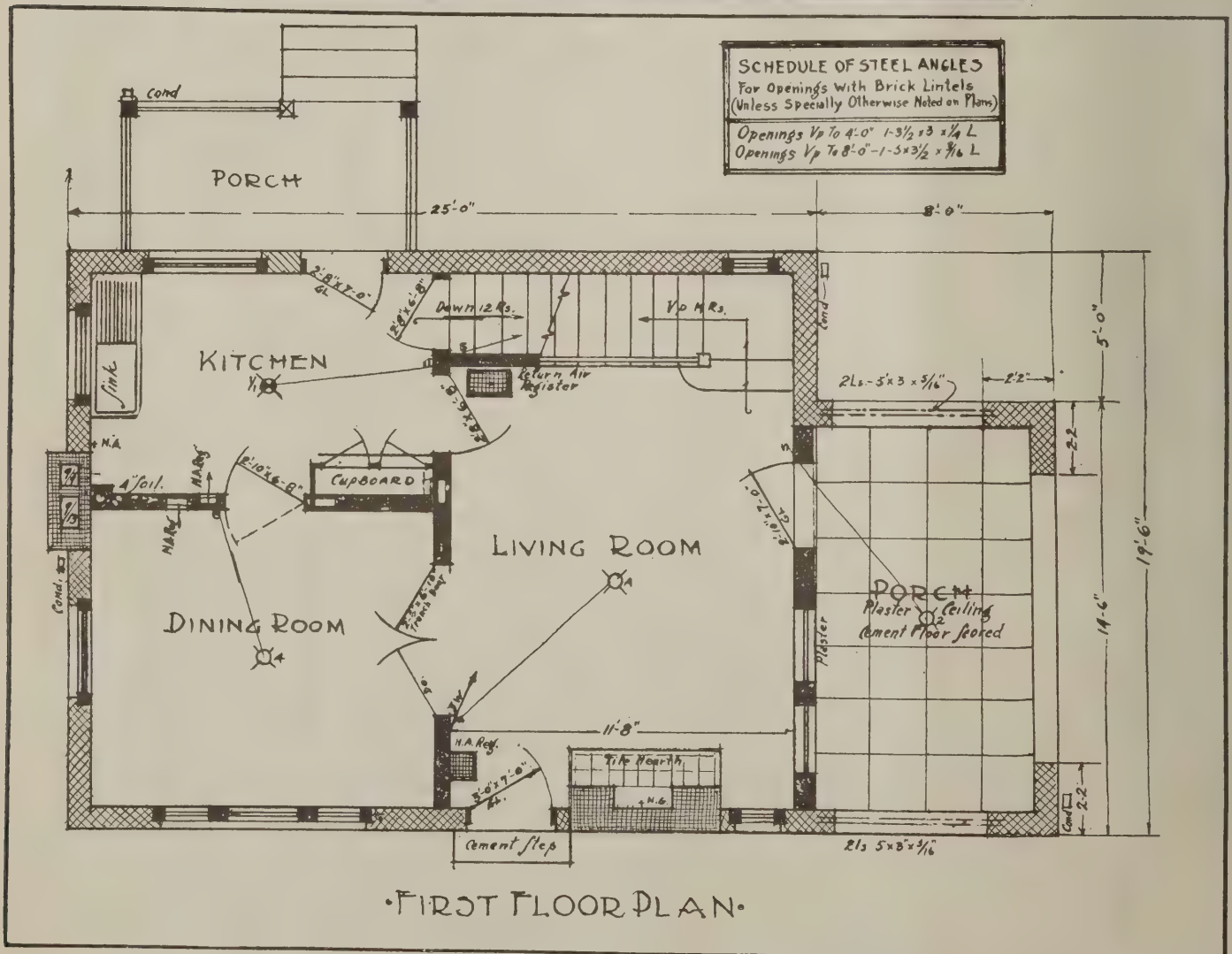


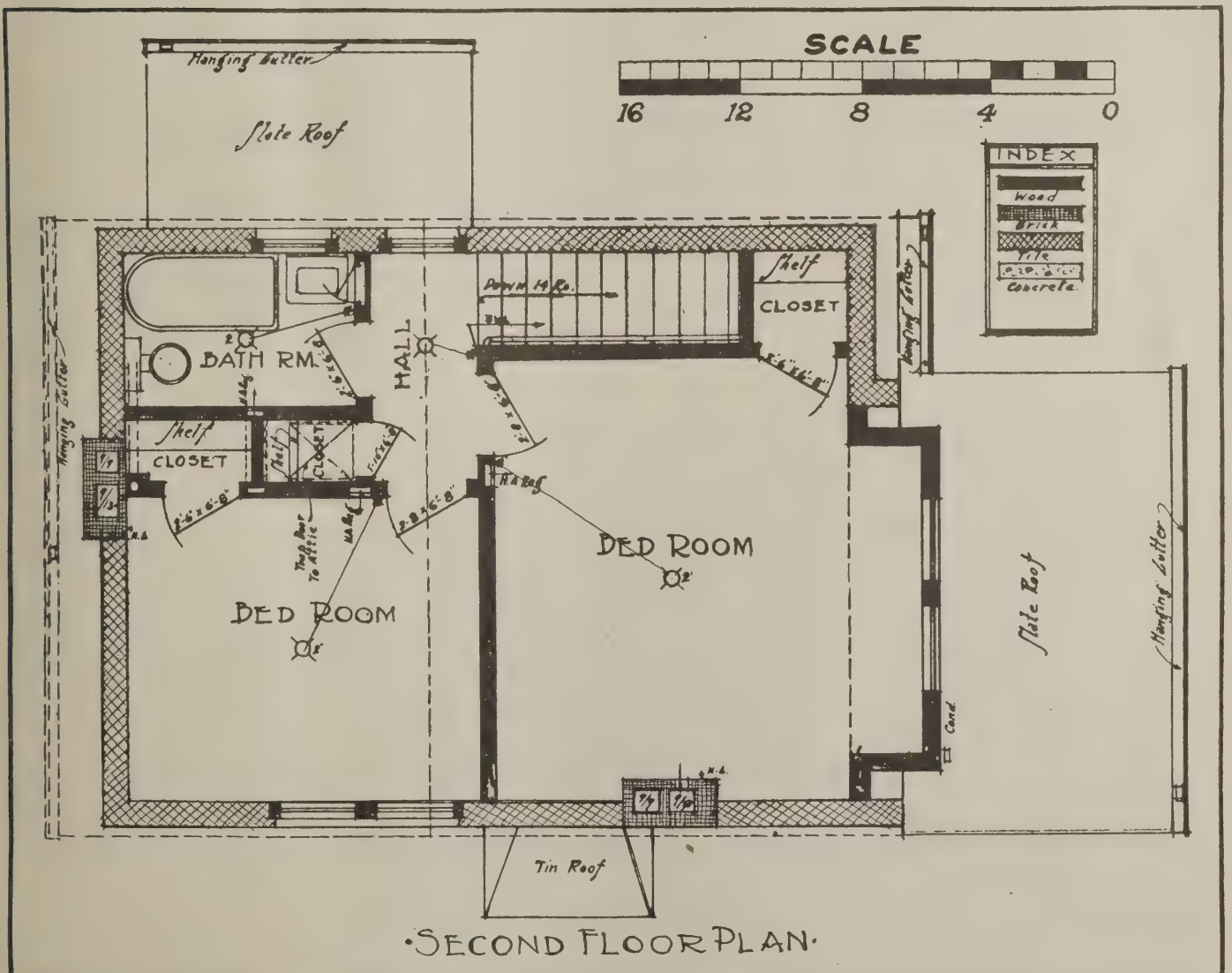
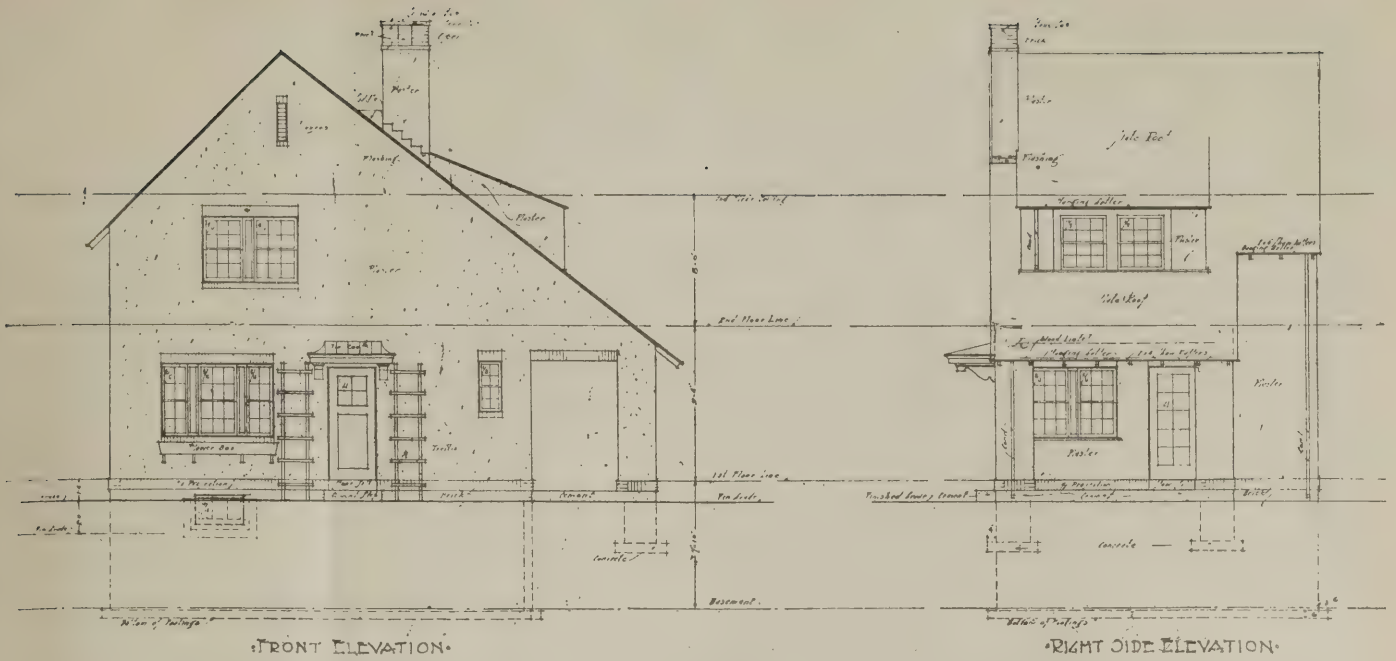
A STUCCO HOUSE AND GARAGE
J. F. Sharp, Architect and Builder, Alliance, Ohio



Working Plans for a Five-Room House

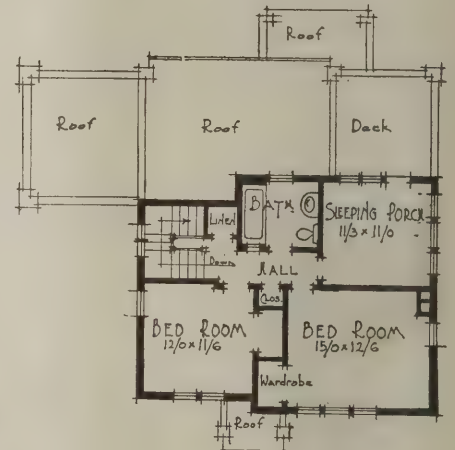
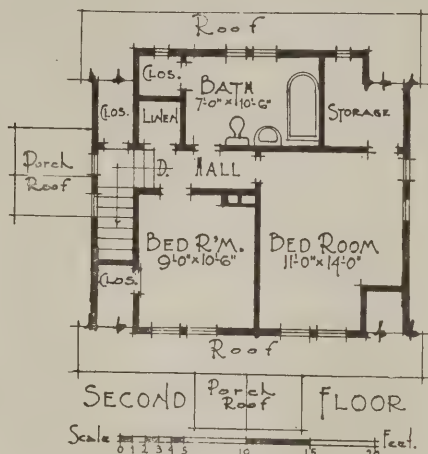
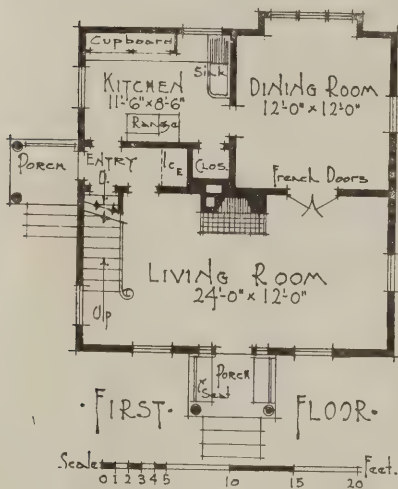
Geo. H. Schwan, Architect, Pittsburgh, Pa.



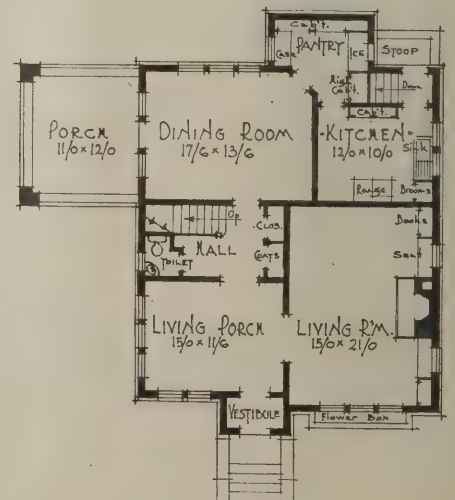


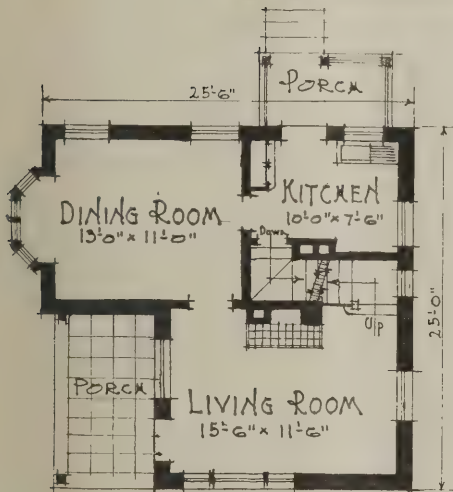


R. H. Sporleder
Builder and Designer
Wauwatosa, Wis.



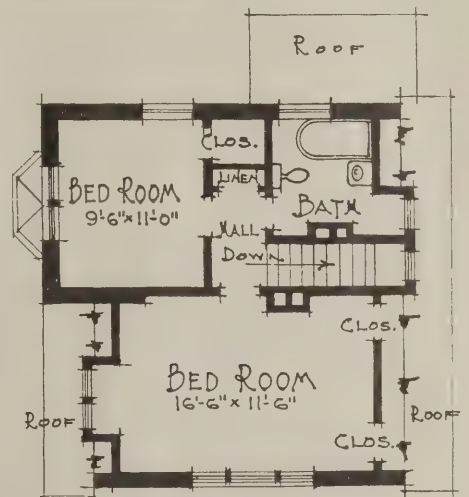
Oscar Sandstrom, builder, Waukegan, Ill.





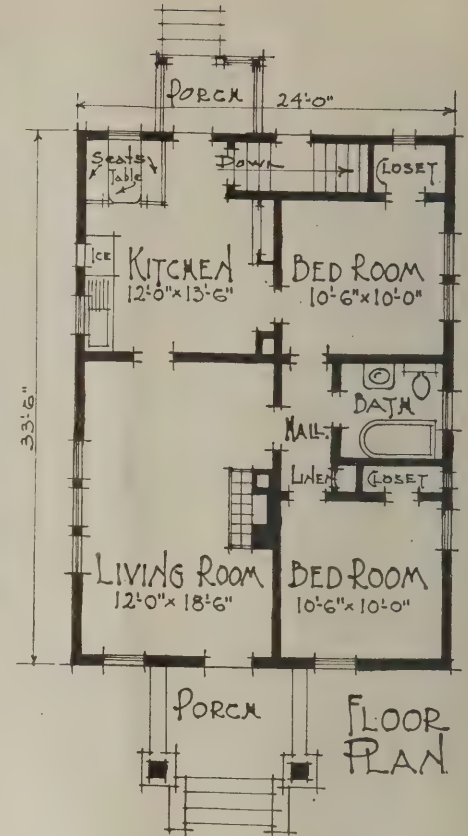
• FIRST-FLOOR-PLAN •

Goodyear Heights
Development
Akron, Ohio

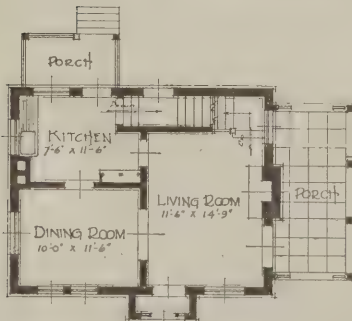


• SECOND-FLOOR-PLAN •



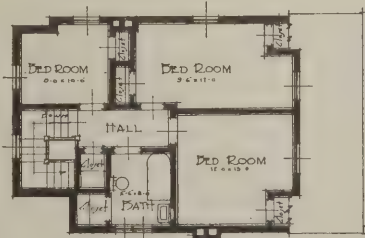
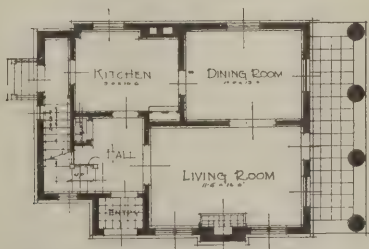
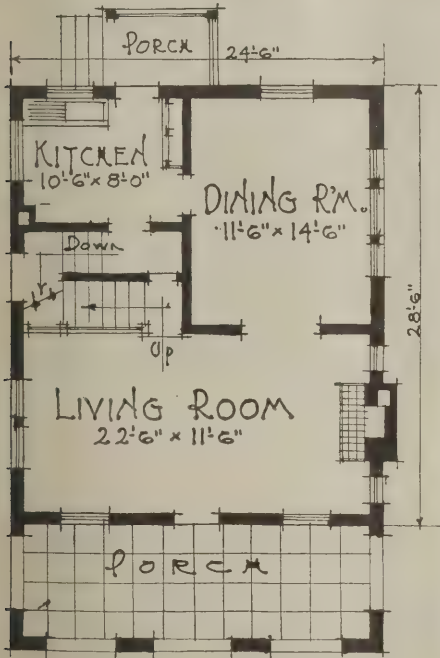
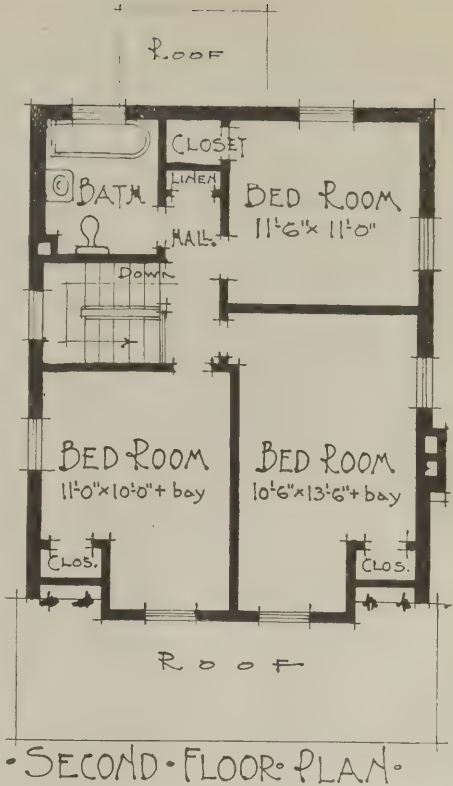


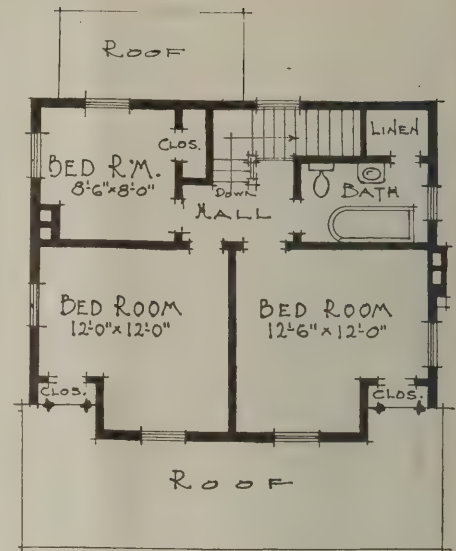
• SECOND FLOOR PLAN •



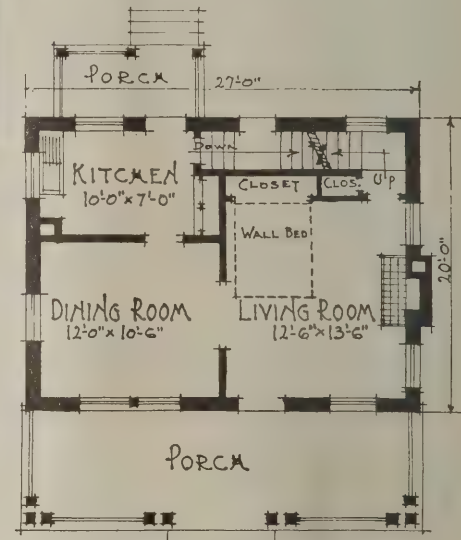
• FIRST FLOOR PLAN •







• SECOND FLOOR PLAN •



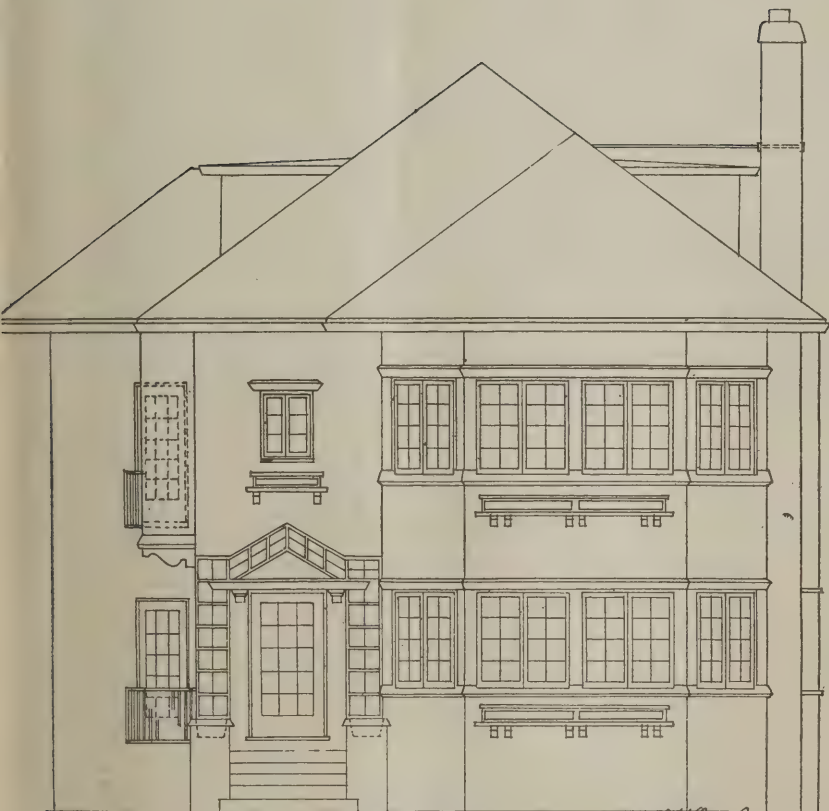
• FIRST FLOOR PLAN •





Duplex Apartment Houses



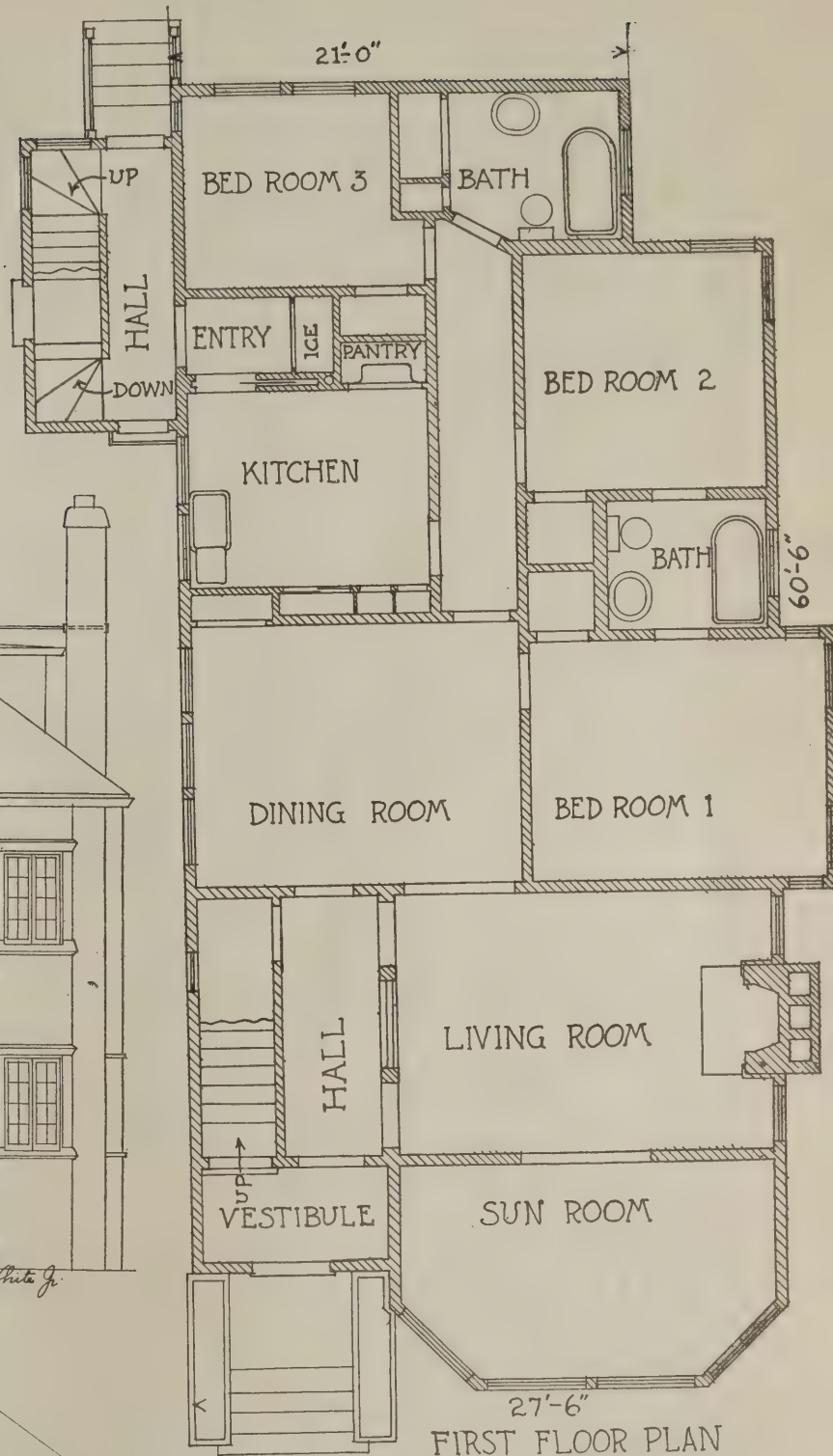


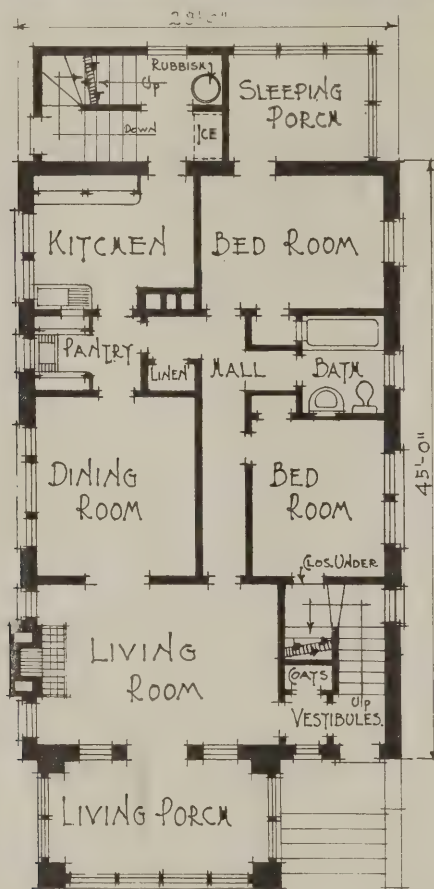
FRONT ELEVATION

*Charles E. White Jr.
Architect*

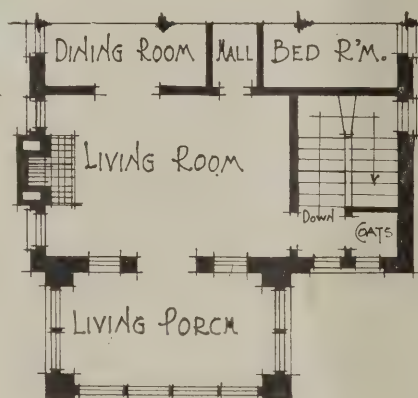
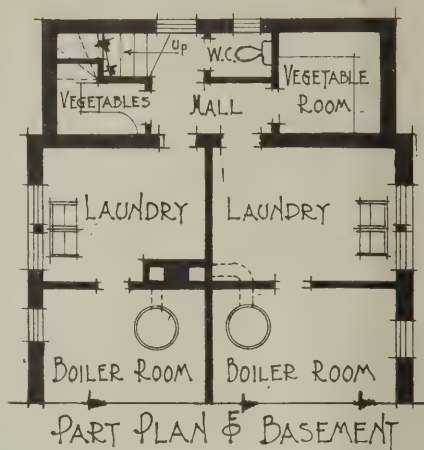


SIDE ELEVATION





FIRST FLOOR PLAN
Scale 0 1 2 3 4 5 10 15 20 Feet

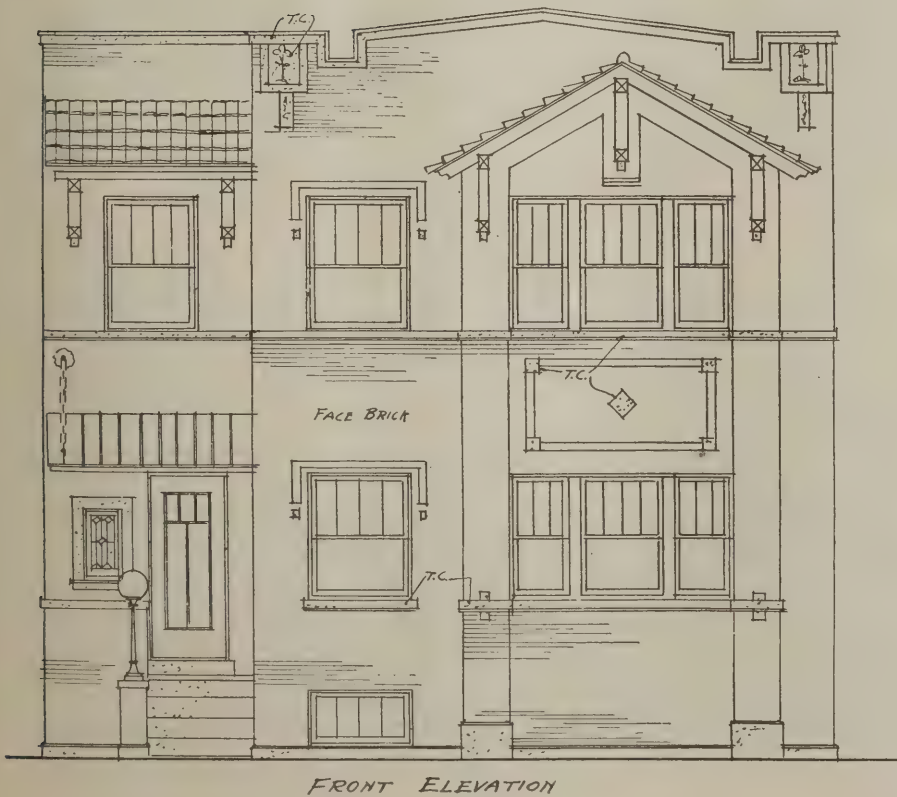


PART PLAN & SECOND FLOOR
Scale 0 1 2 3 4 5 10 15 20 Feet

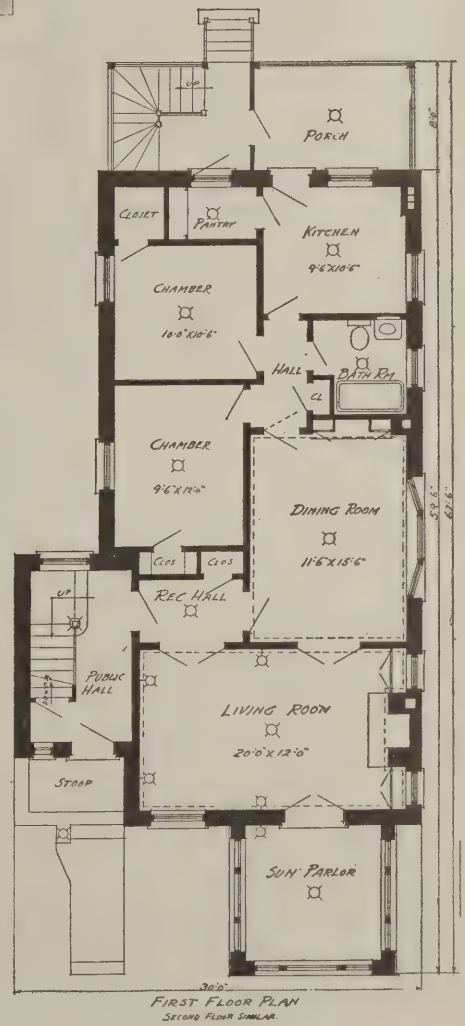




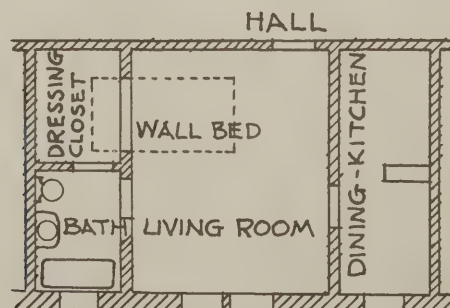
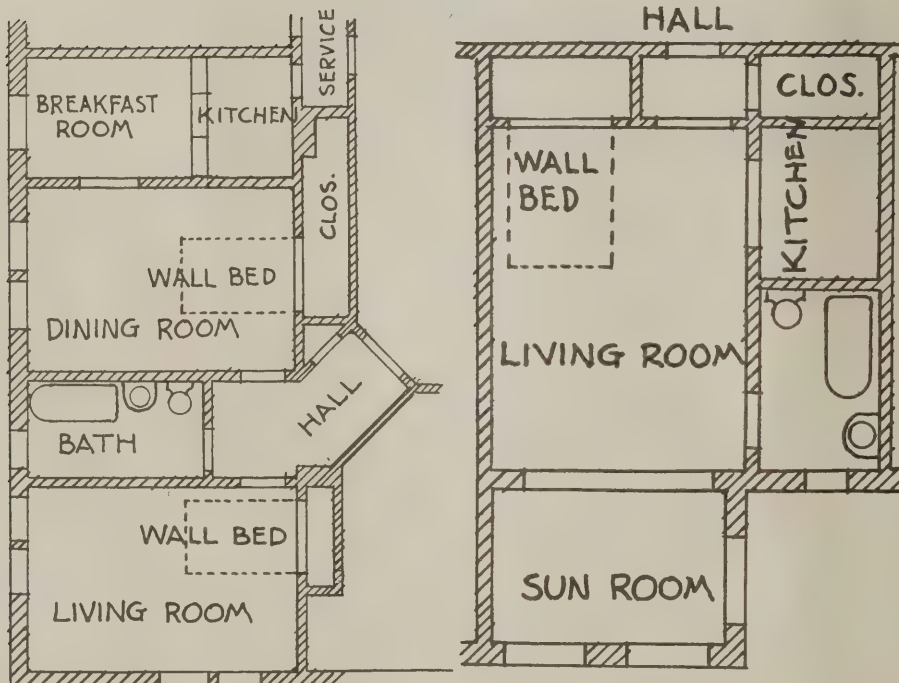
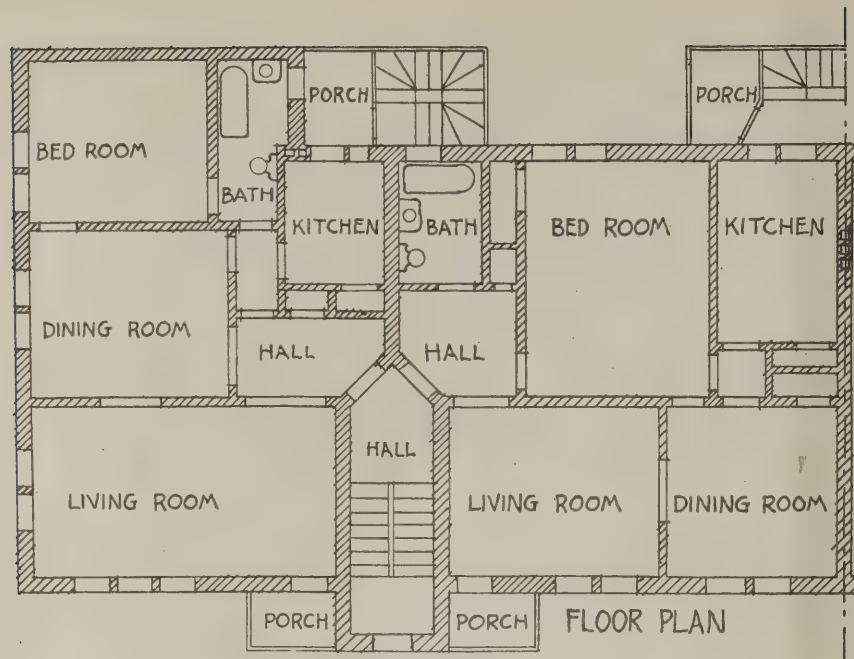
Edward Benson, Architect



FRONT ELEVATION



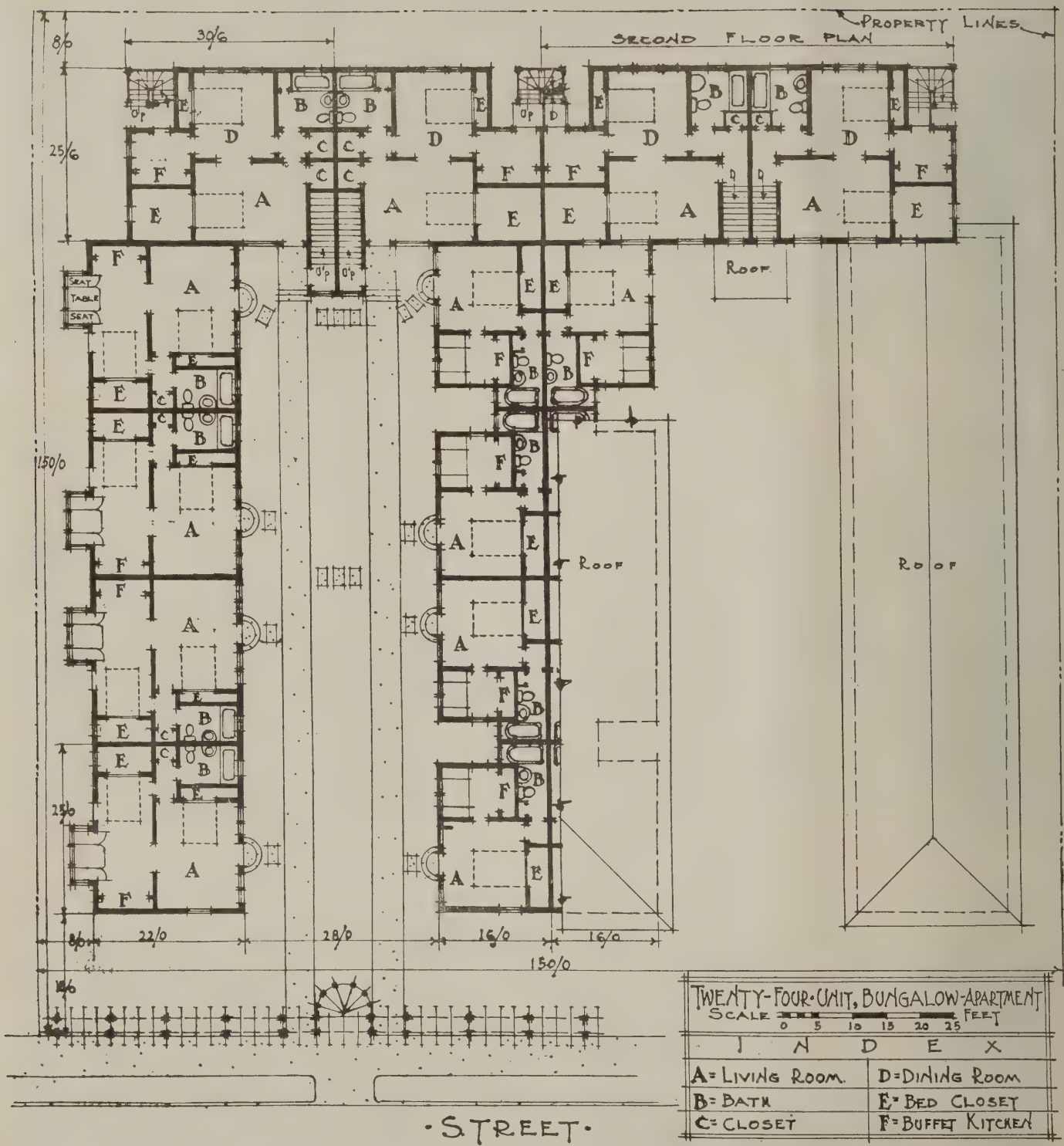
FIRST FLOOR PLAN
SECOND FLOOR SIMILAR

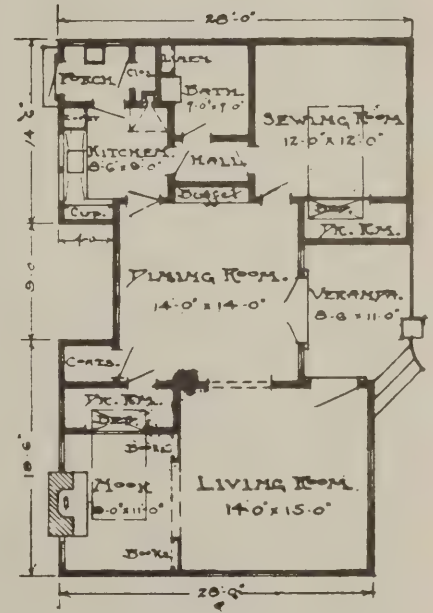
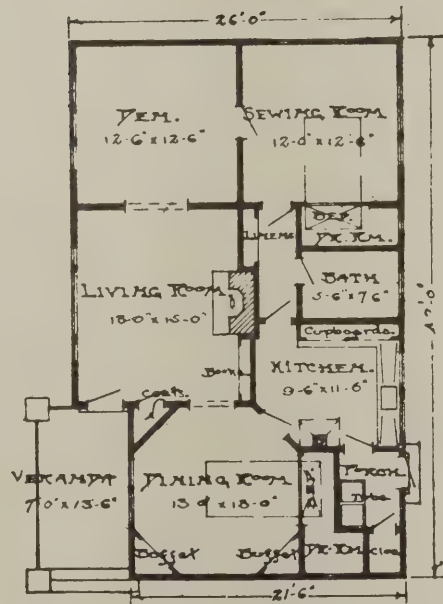
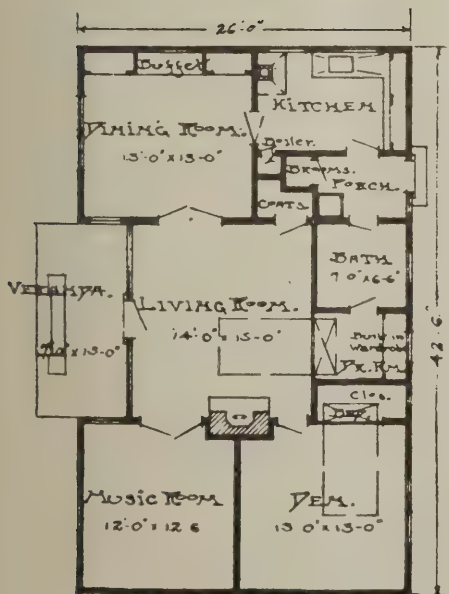
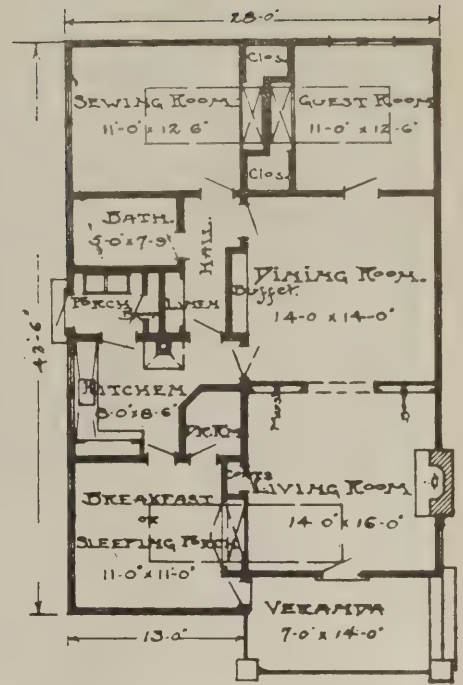
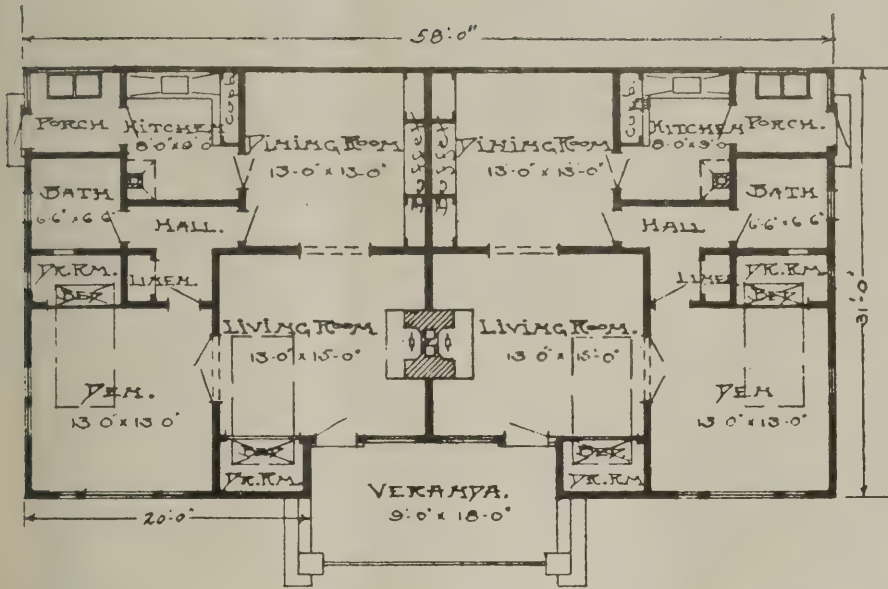


SUGGESTIONS FOR APARTMENT PLANNING

Bungalow Court Apartments

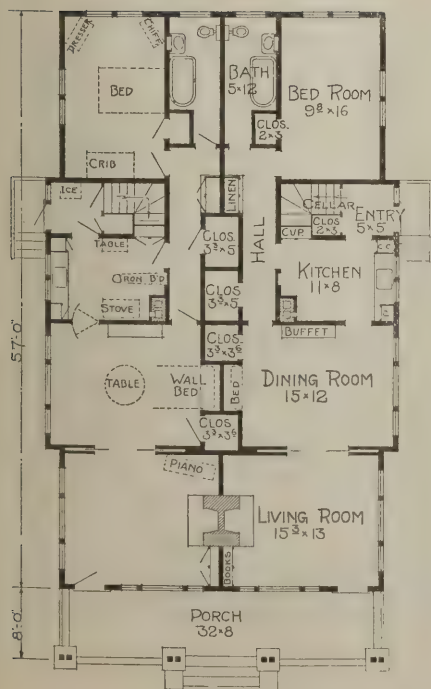
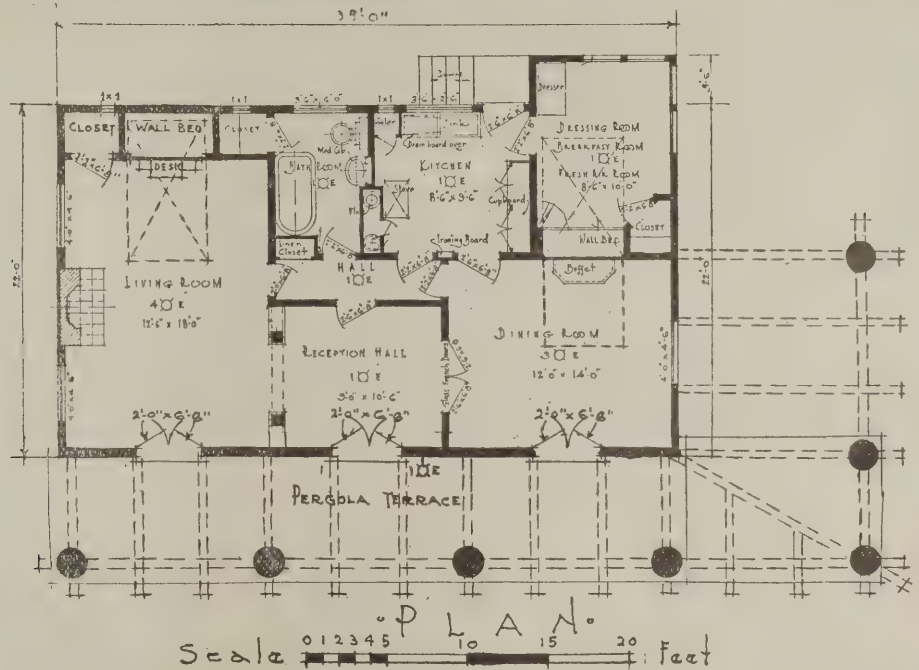
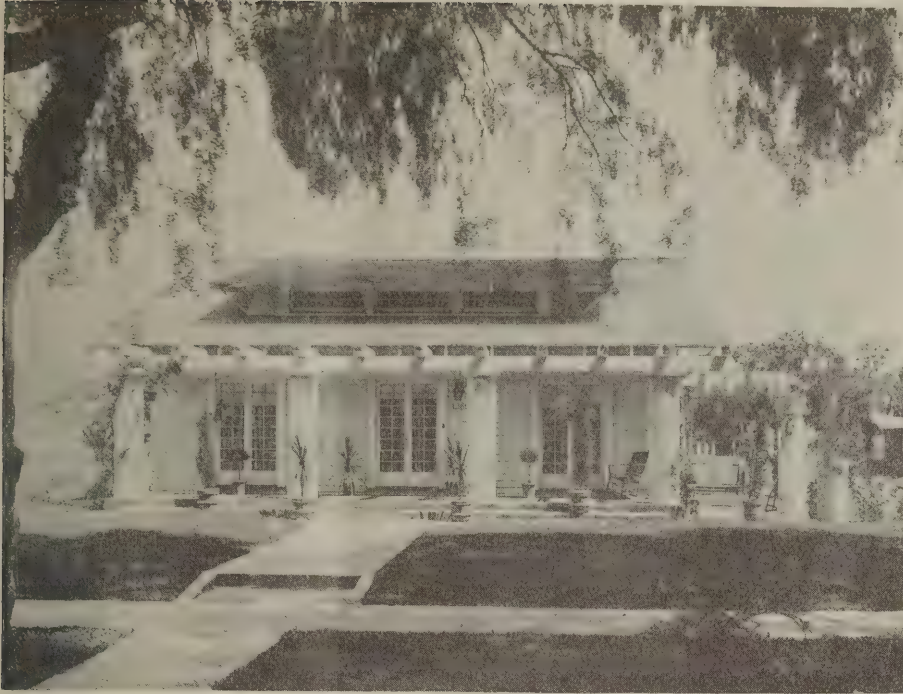






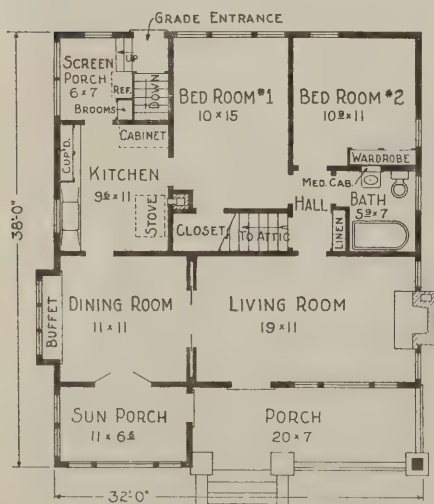
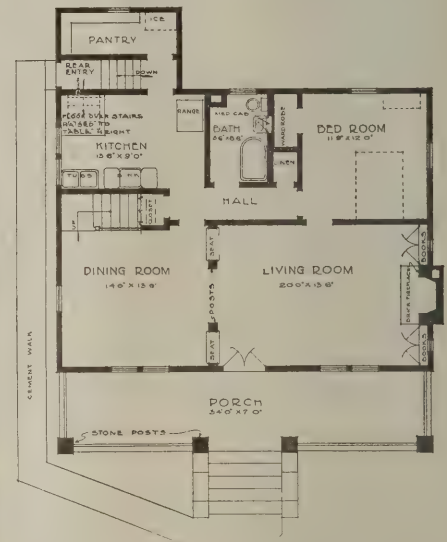
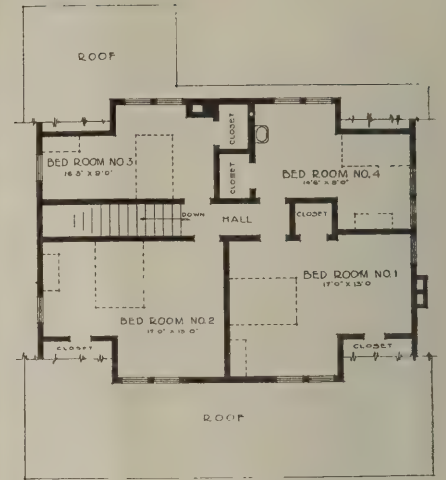
Bungalows







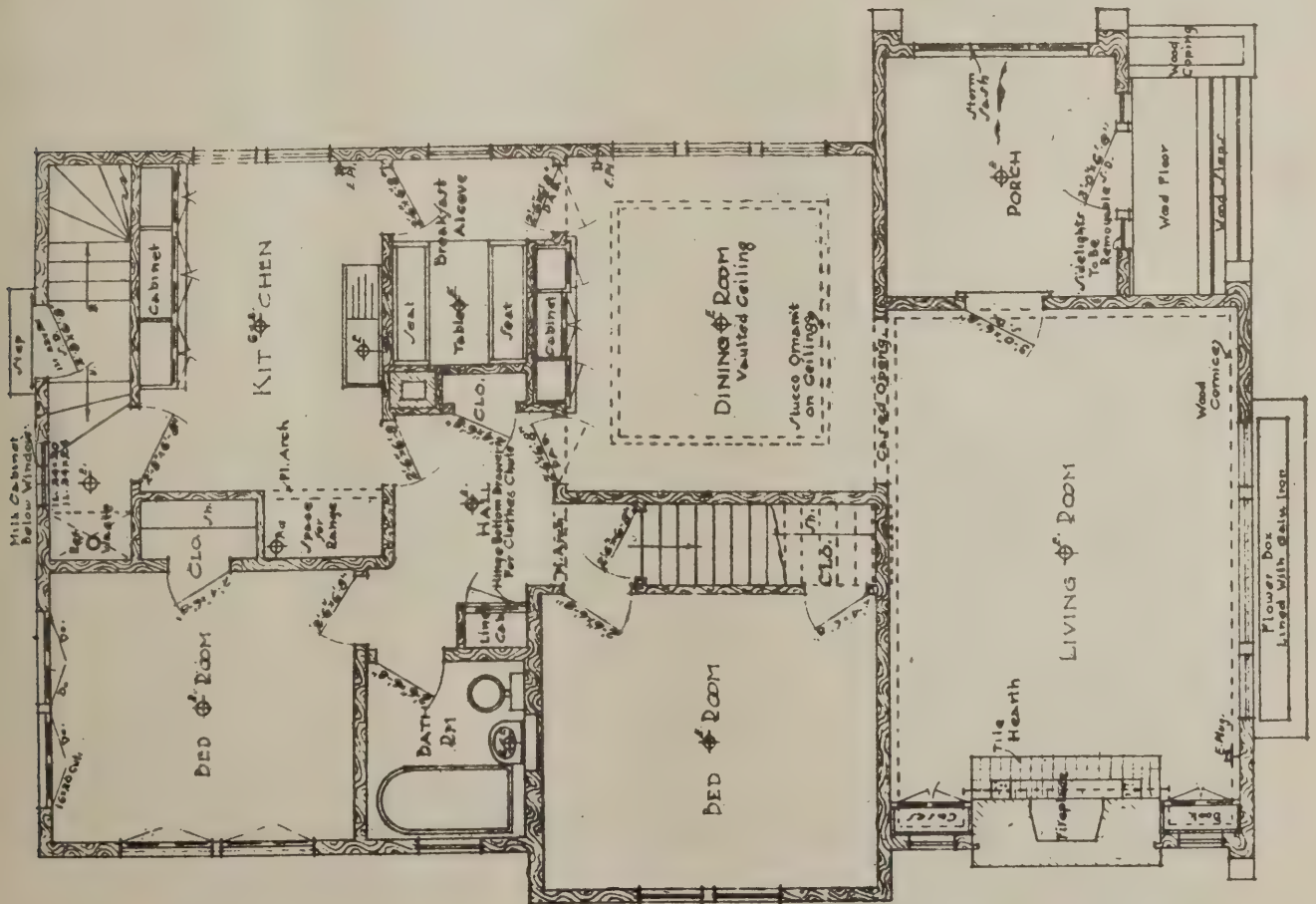
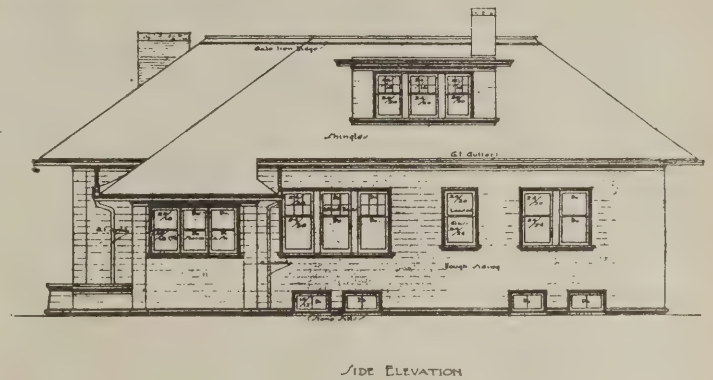
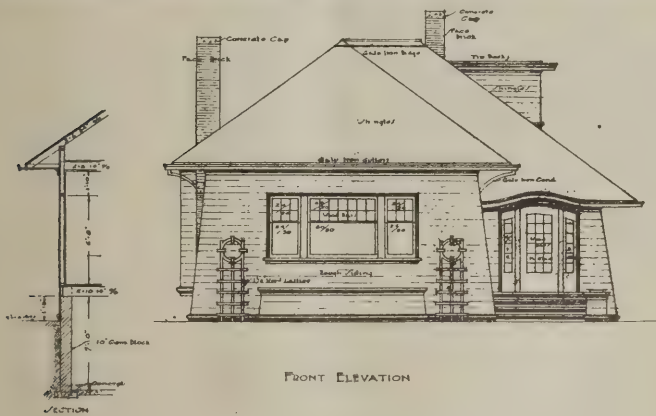
Tracy Realty Co., Cos Cob, Conn.

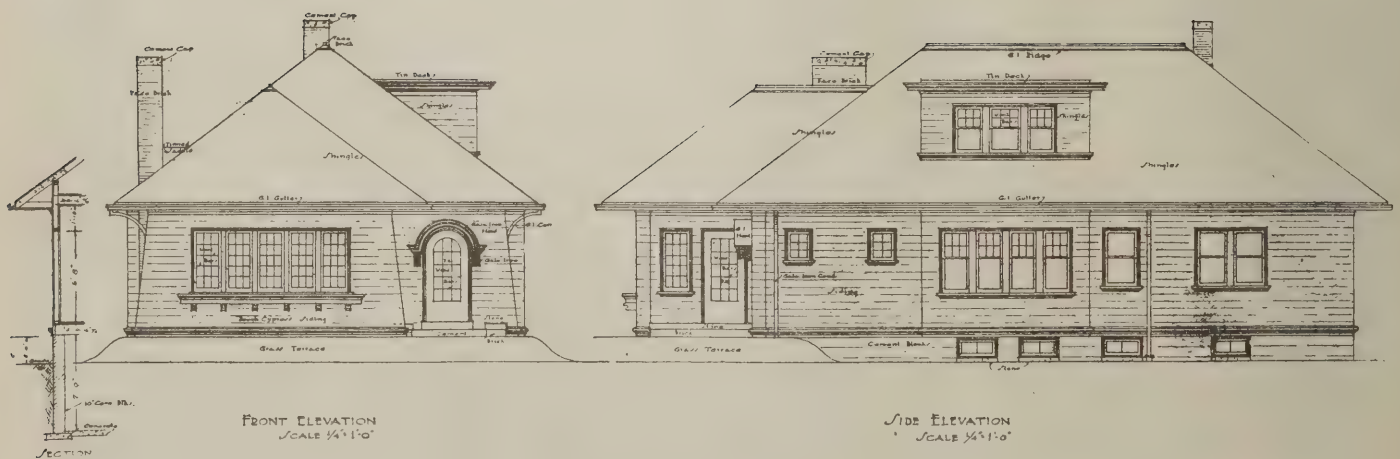


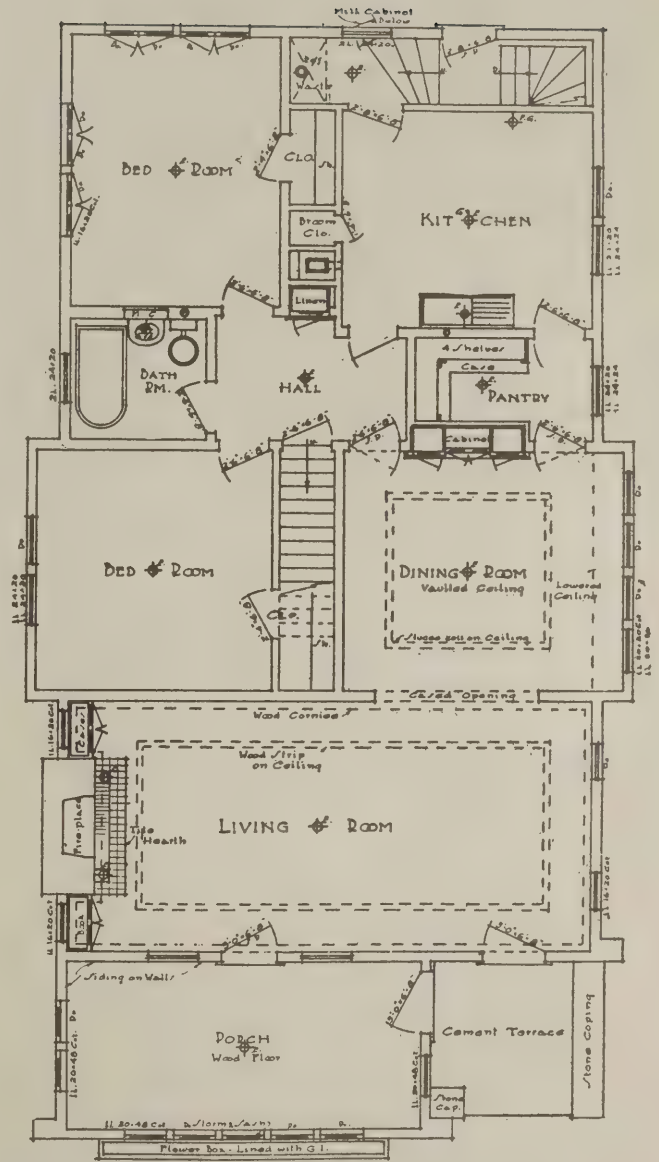
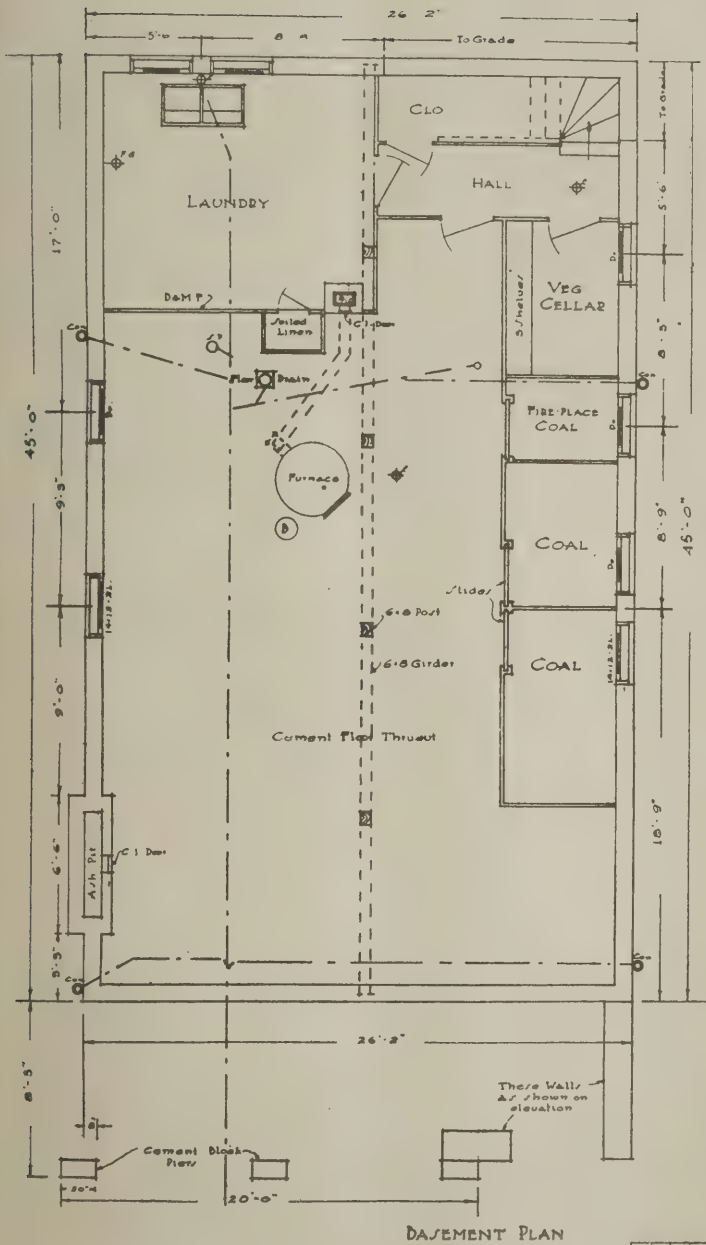
E. W. Stilwell, Architect



Designed and
Built by
William C. Keller,
Milwaukee, Wis.





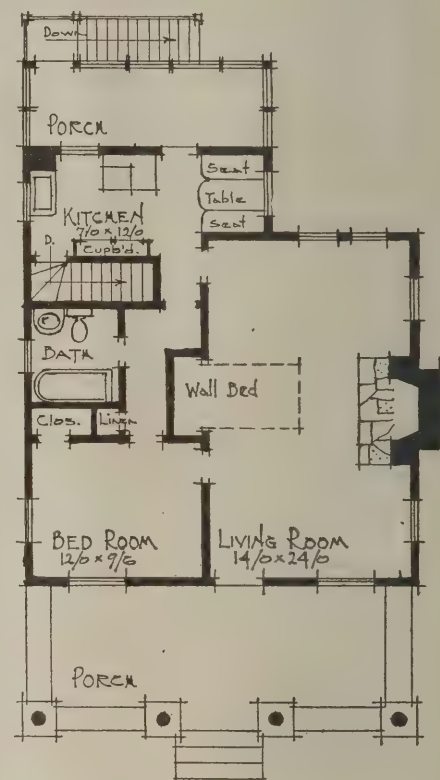




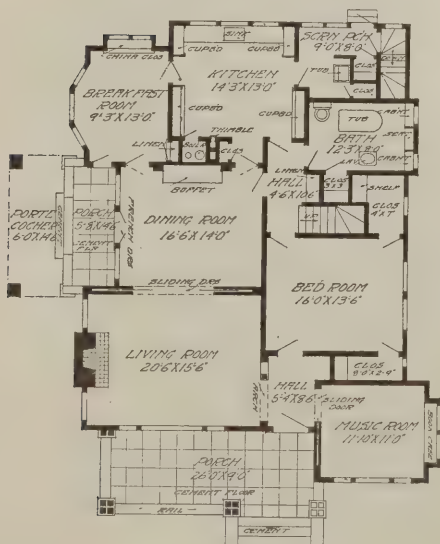
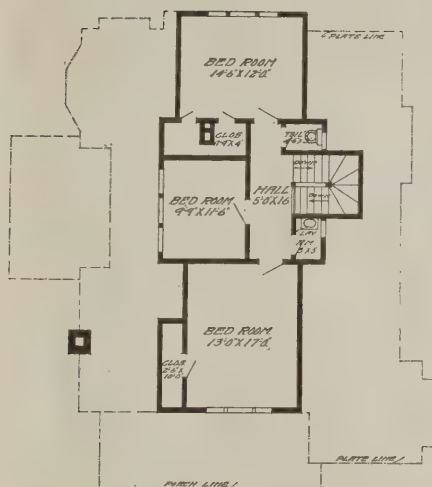
Field stones and stucco—vicinity of Stamford, Conn.



Rear view

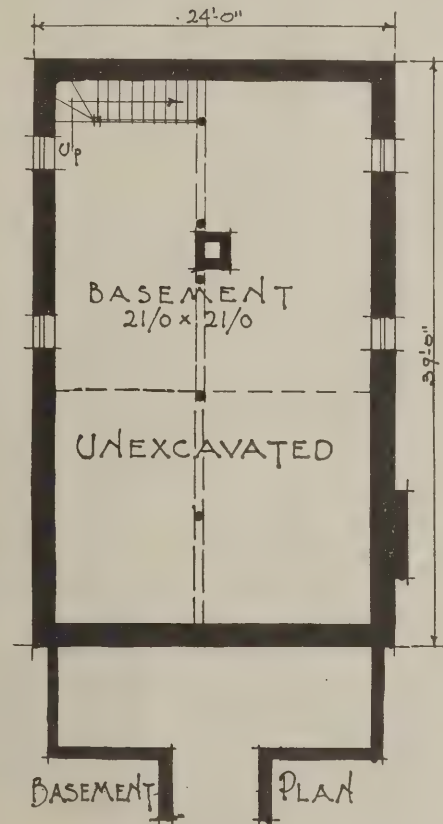
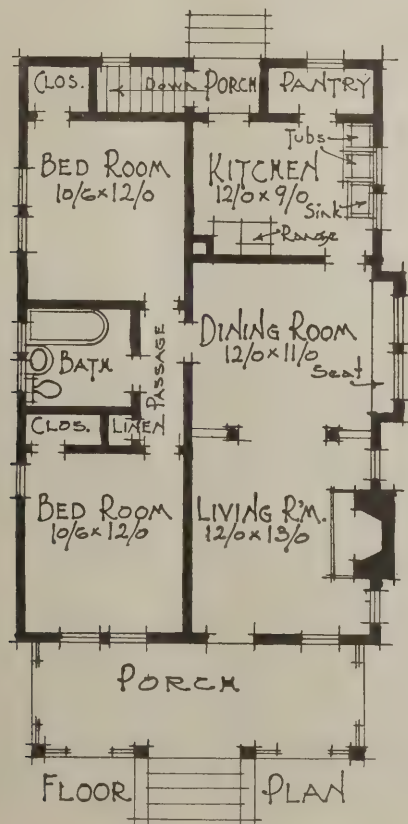
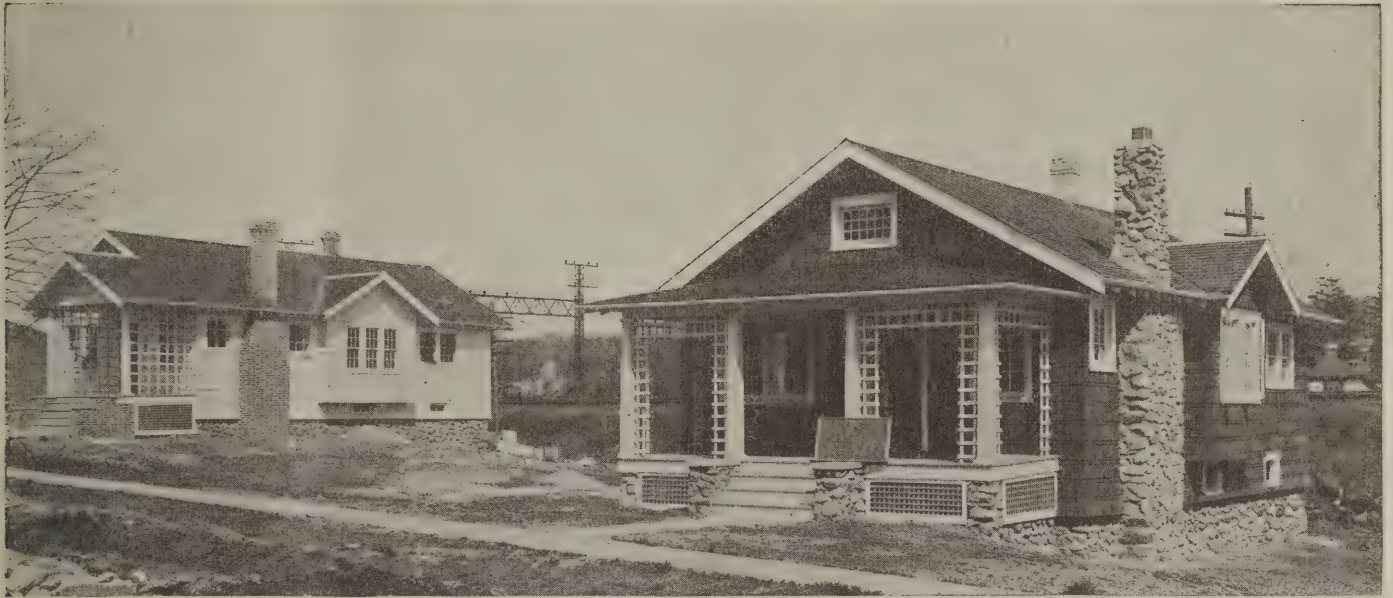


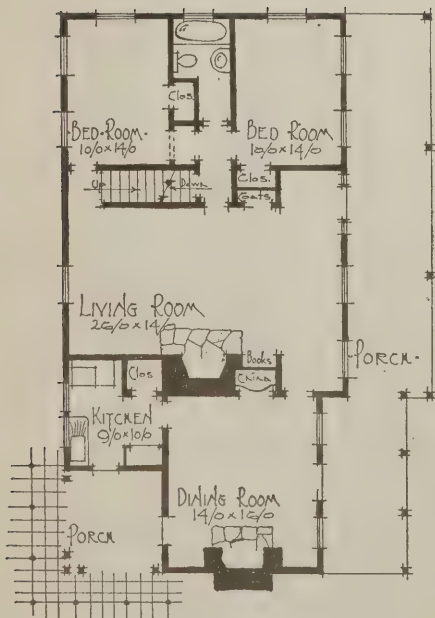
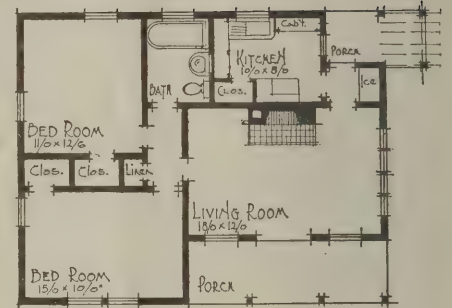
Below: story and a half, bungalow type.
W. E. Allen, Architect, Los Angeles, Cal.

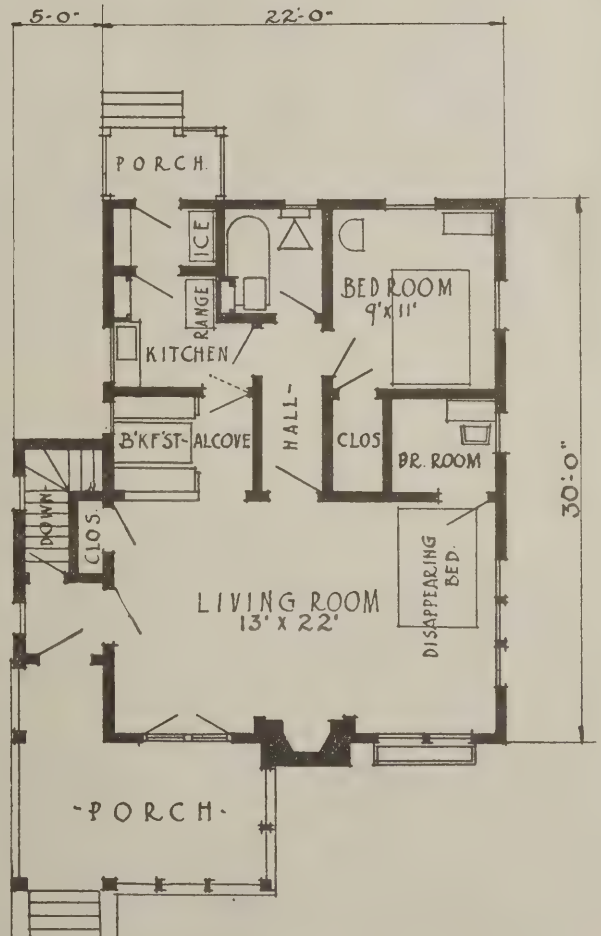
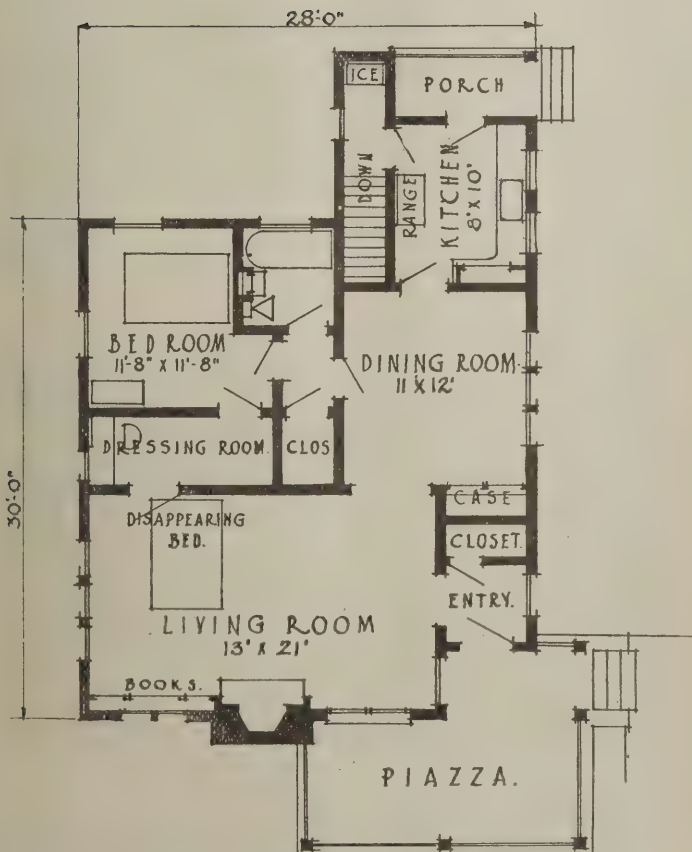
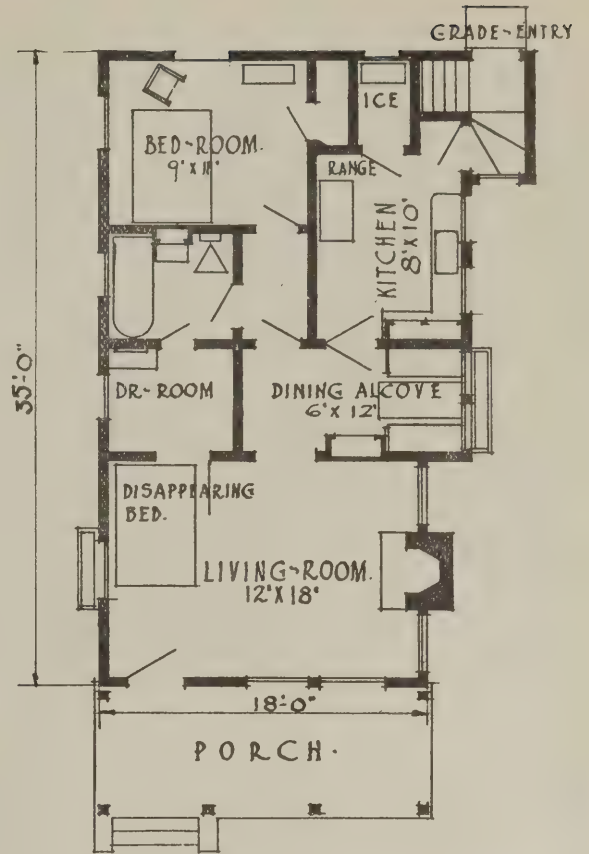
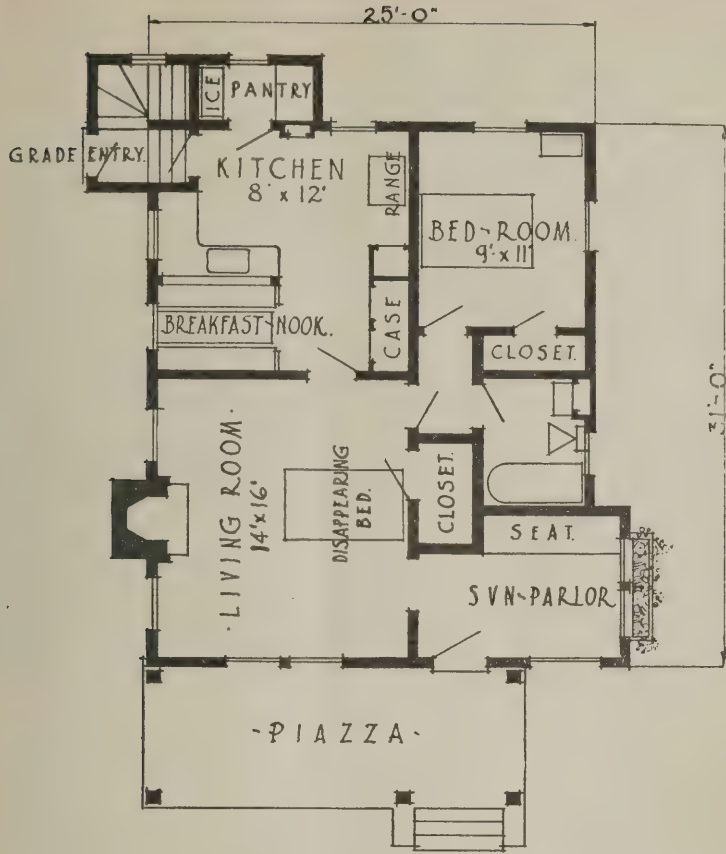


Low-Cost Houses

Designed and Built by John J. Rorick, Stamford, Conn.







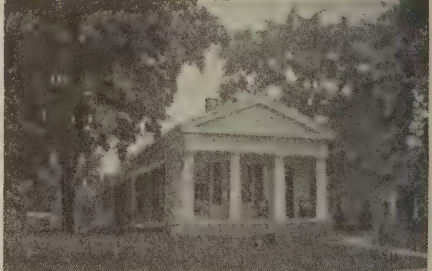
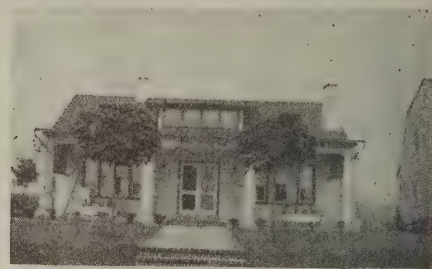
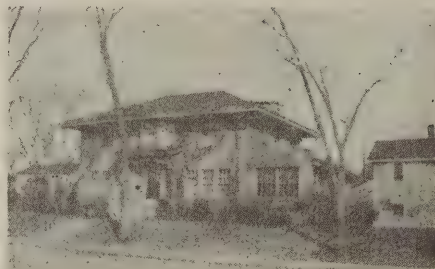
Economical bungalow floor plans originated by the Architectural Department of the National Lumber Manufacturers' Ass'n

Modern Homes



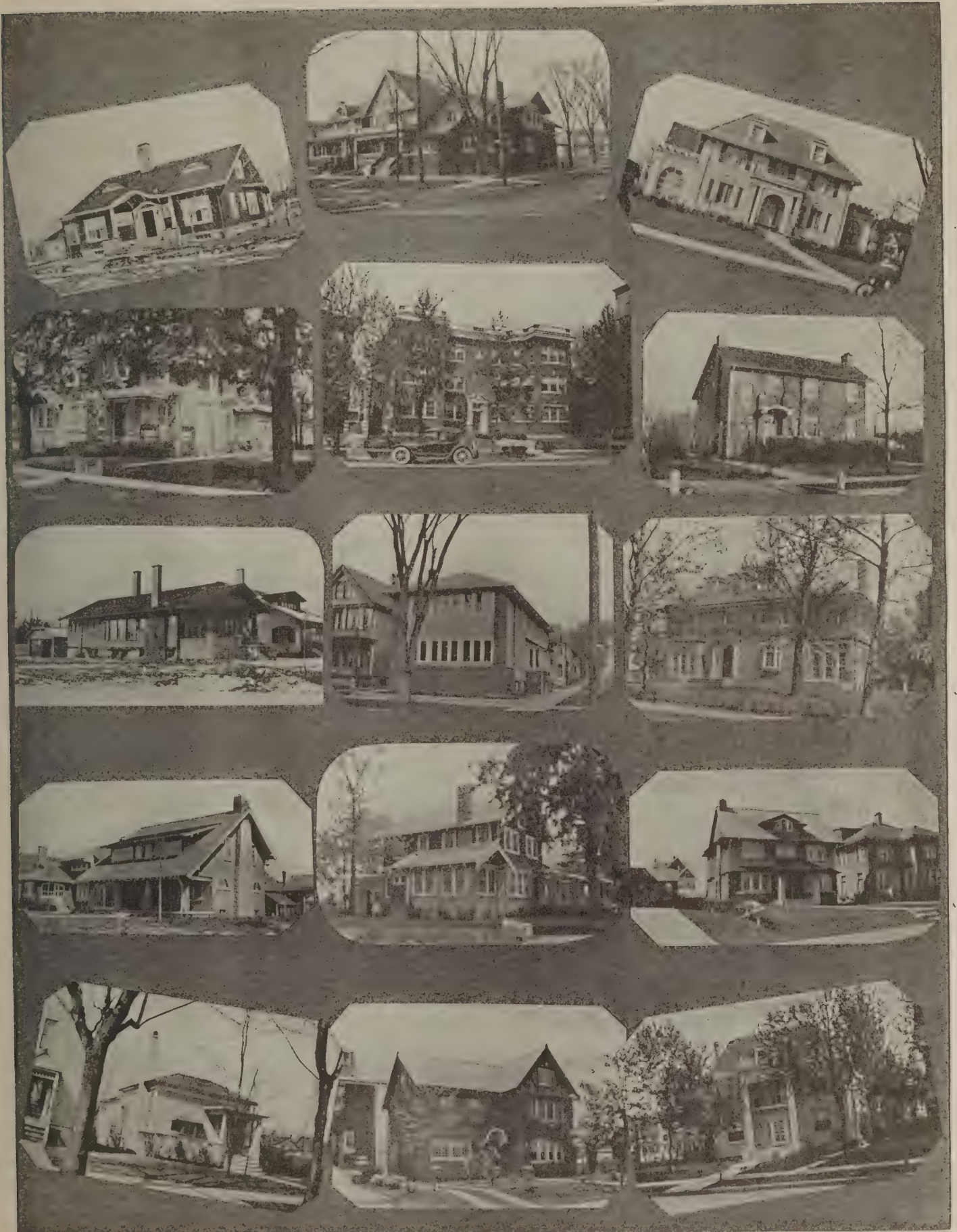


Twentieth Century Homes

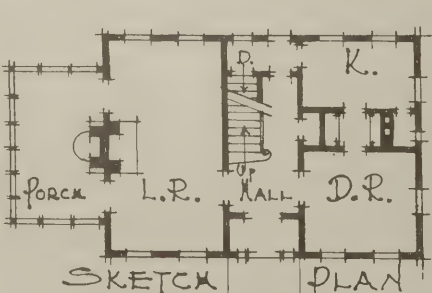


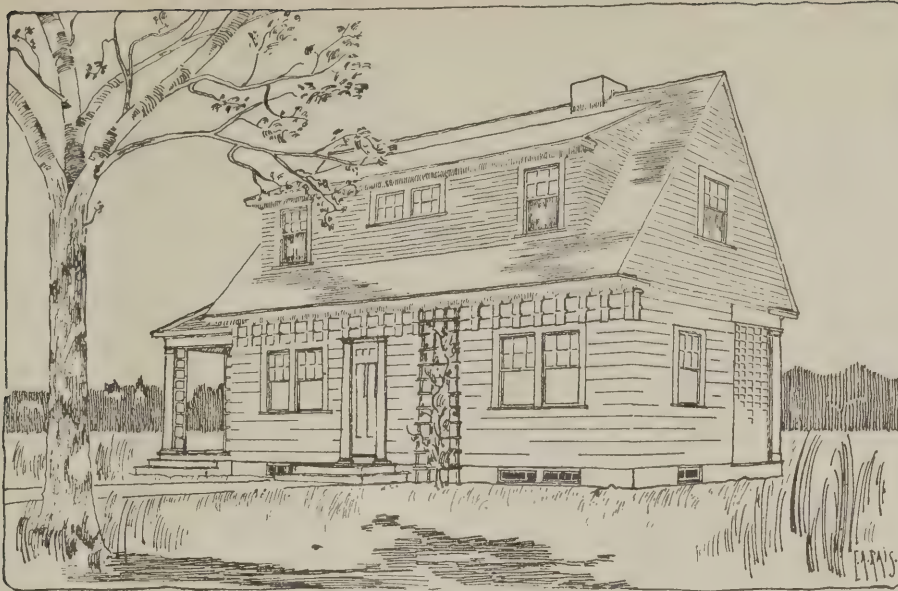




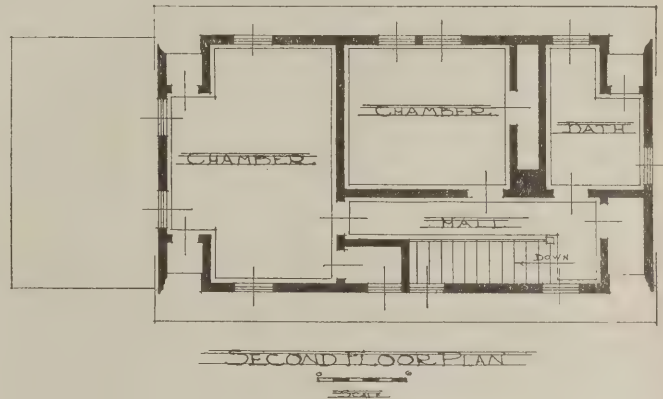
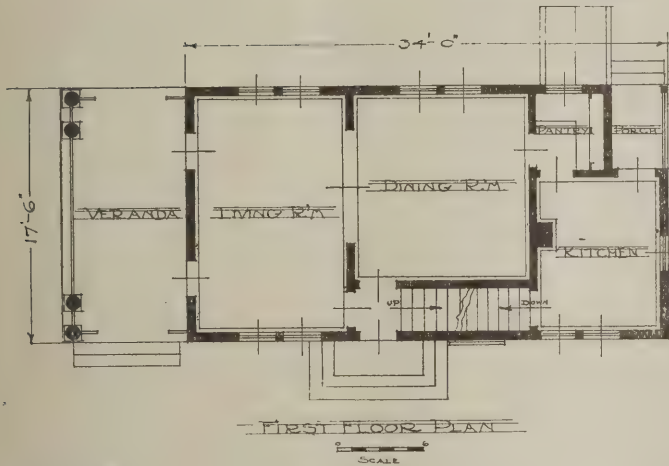


American Colonial Houses



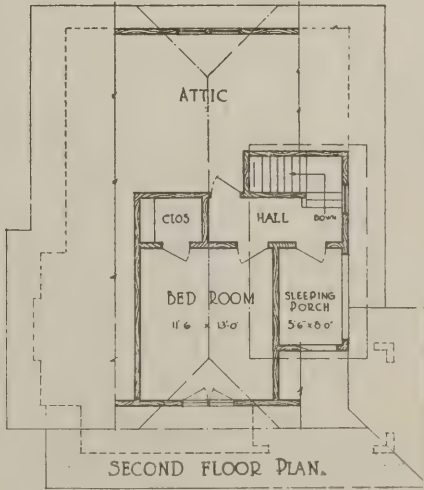
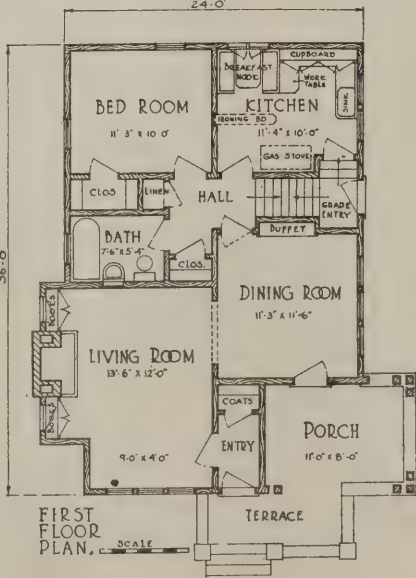
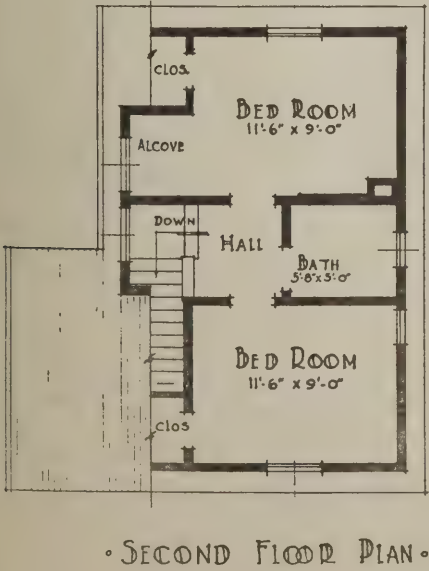
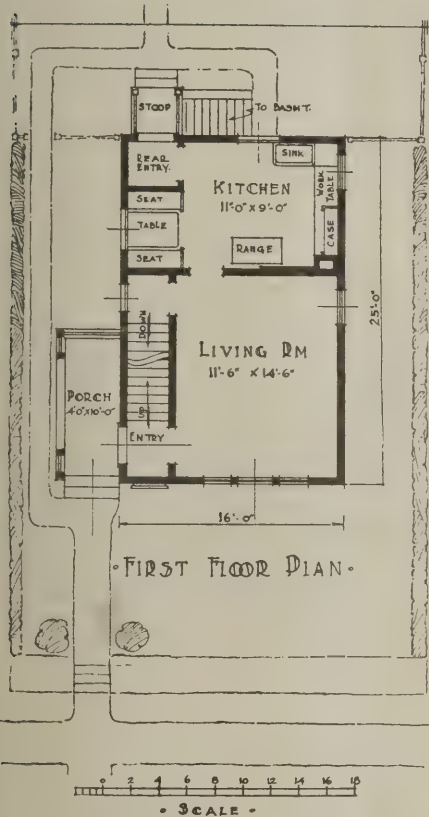
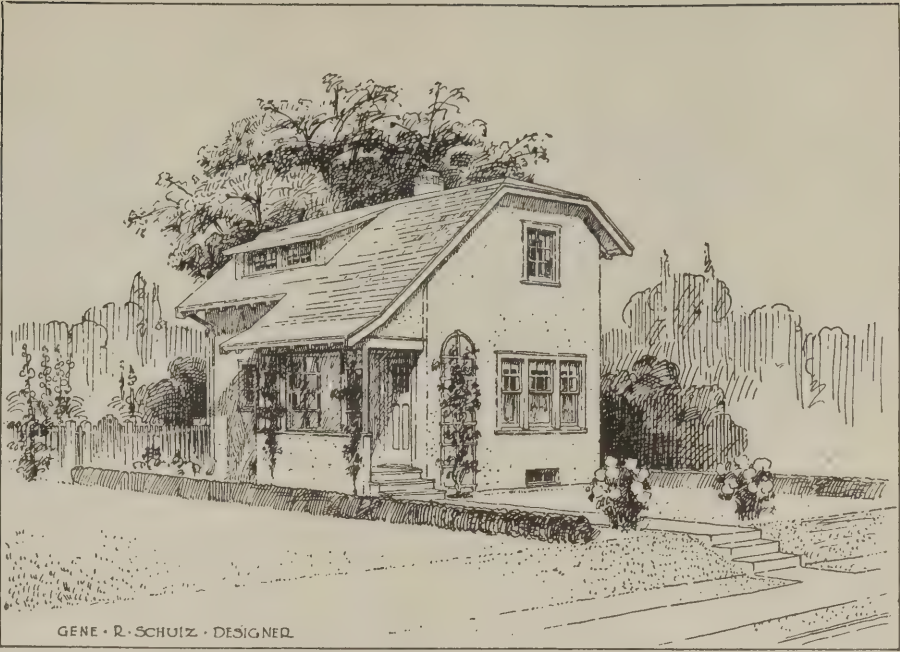


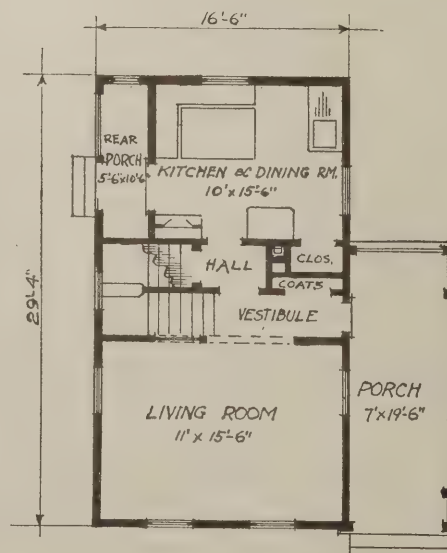
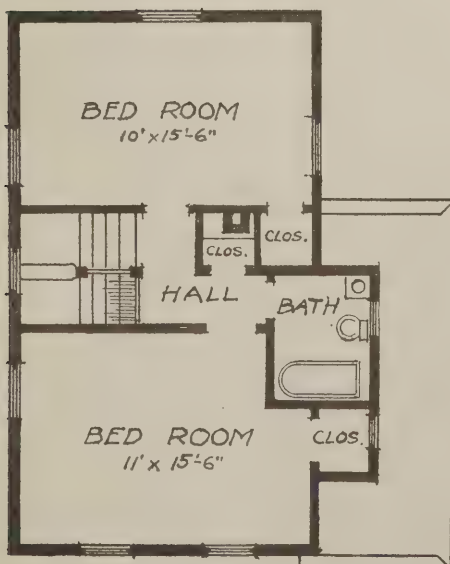
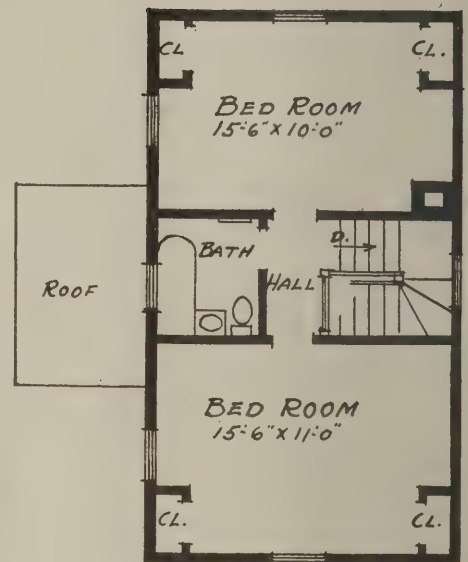
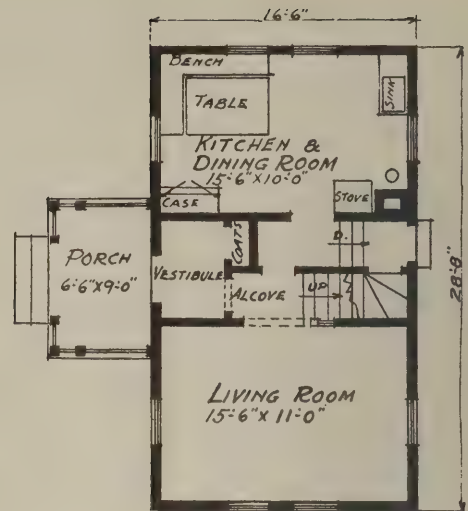
Chas. A. Rais, Architect



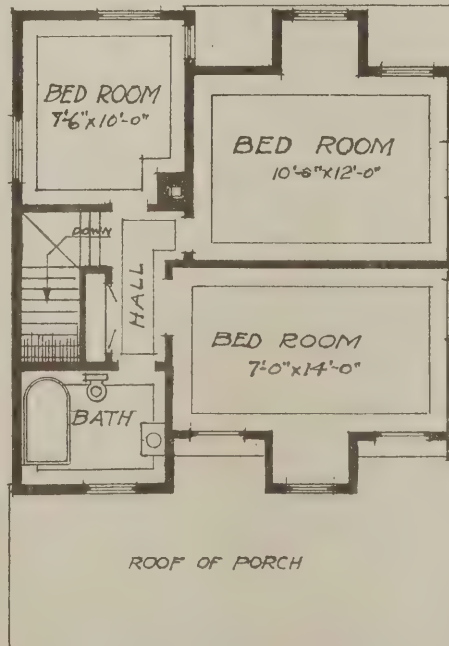
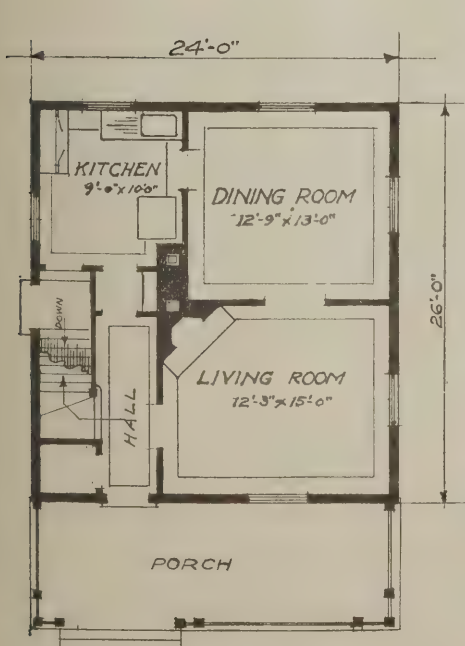
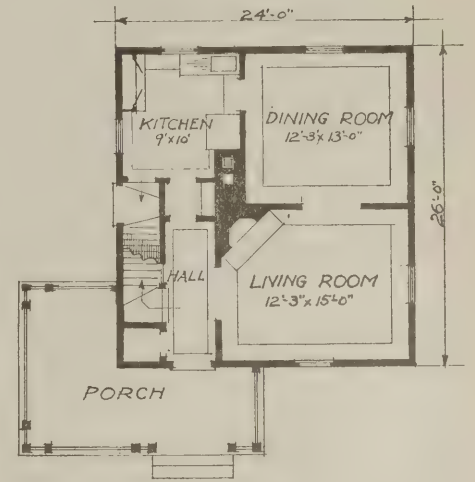
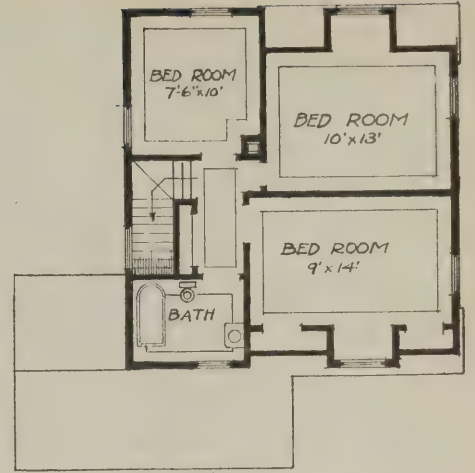
Chas. P. Rawson, Architect. See plans on next page

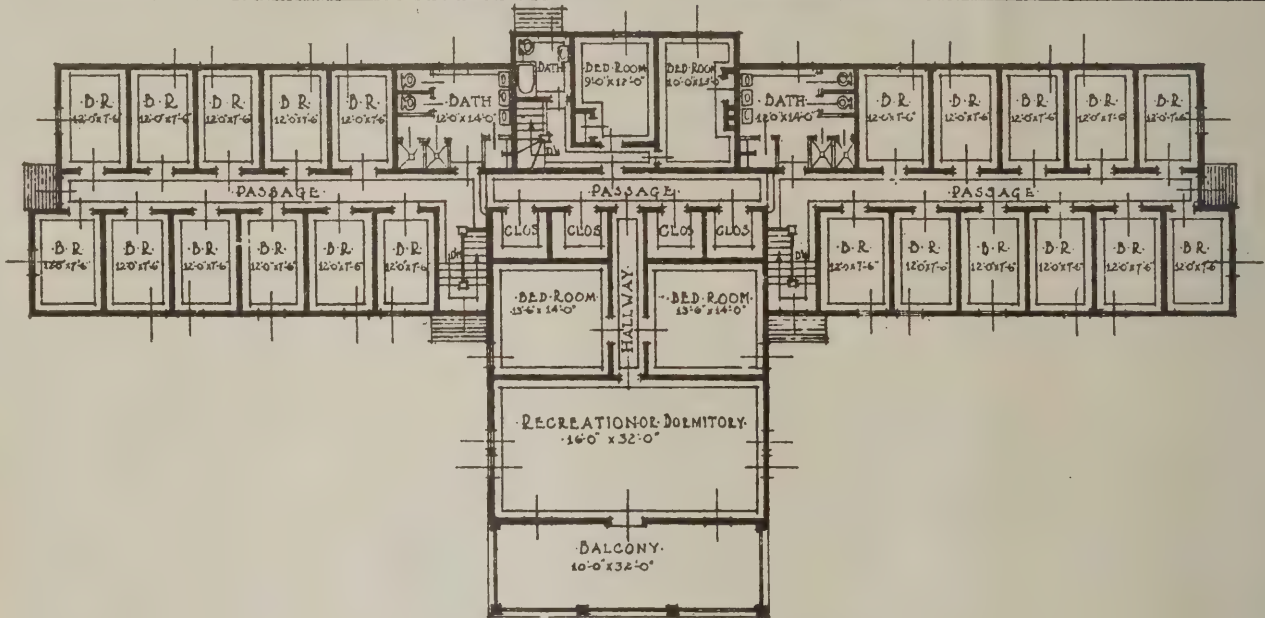
Eugene R. Shulz,
Architect,
Milwaukee, Wis.



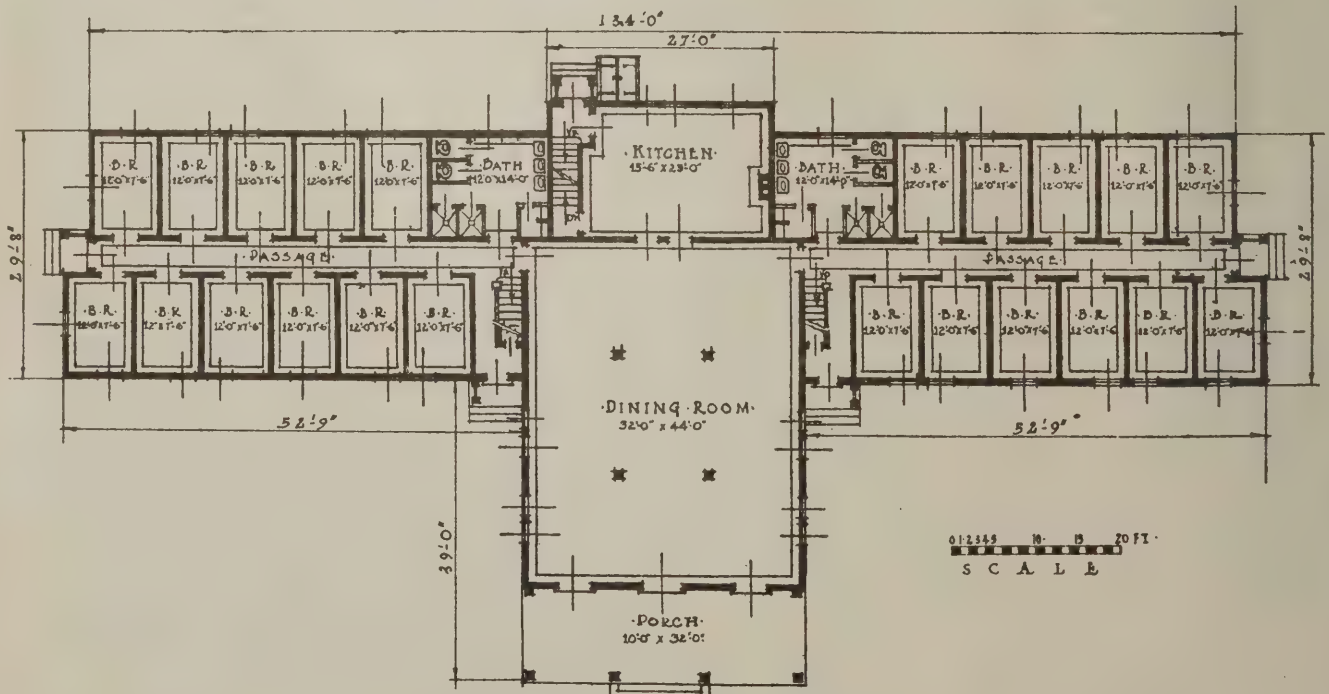


Development at
Perryville, Maryland
Mann and McNeille,
Architects





SECOND FLOOR PLAN

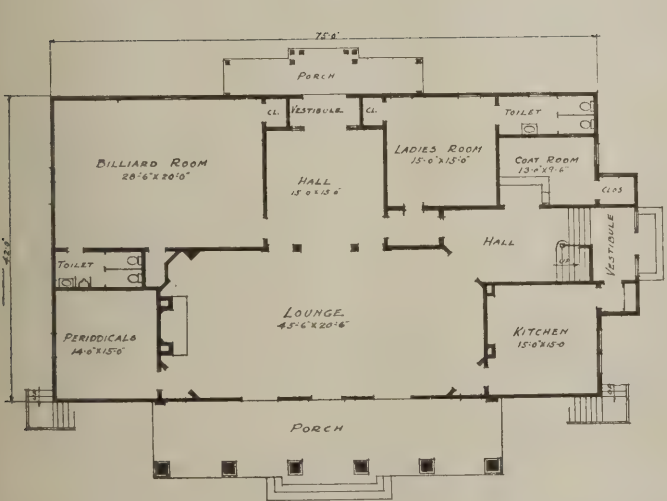


FIRST FLOOR PLAN

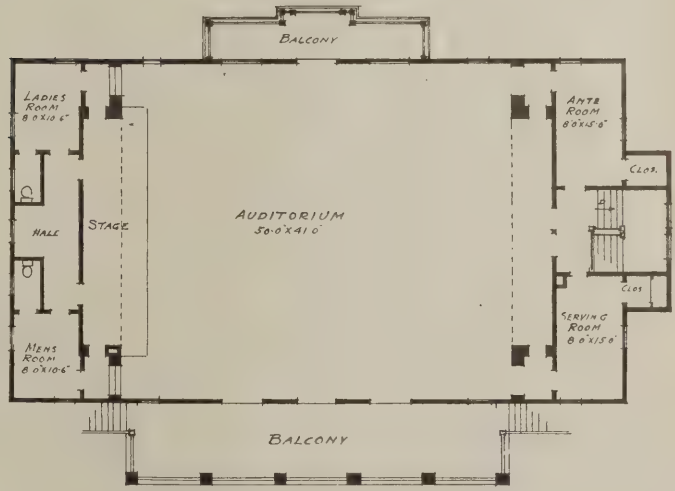
Boarding house for forty-eight men—Mann and MacNeille, Architects



Community House—Mann and MacNeille, Architects



FIRST FLOOR PLAN

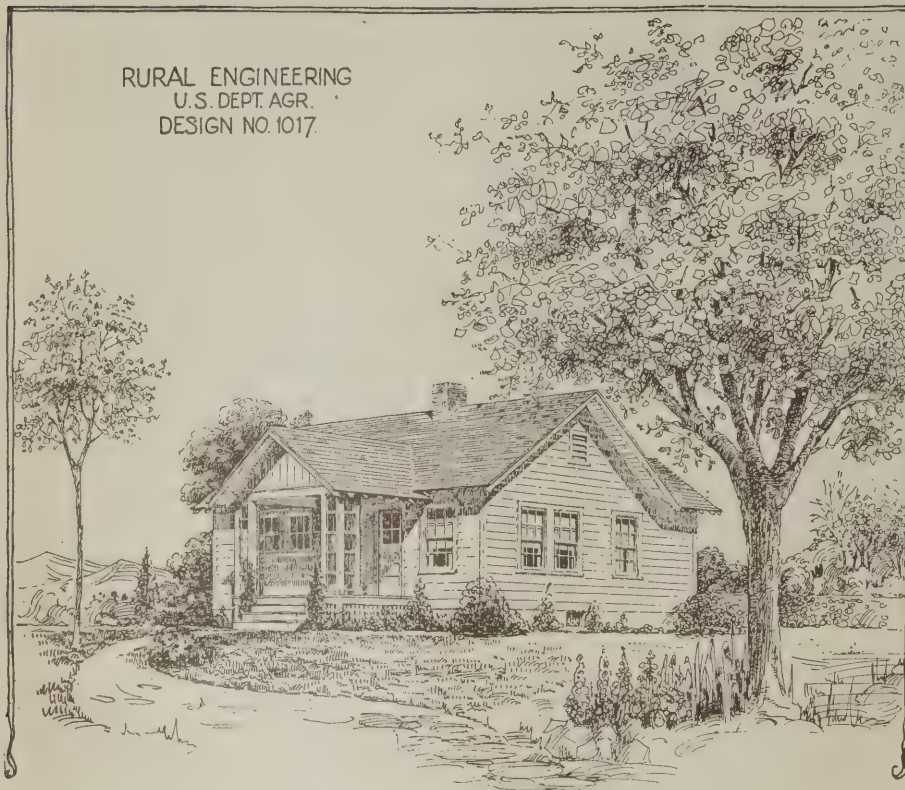


SECOND FLOOR PLAN

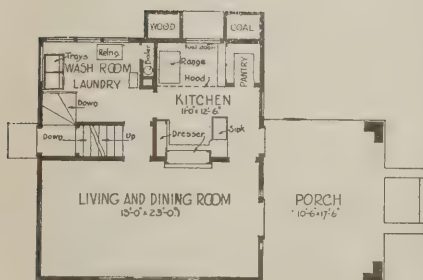
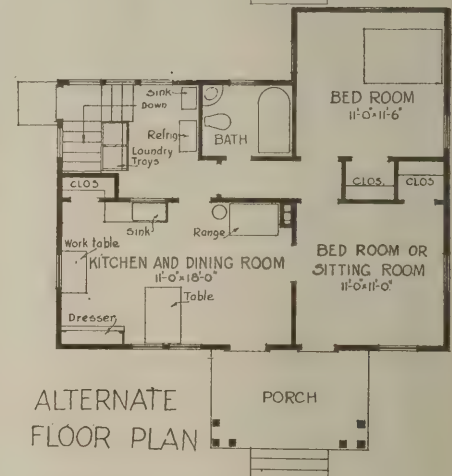
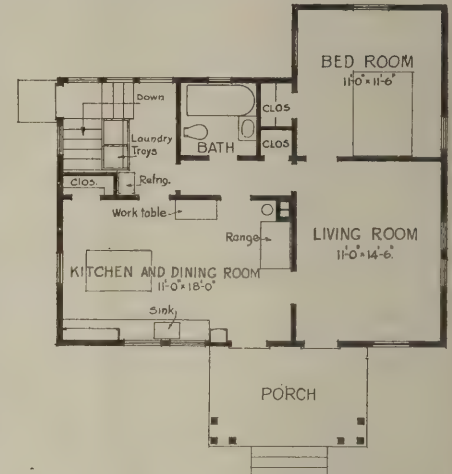
Types of Farm Houses

U. S. Department of Agriculture, Washington, D. C.

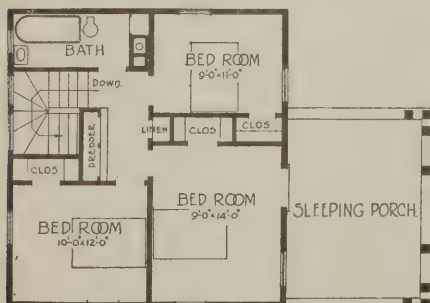
The Department Furnishes Blueprints of These and Similar Houses for a Small Fee



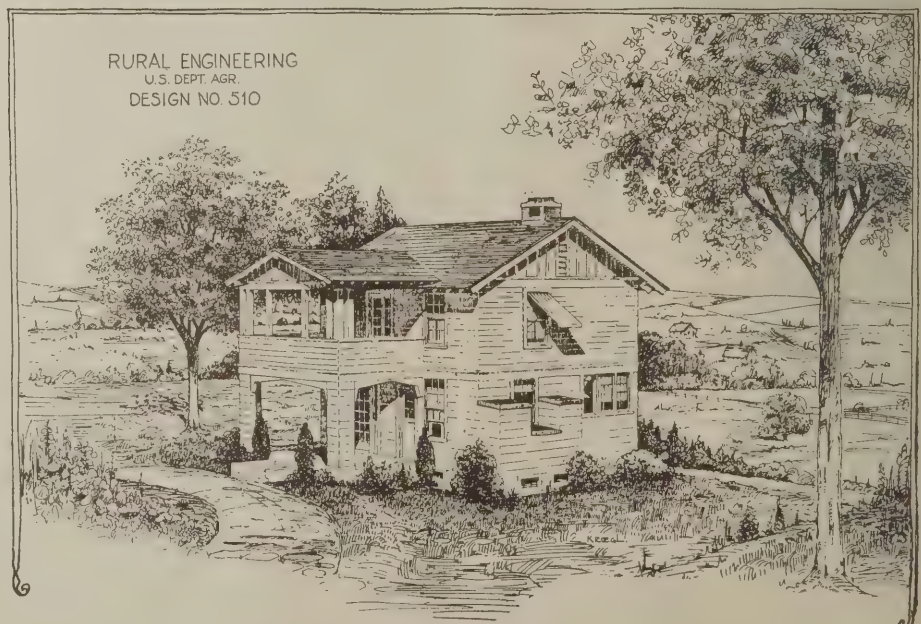
RURAL ENGINEERING
U. S. DEPT. AGR.
DESIGN NO. 1017



FIRST FLOOR PLAN

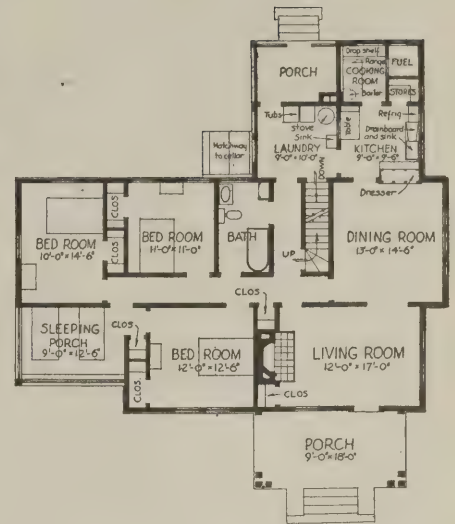


SECOND FLOOR PLAN

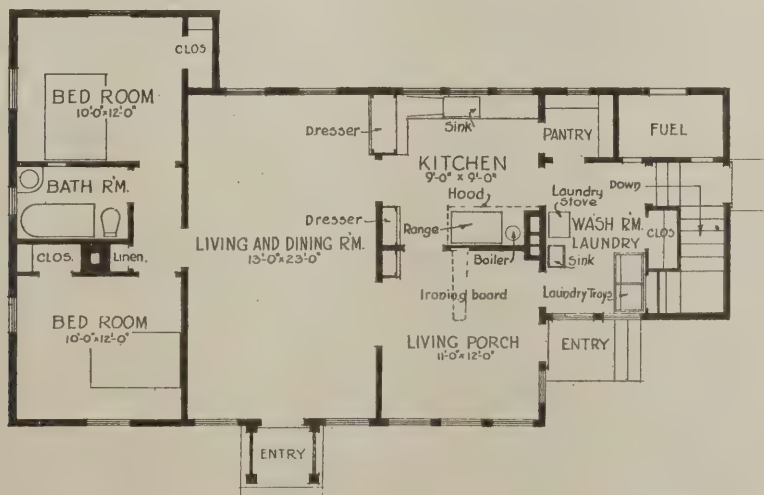
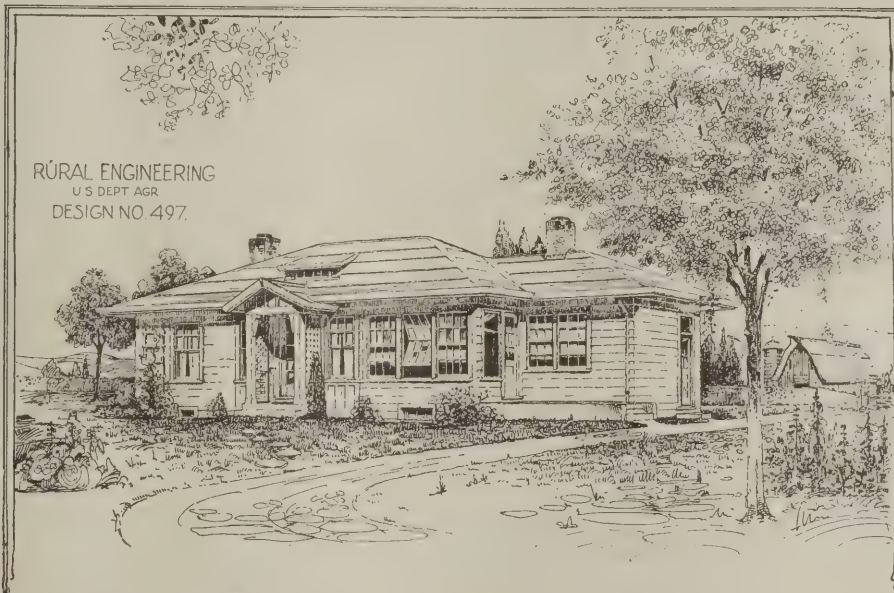


RURAL ENGINEERING
U. S. DEPT. AGR.
DESIGN NO. 510

RURAL ENGINEERING
U.S. DEPT. AGR.
DESIGN NO. 702.

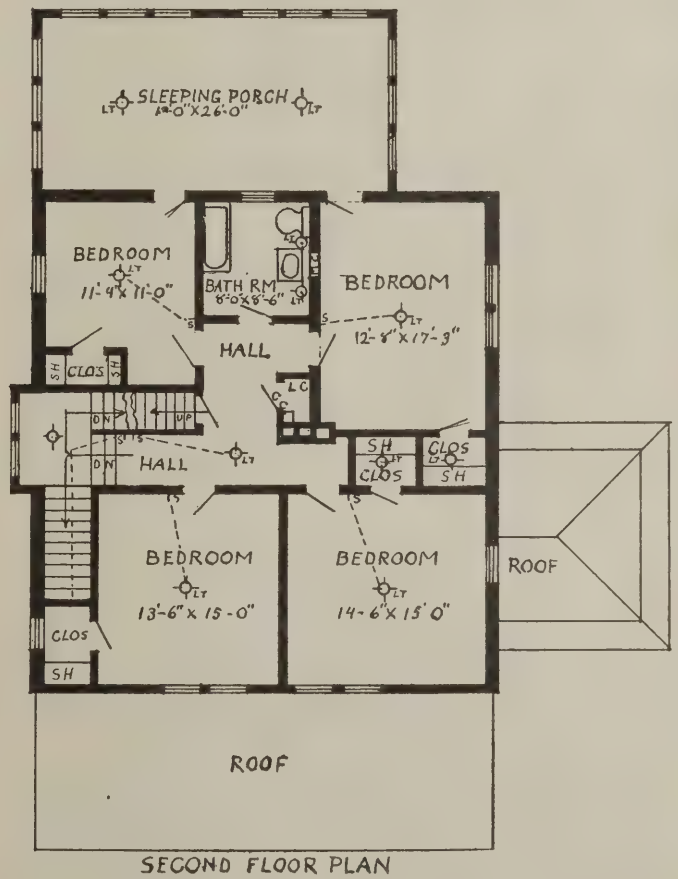
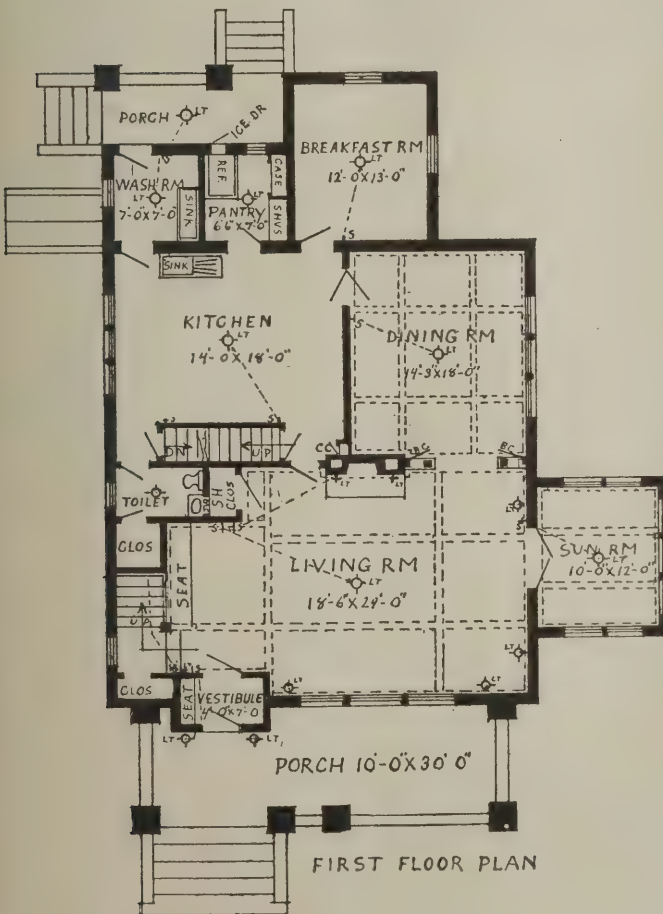


RURAL ENGINEERING
U.S. DEPT. AGR.
DESIGN NO. 497.

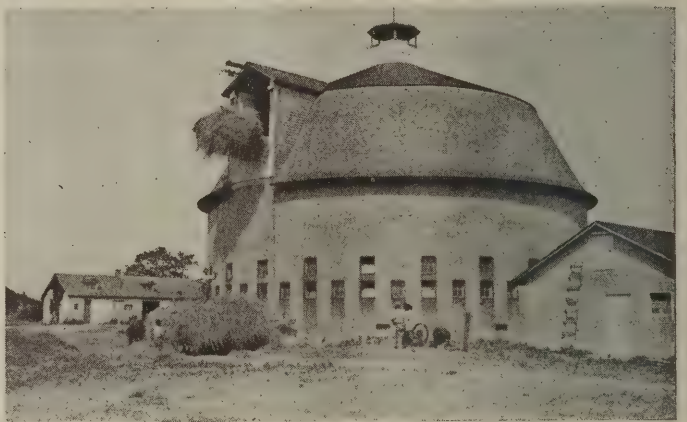


A Modern Farmhouse

Designed and Built by I. P. Hicks

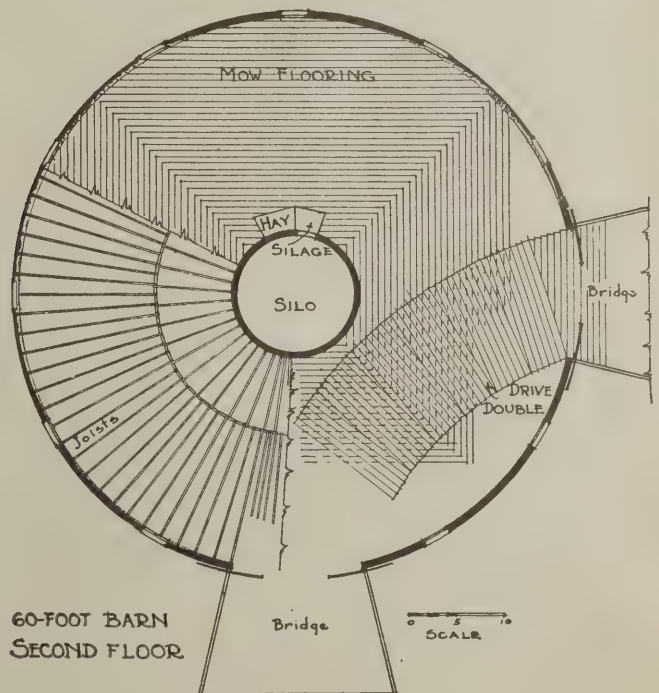
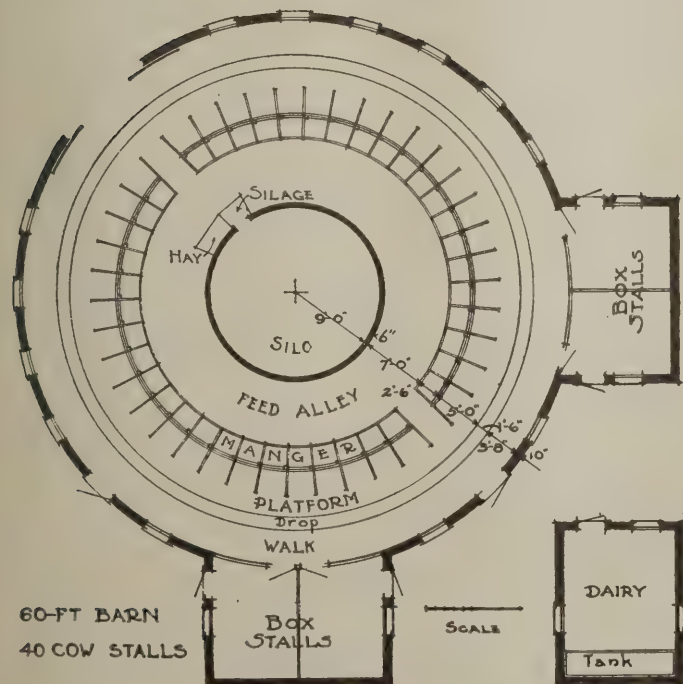
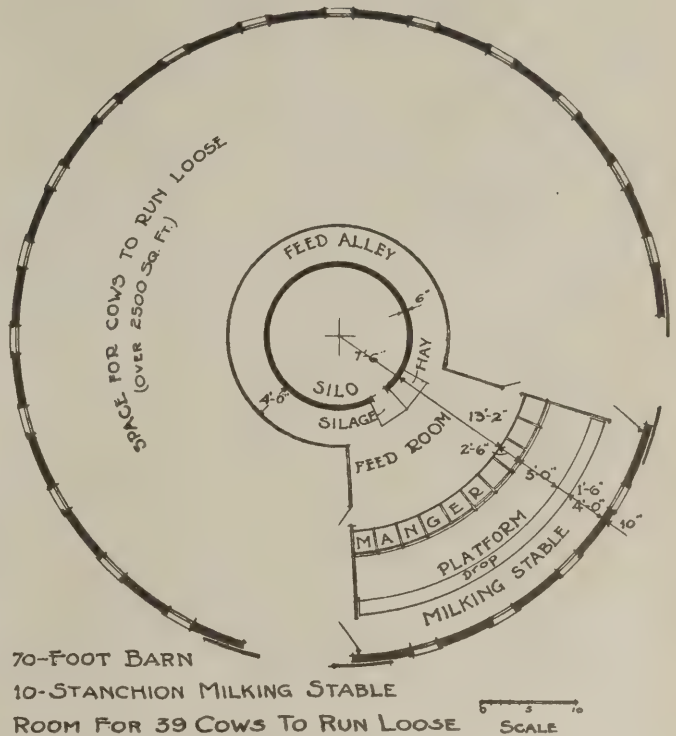
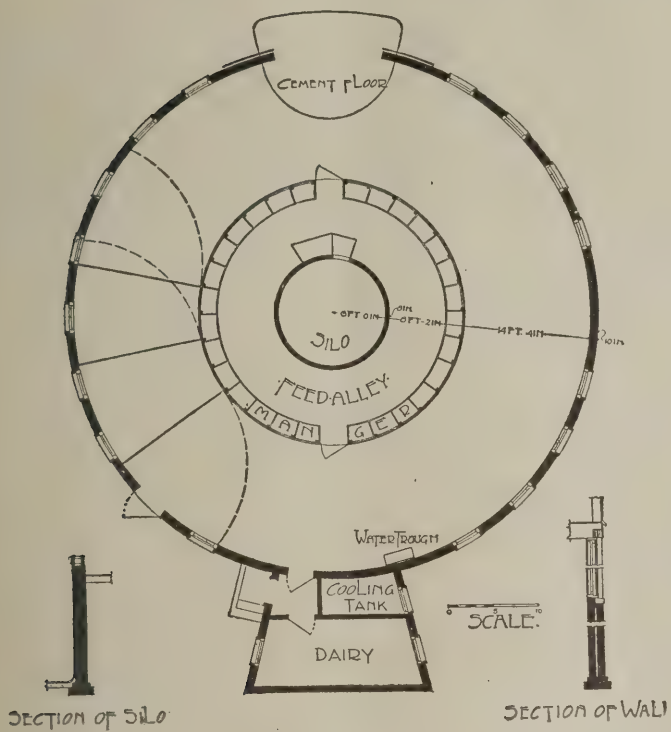


BARN S

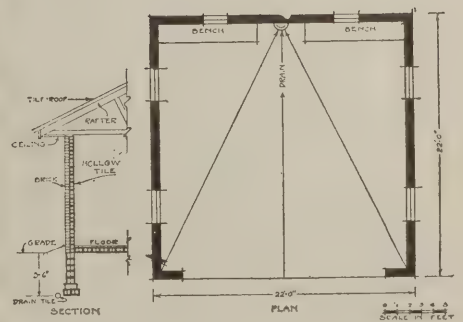
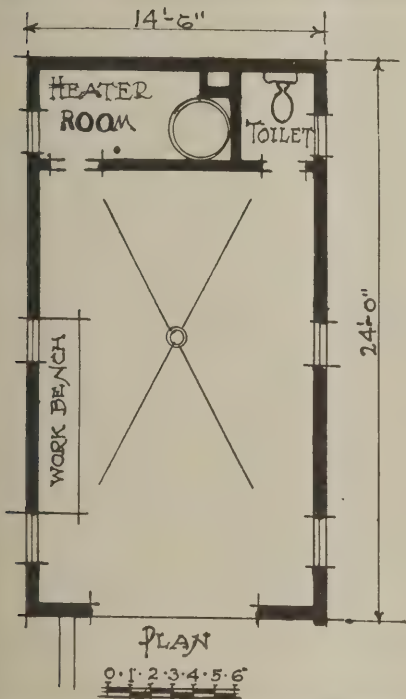
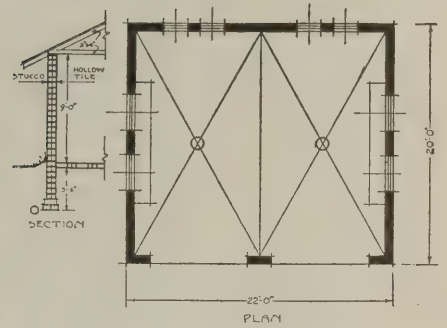


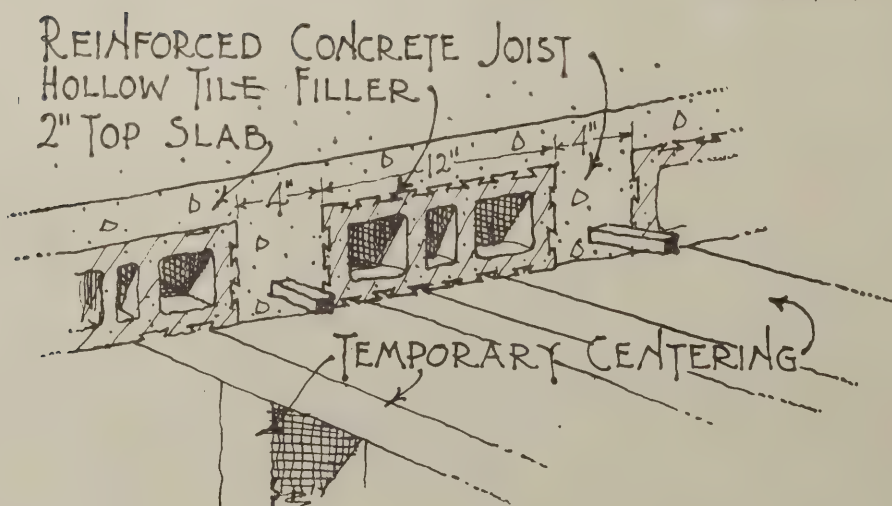
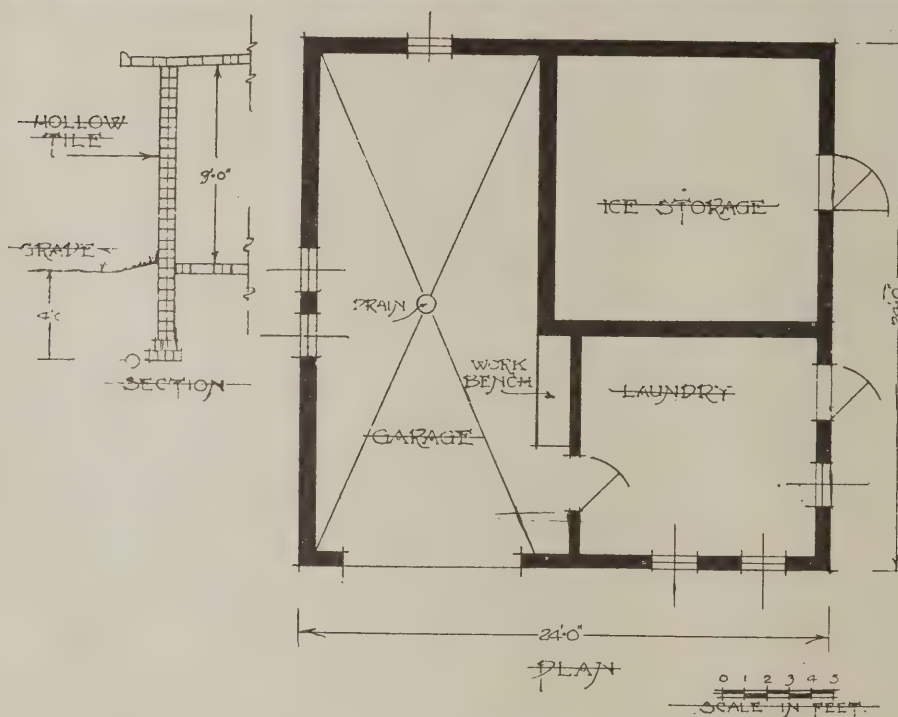
Round Barn Plans

Agricultural Experiment Station, University of Illinois, Urbana, Ill.



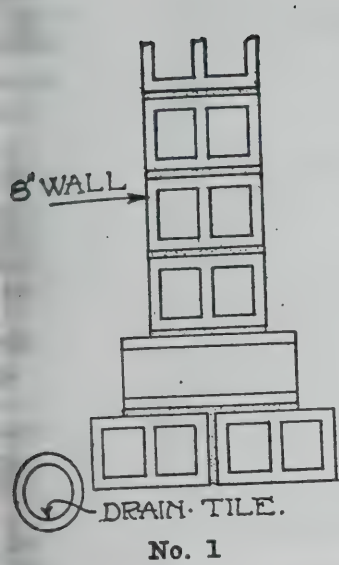
Garages



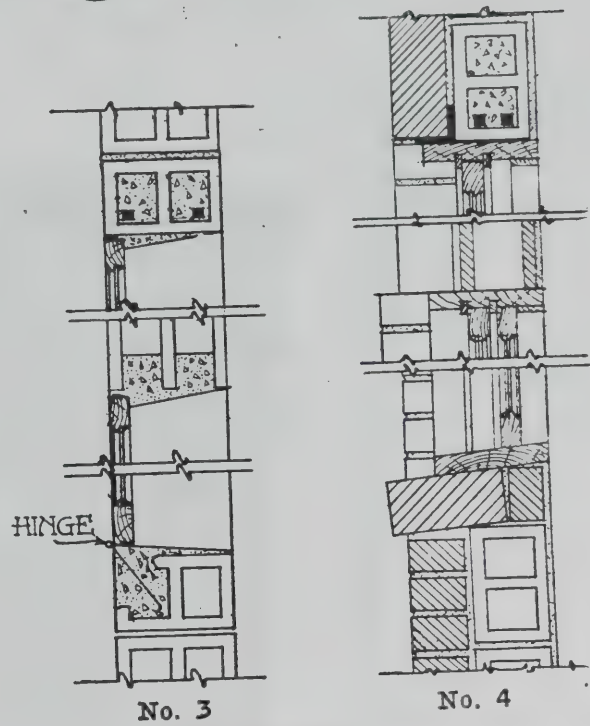
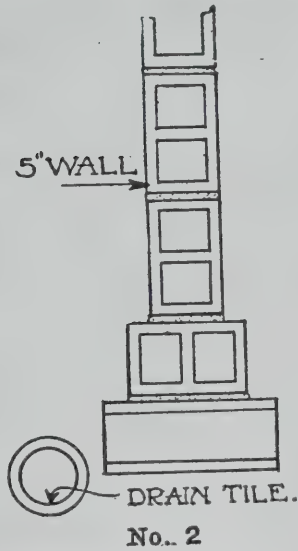


Roof slab detail

Miscellaneous Garage Details

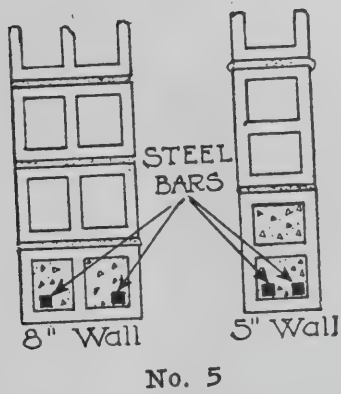


Footings



Window details

No. 4



Lintel details

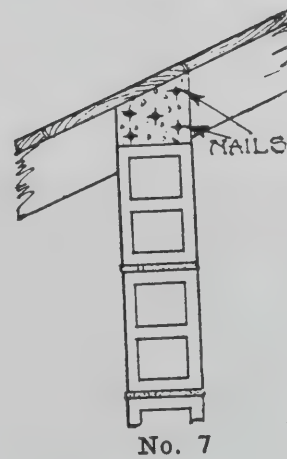
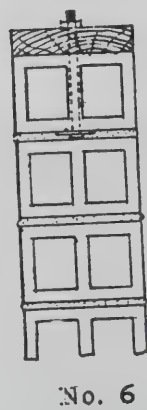
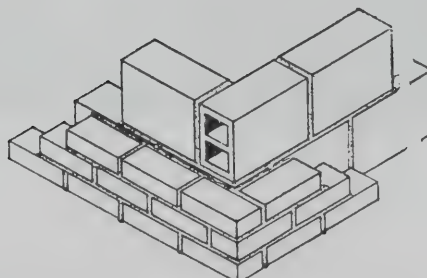
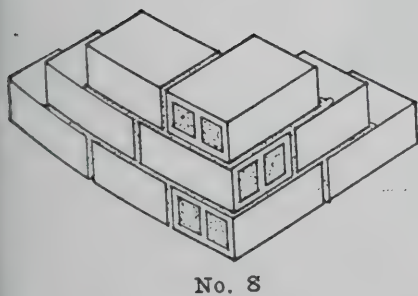
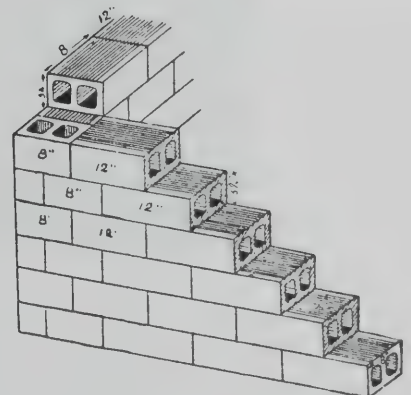


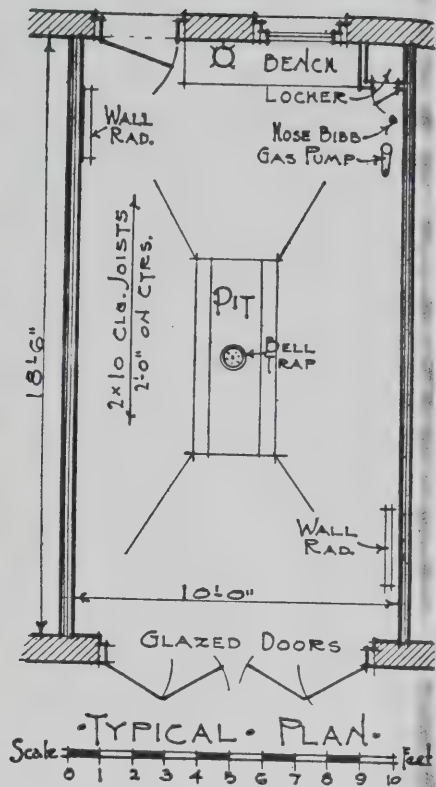
Plate details

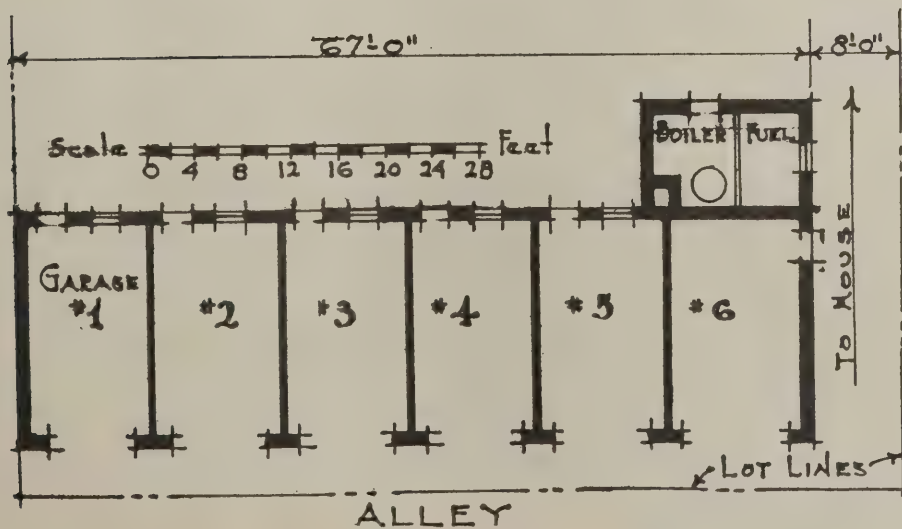
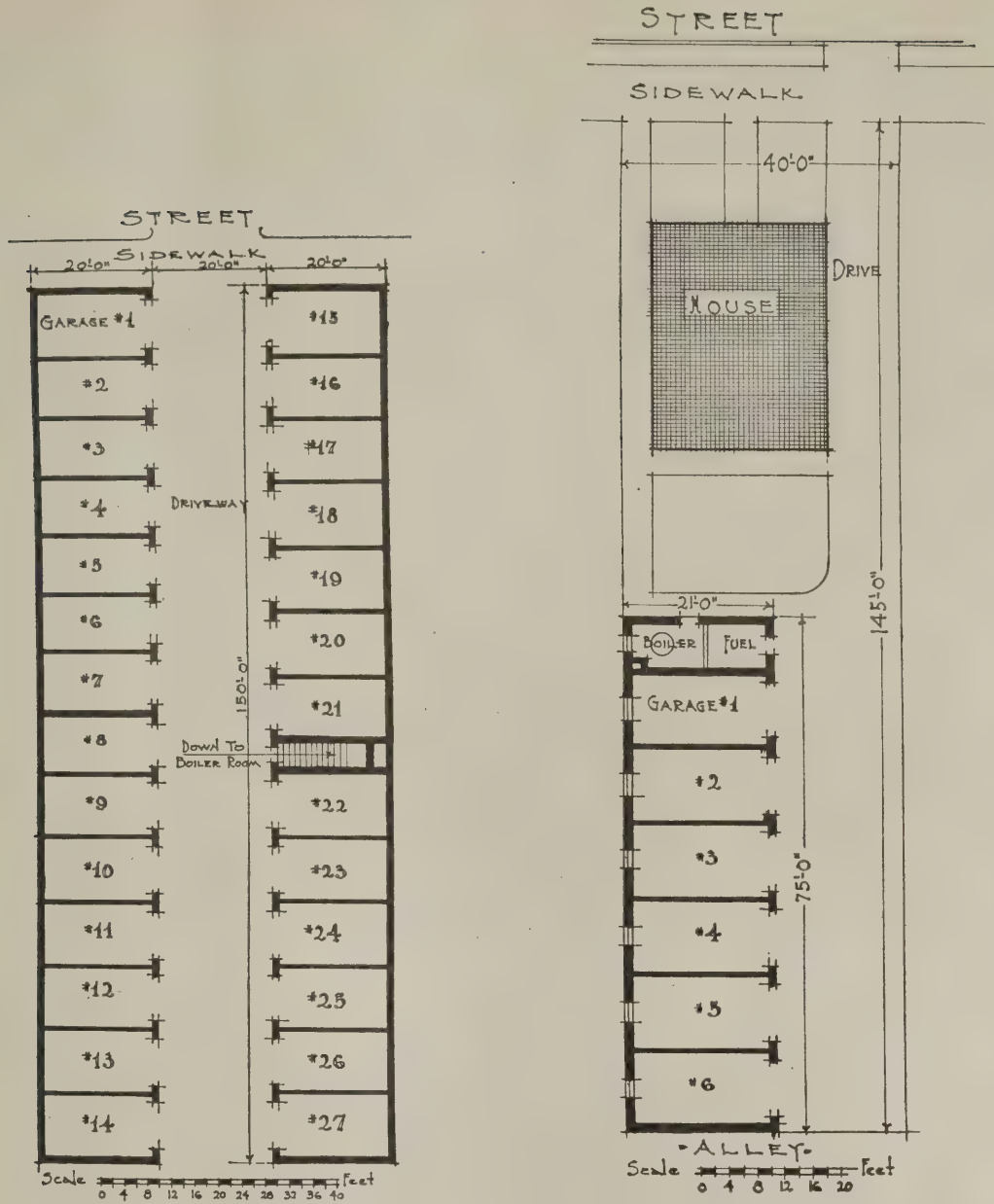


Corner details



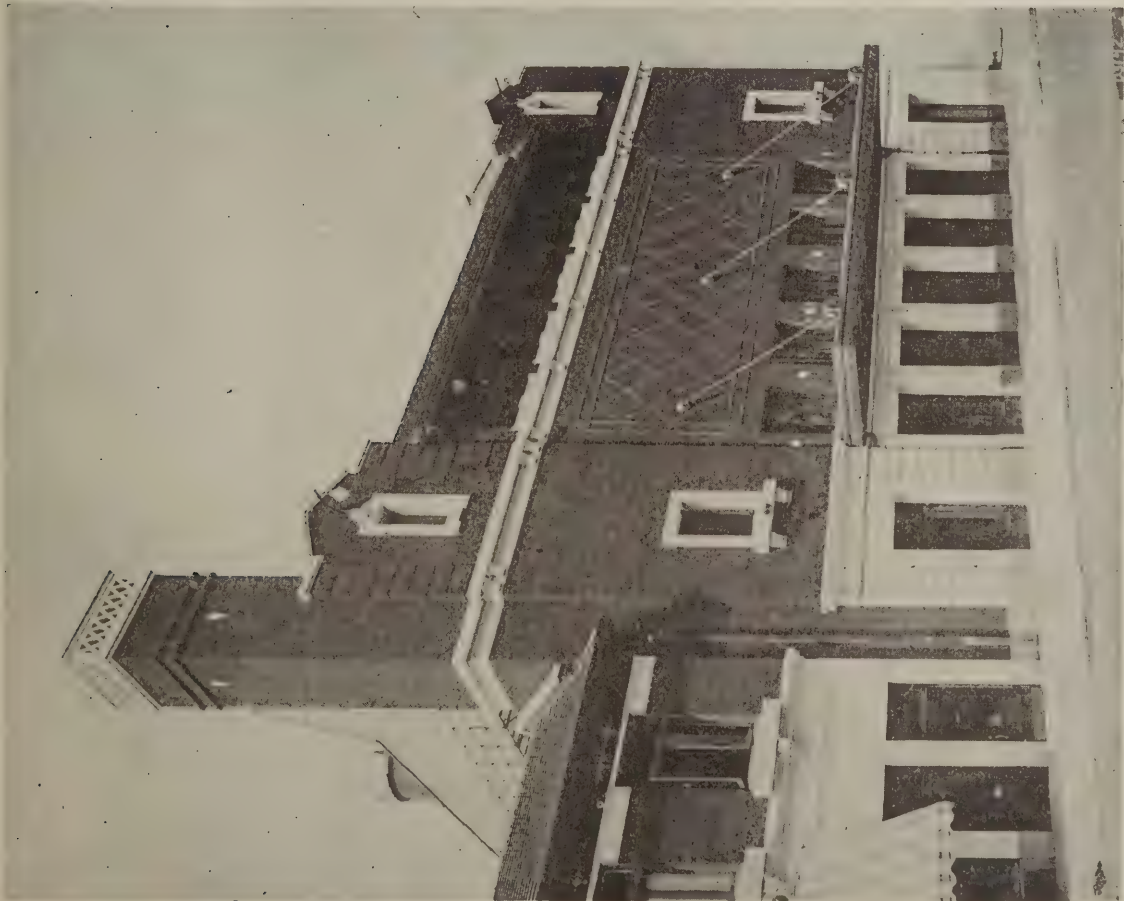
Garage Courts

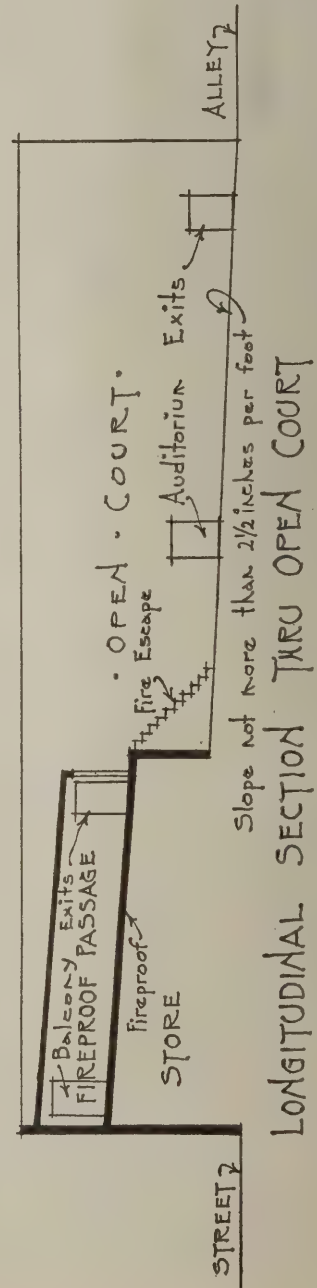
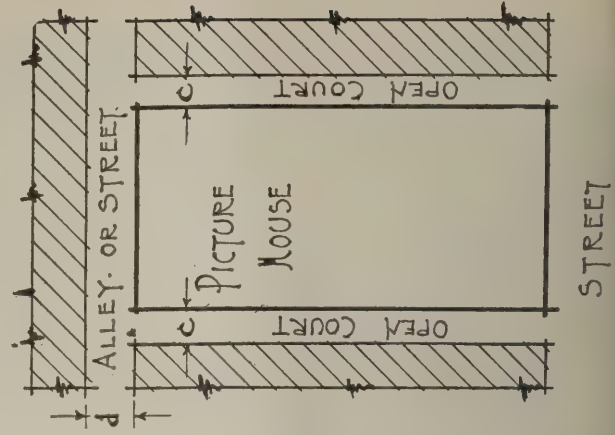
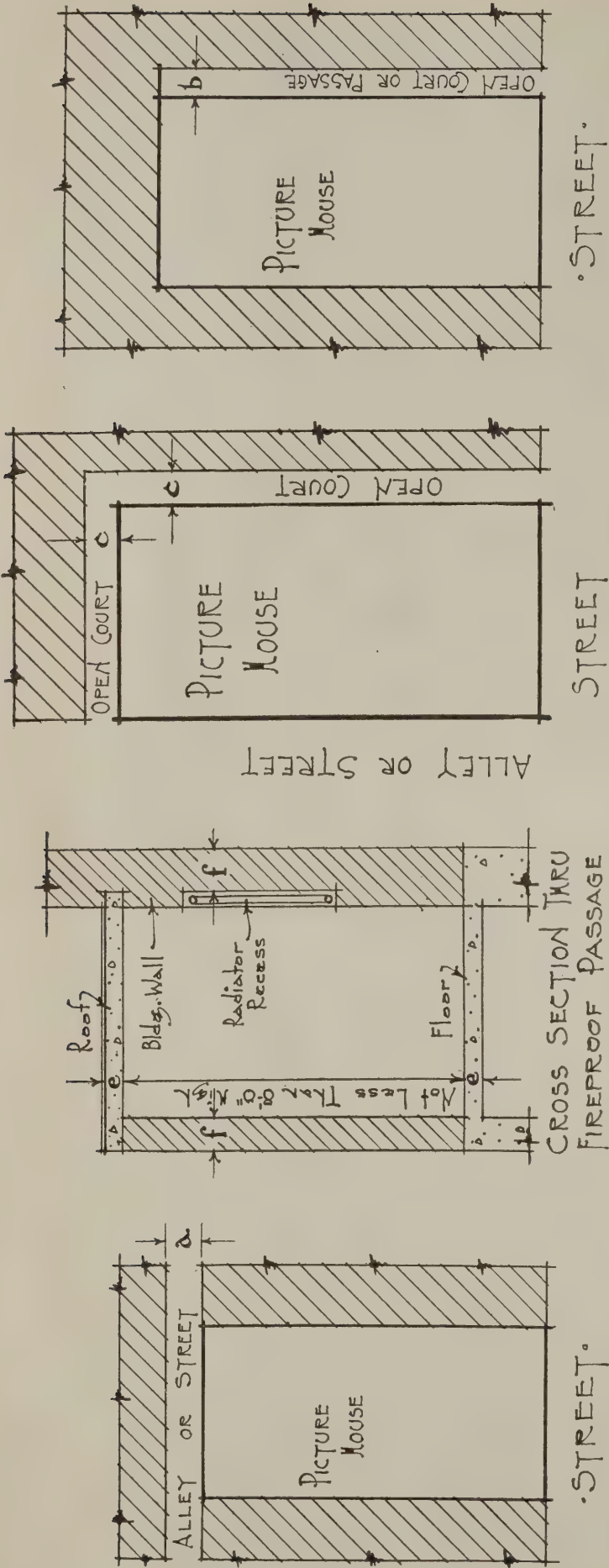




Motion Picture Theatres

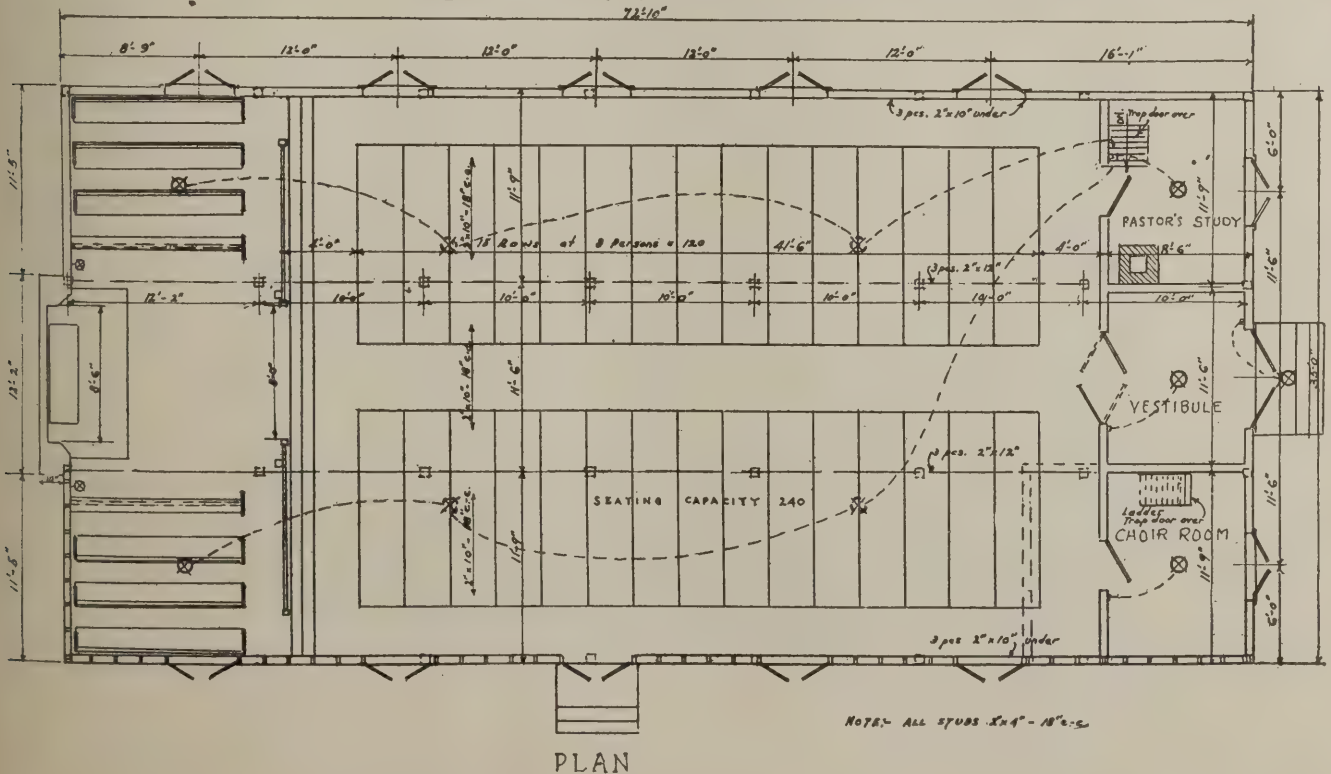








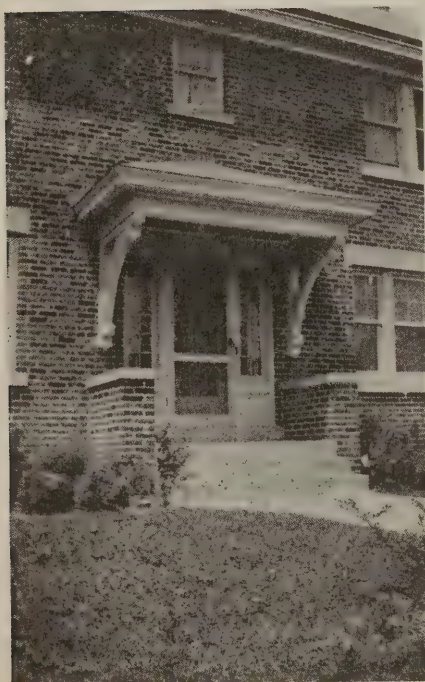
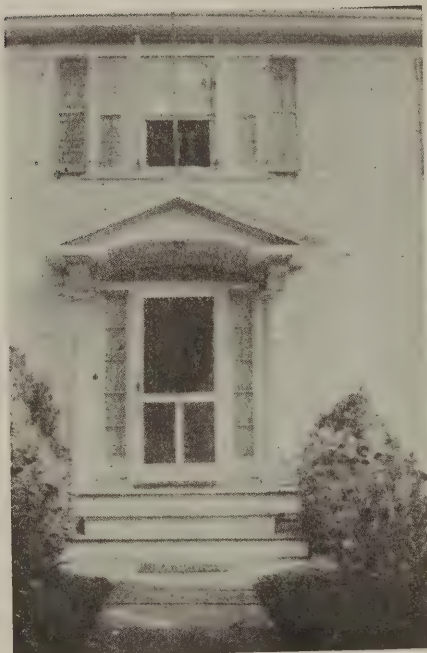
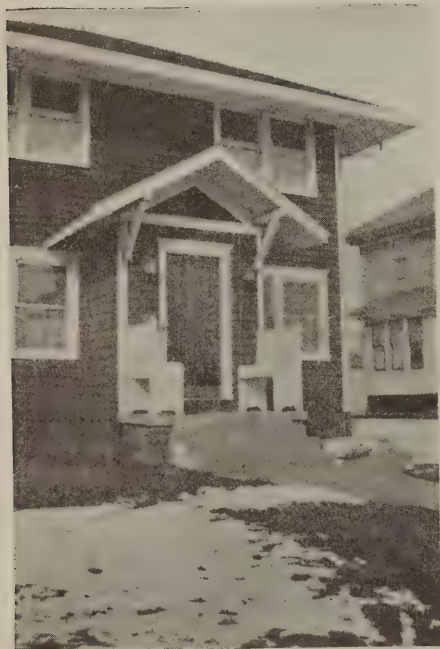
Tilghman H. Moyer, designer and builder

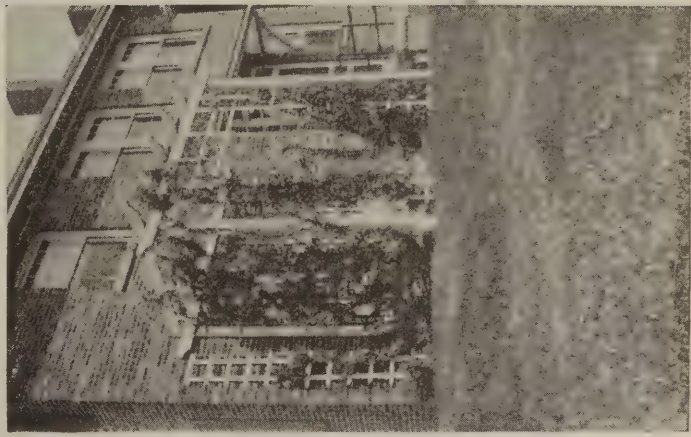
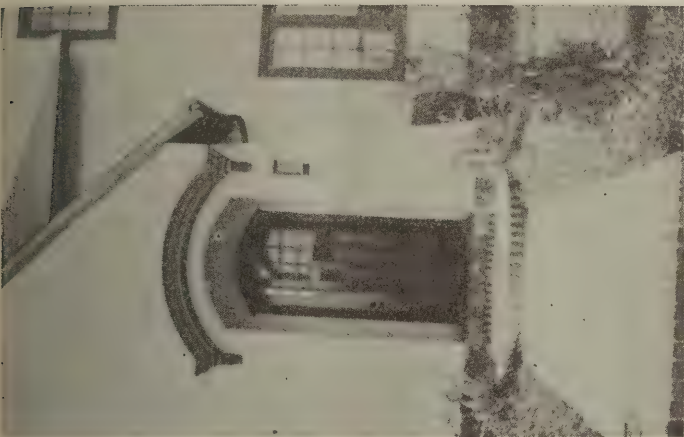
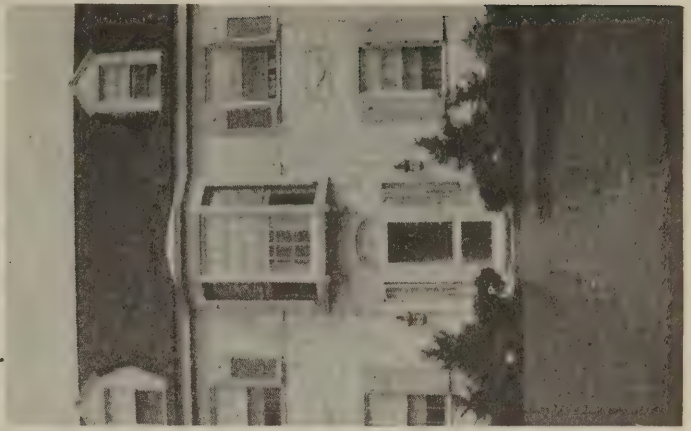


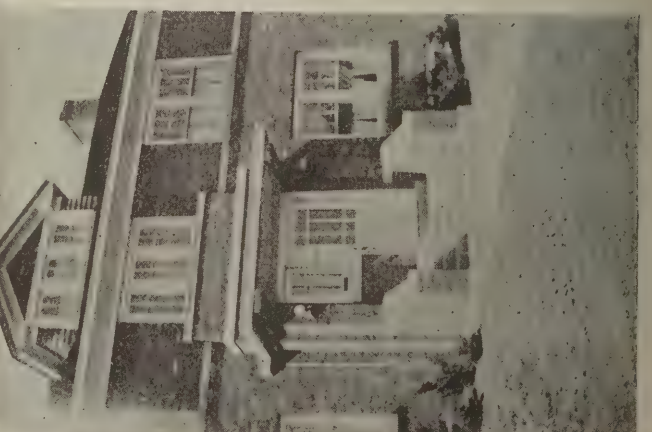
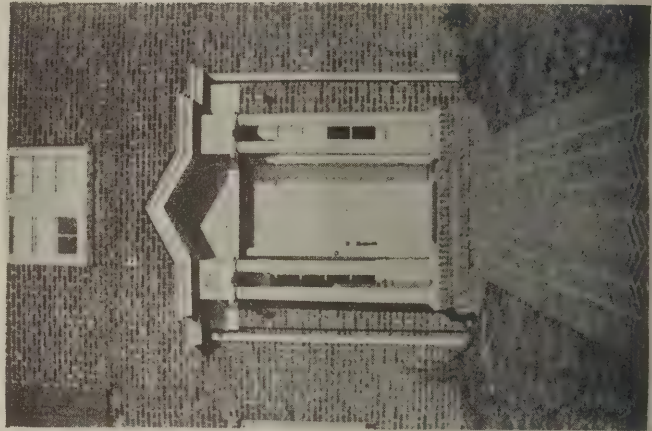




ENTRANCES

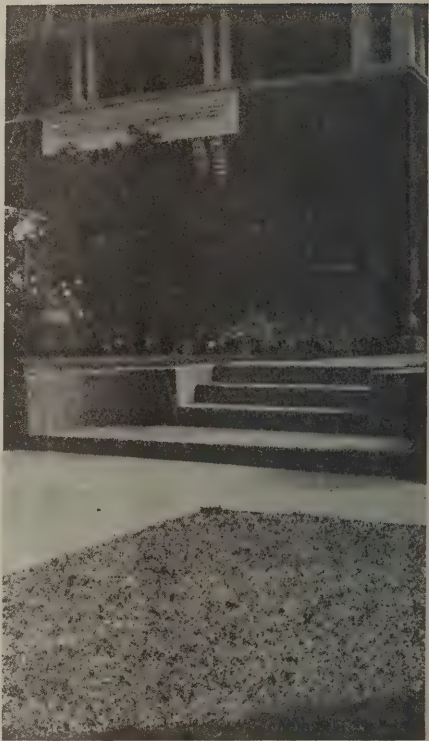






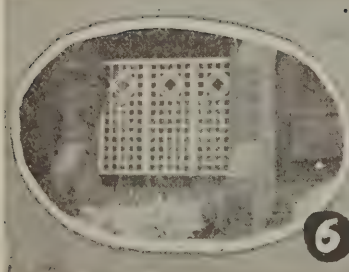
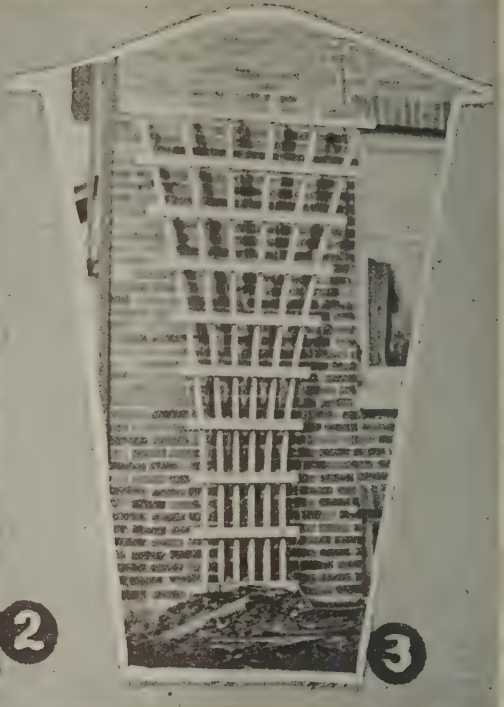
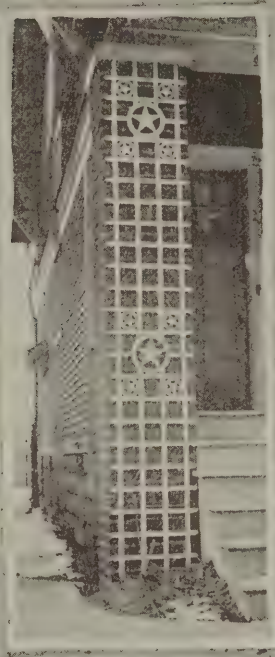
Concrete and Brick Steps

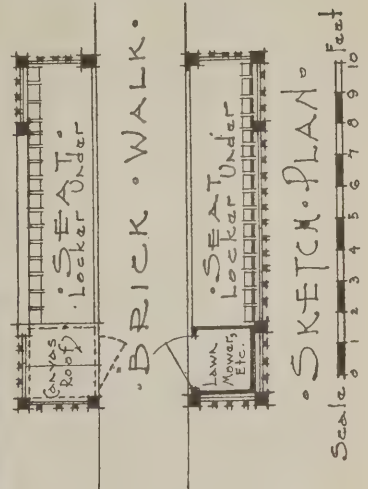
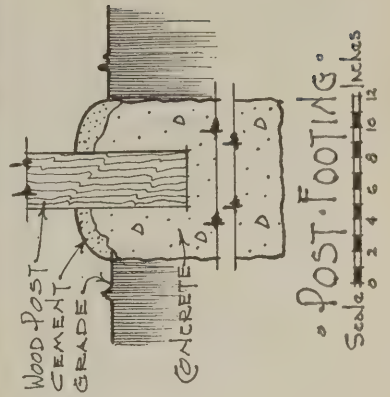
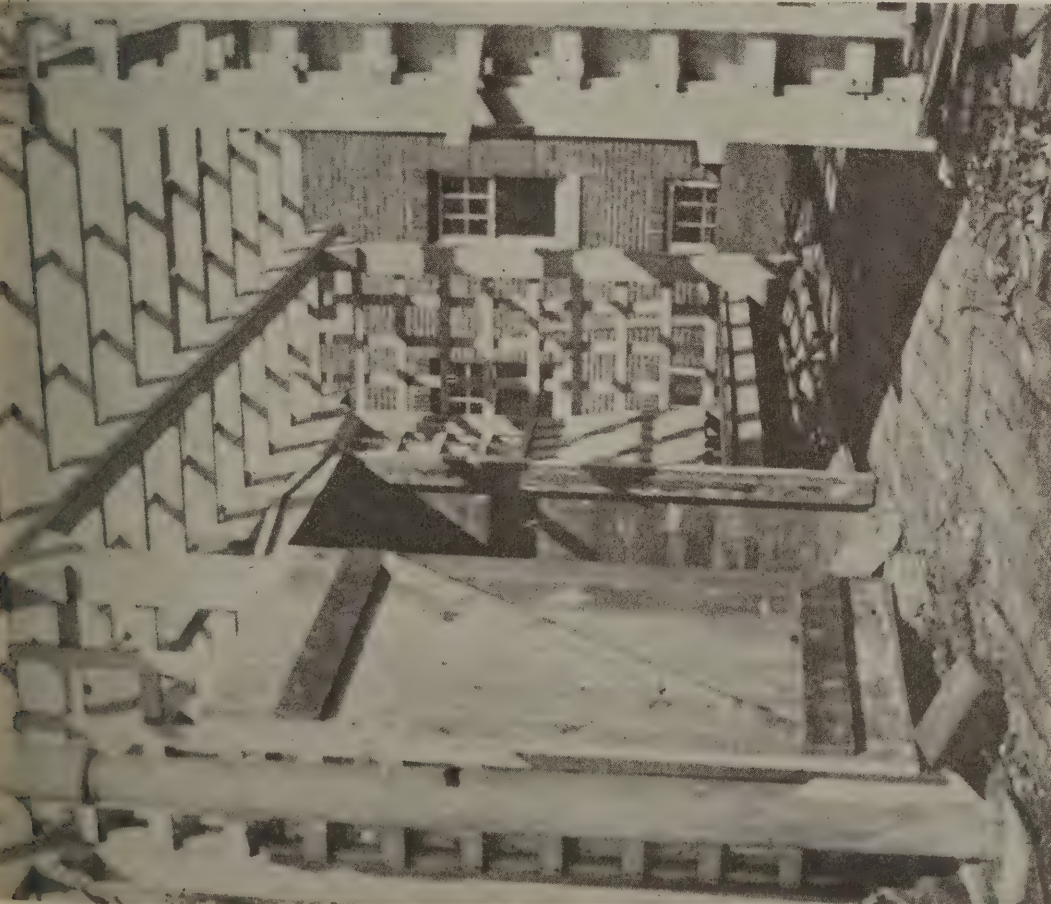




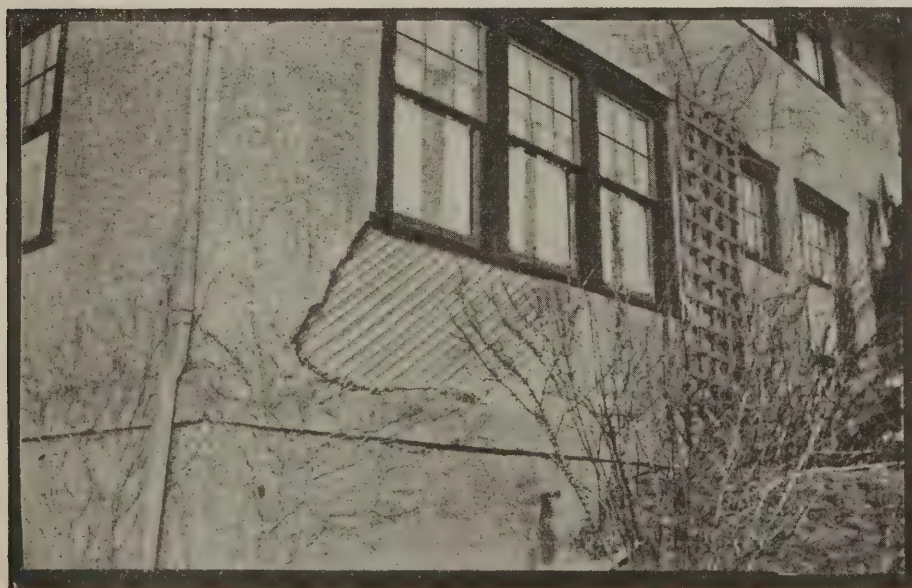
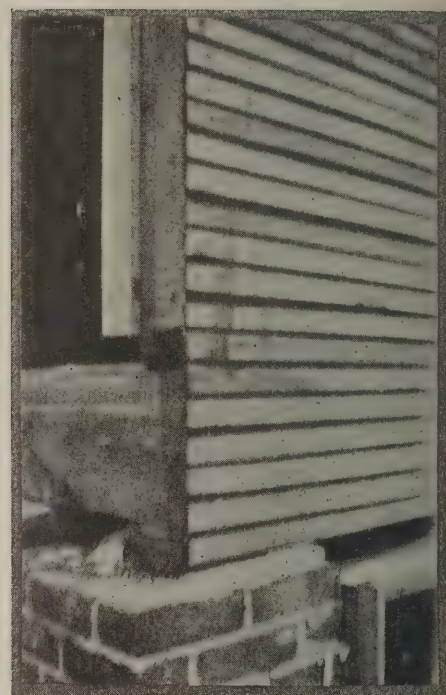


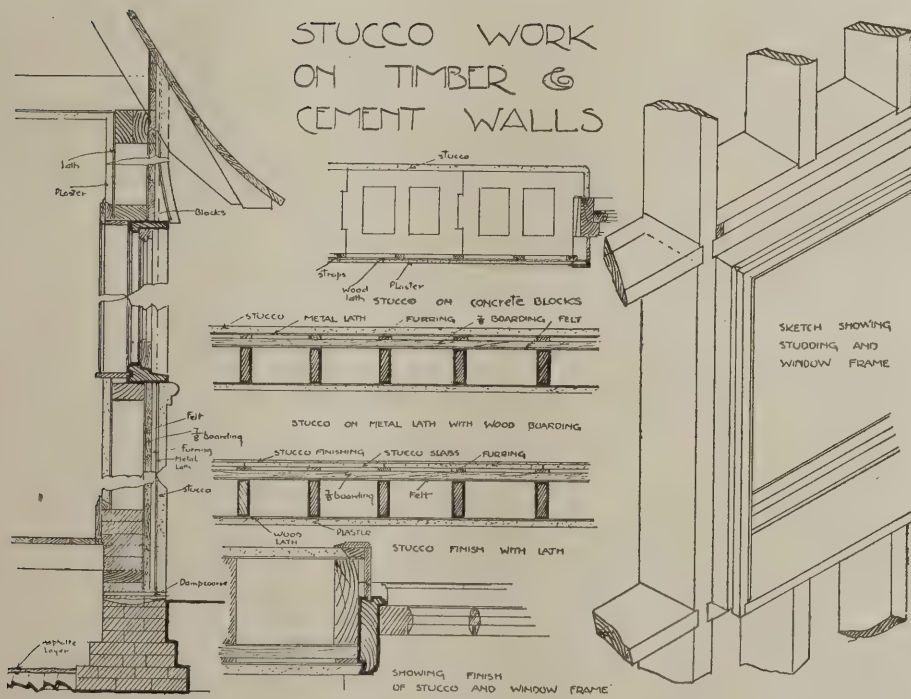
Trellis Work





Stucco Work



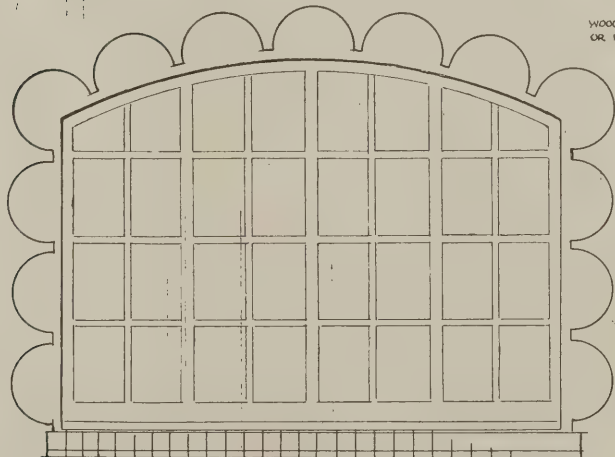


STUCCO WORK
ON TIMBER &
CEMENT WALLS

SKETCH SHOWING
STUDDING AND
WINDOW FRAME



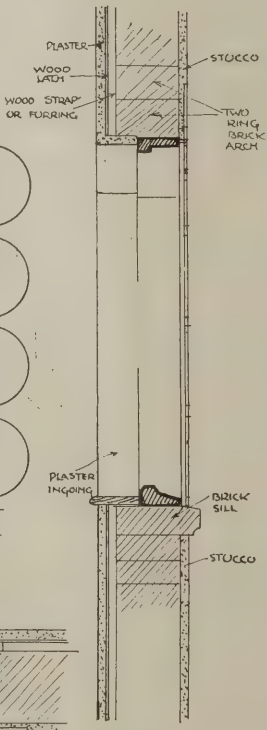
STUCCO WORK
ON A BRICK WALL



ELEVATION OF WINDOW

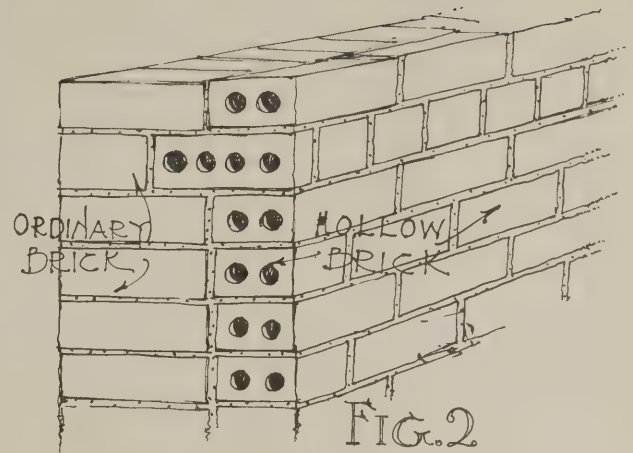
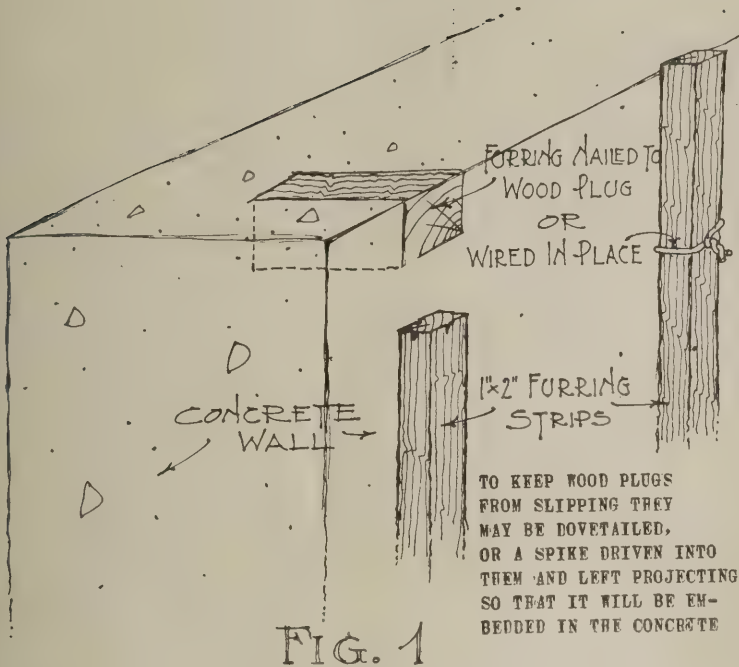


PLAN

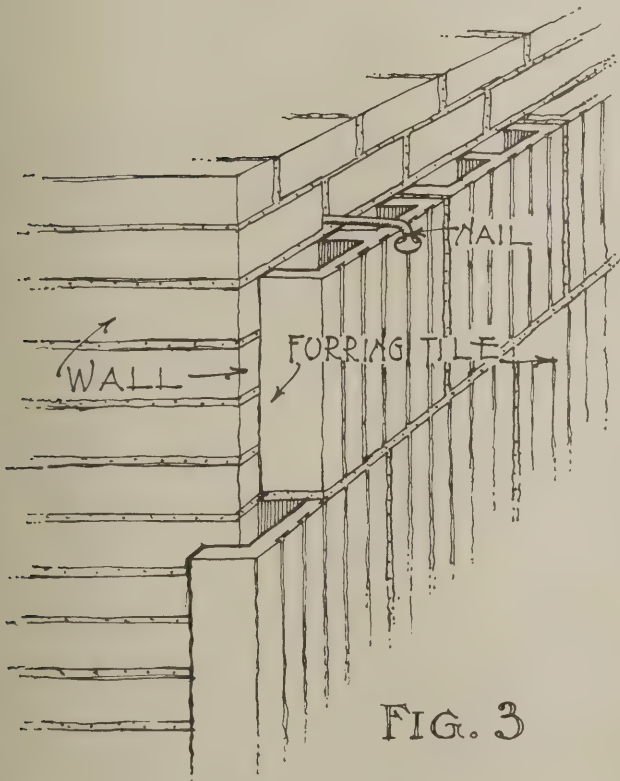


SECTION

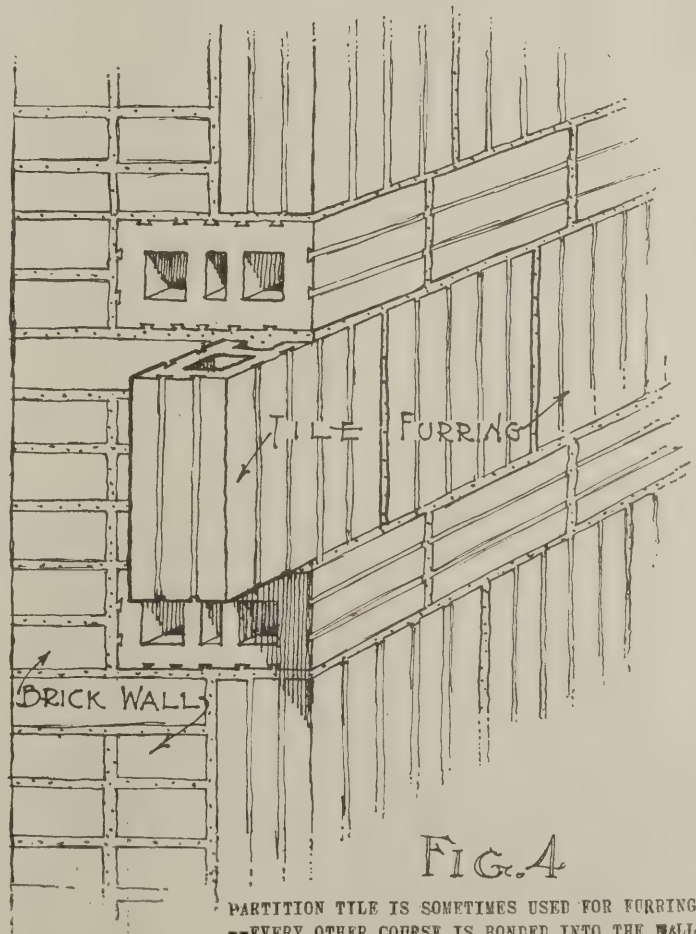
Wall Furring



SOME HANDS OF HOLLOW BRICK ARE GROOVED TO RECEIVE PLASTER.



TERRA COTTA FURRING BLOCKS ARE GROOVED TO FORM A KEY FOR PLASTER. GYPSUM TILES ARE GROOVED LIGHTLY, IF AT ALL. AS THE PLASTER ADHERES WITHOUT THE AID OF A MECHANICAL BOND.



PARTITION TILE IS SOMETIMES USED FOR FURRING. --EVERY OTHER COURSE IS BONDED INTO THE WALL.

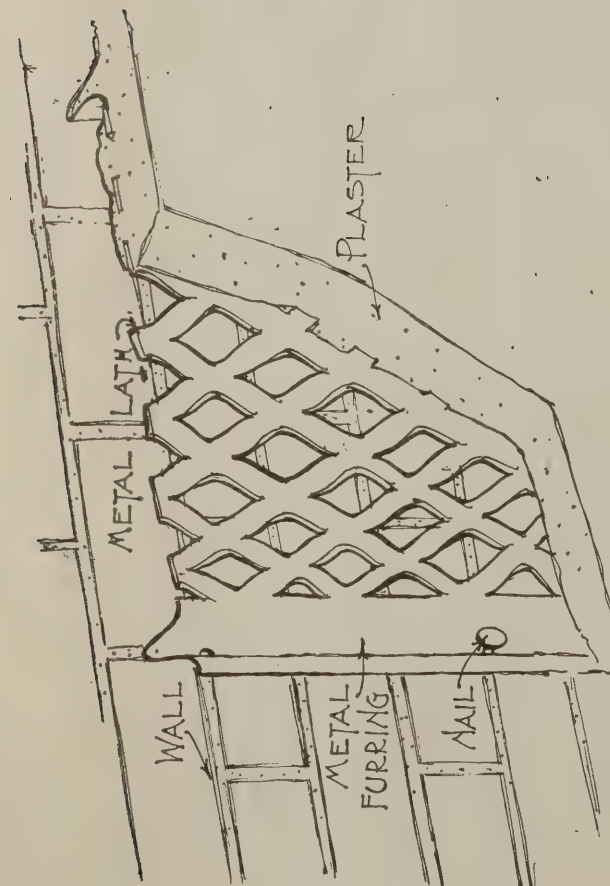
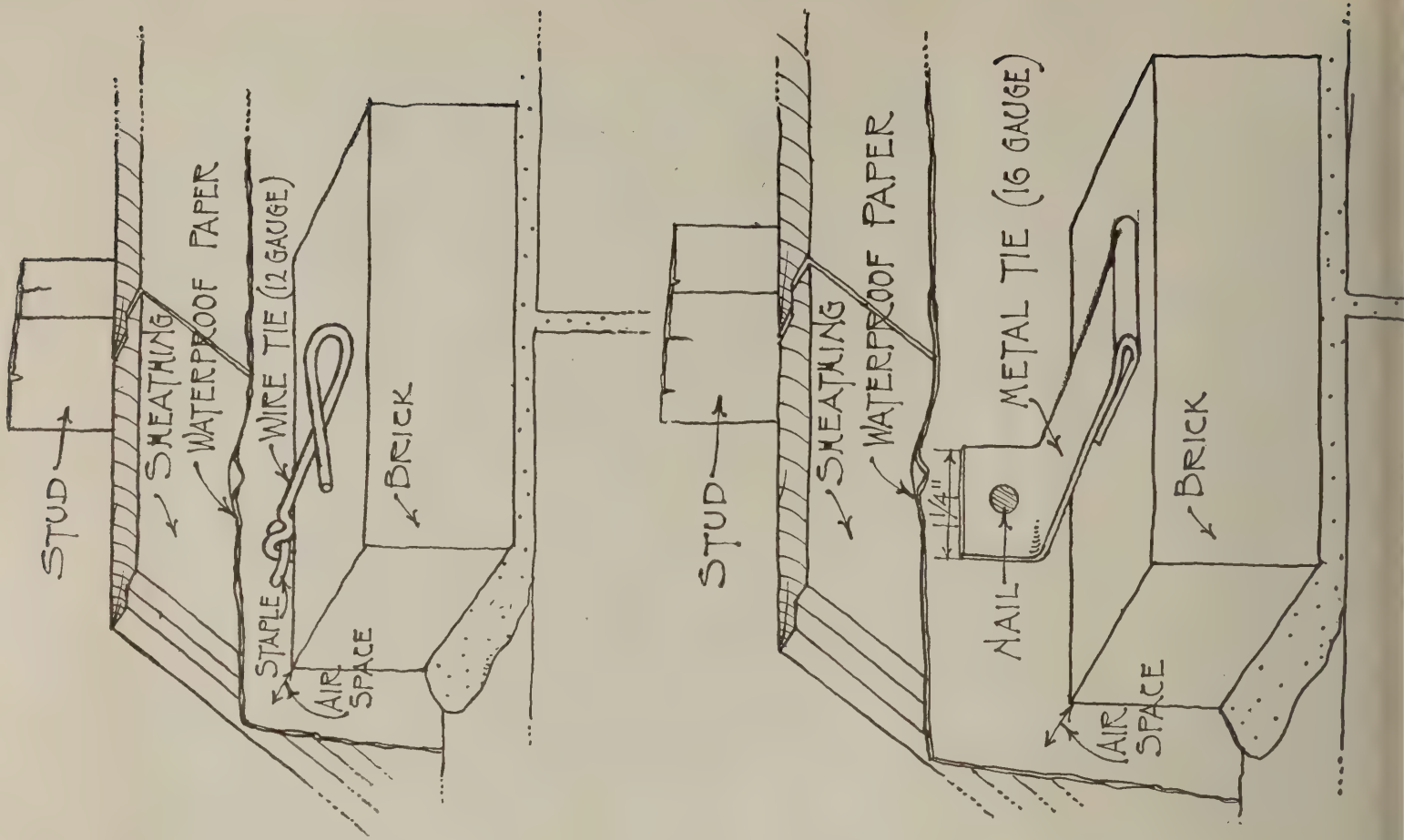
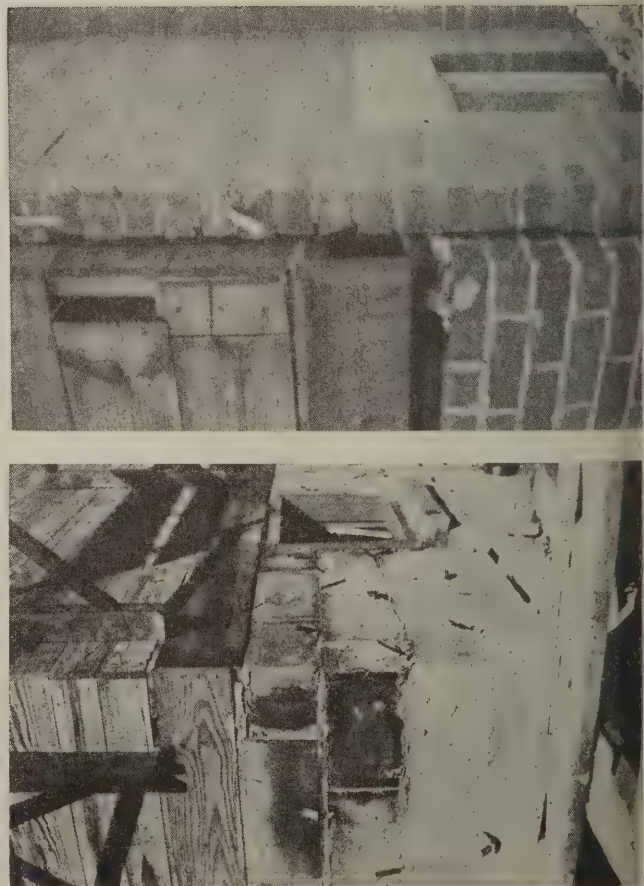


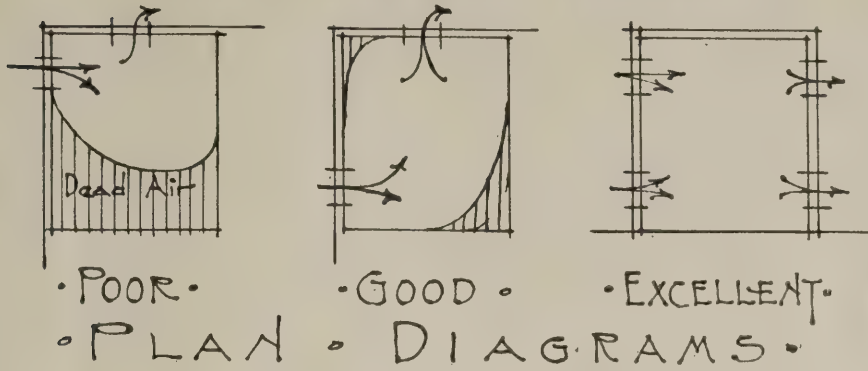
FIG. 5

METAL FURRING IS OFTEN SEPARATE FROM THE LATH, AND THE LATH IS TIED TO IT OR ATTACHED BY PRONGS ON THE FURRING, ETC. SOME BRANDS HAVE THE FURRING MOVEN INTO THE LATH

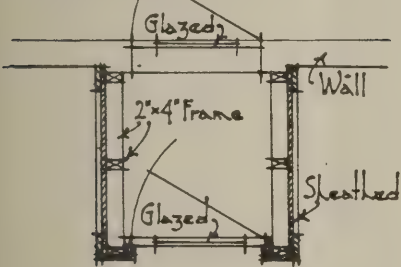
Brick Veneer



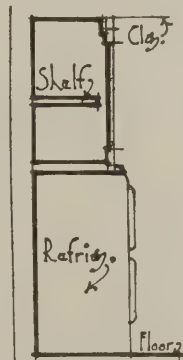
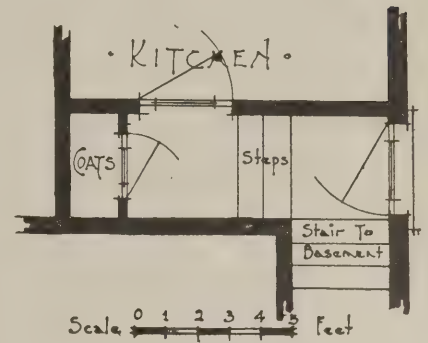
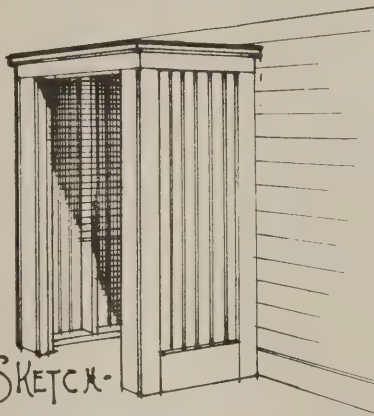
Kitchen Details and Ventilation



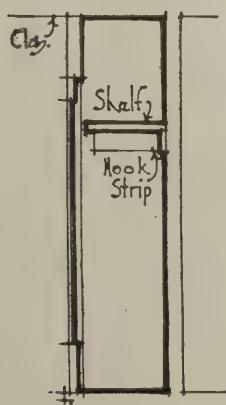
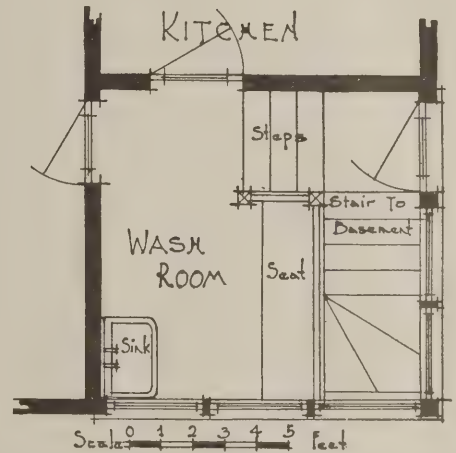
• KITCHEN •



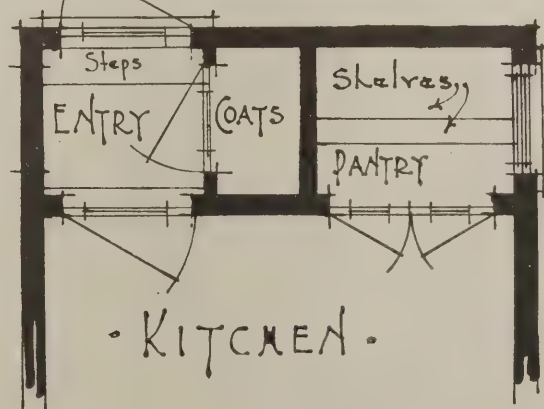
• PLAN •

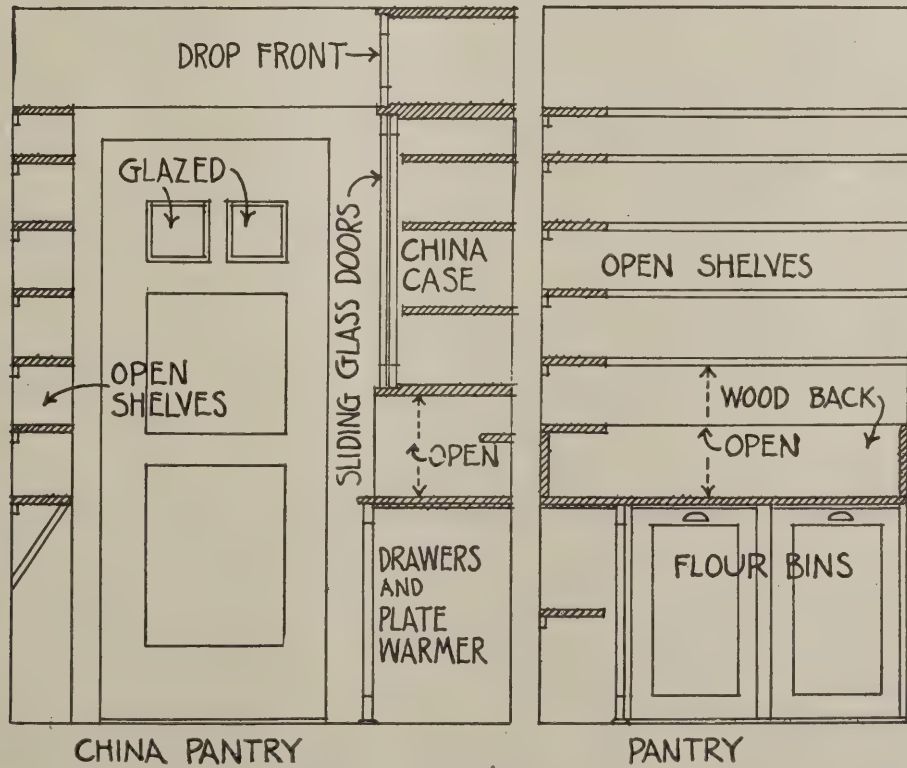
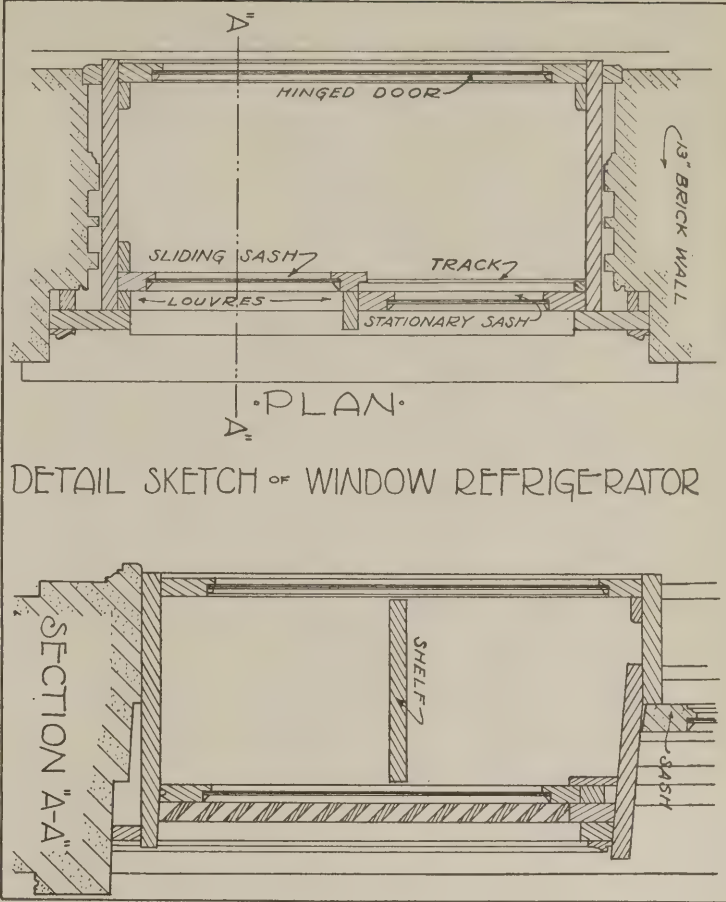
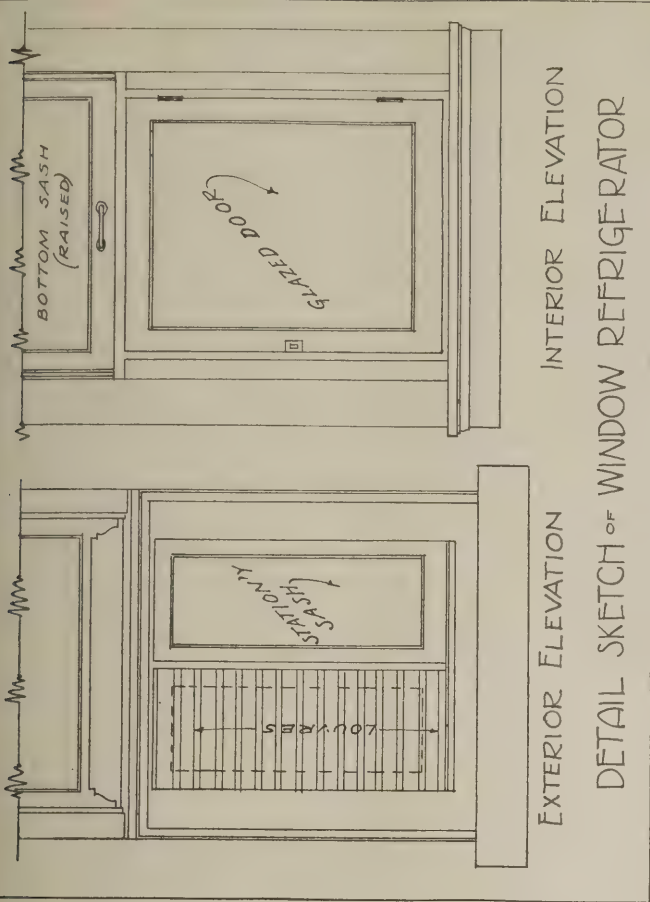


• REFRIGERATOR CABT. •

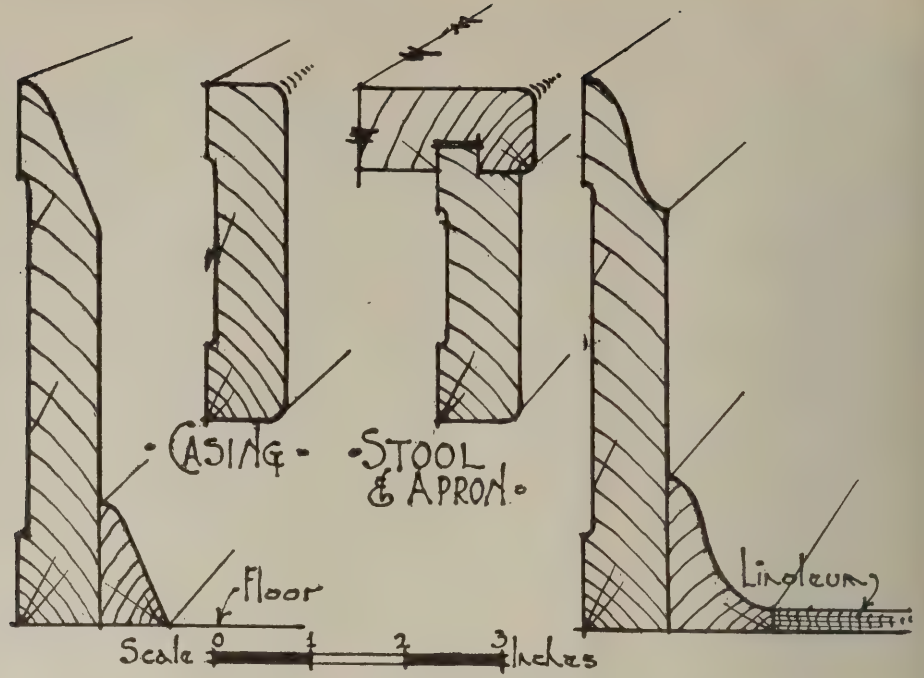


• COAT CLOSET •





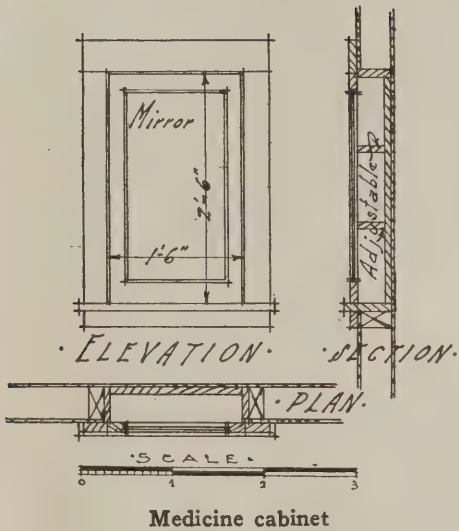
PANTRY DETAILS



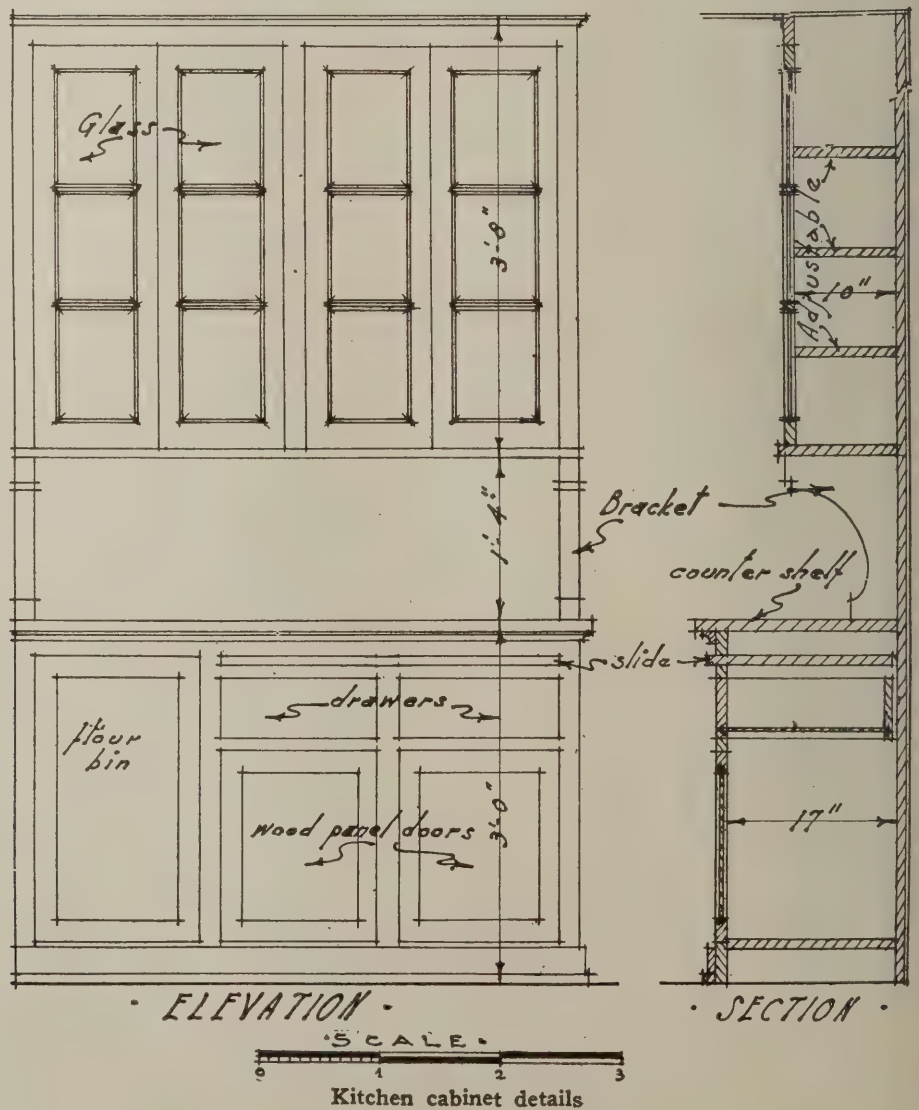
• BASE •

Interior trim for kitchen

• BASE •



Medicine cabinet

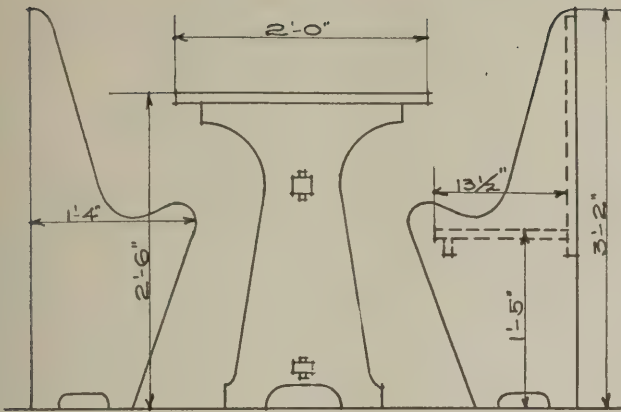


• ELEVATION •

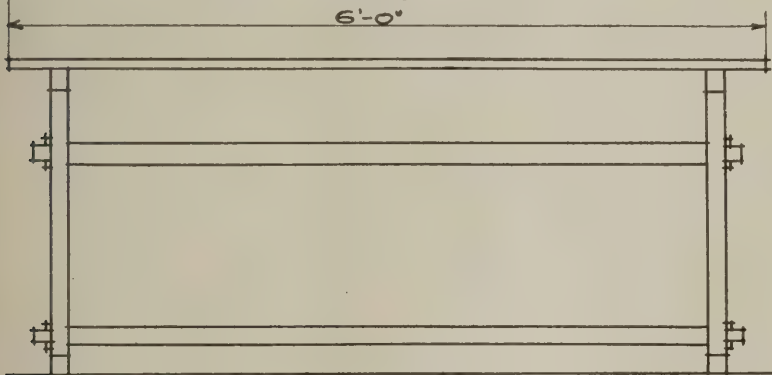
• SECTION •

Kitchen cabinet details

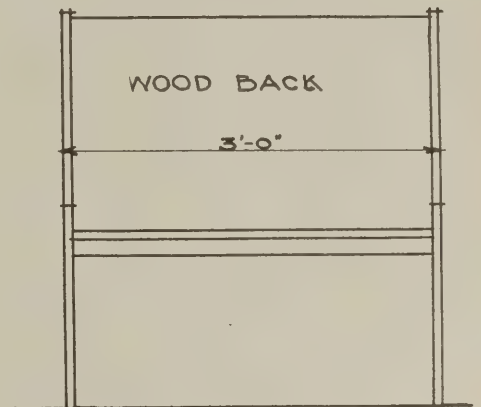
Portable Breakfast Room Details



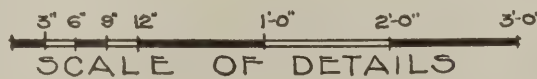
ENDS OF BENCHES & TABLE



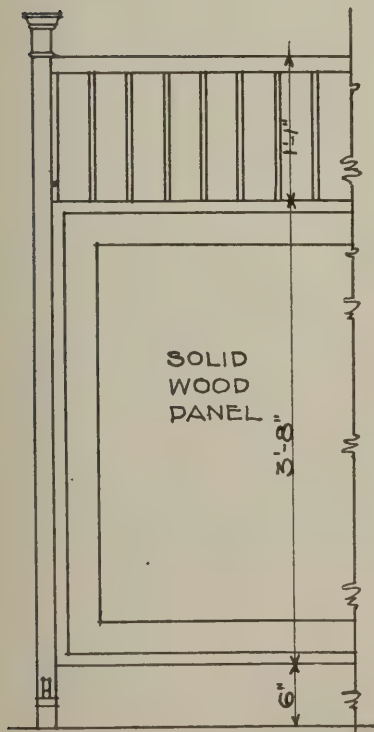
SIDE OF TABLE



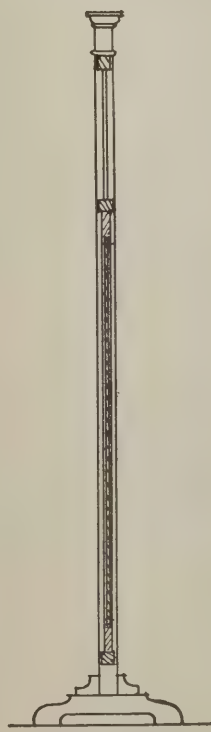
FRONT OF BENCH



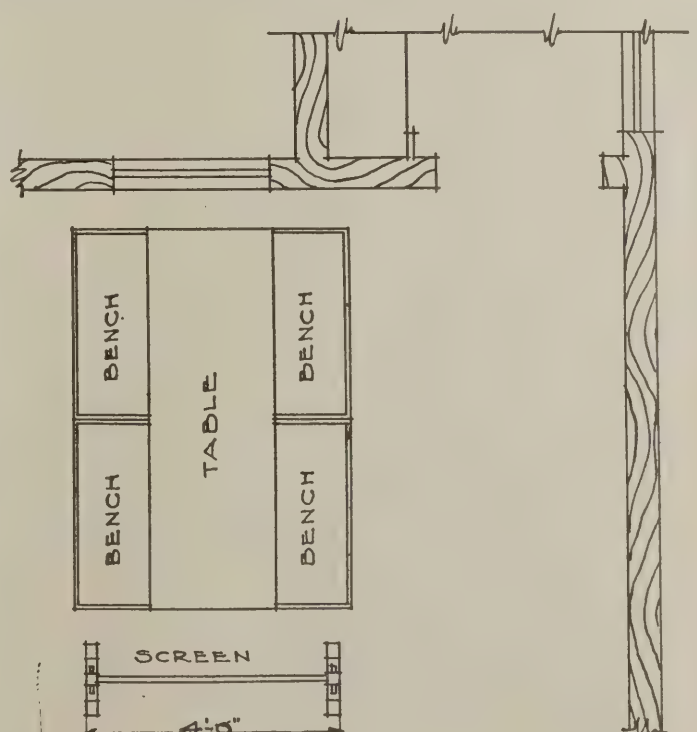
SCALE OF DETAILS



FACE OF SCREEN

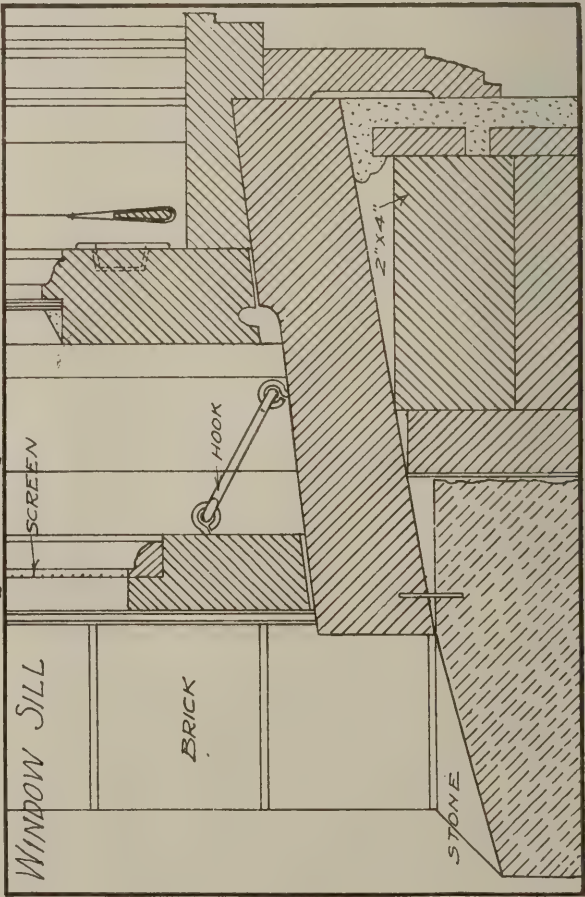
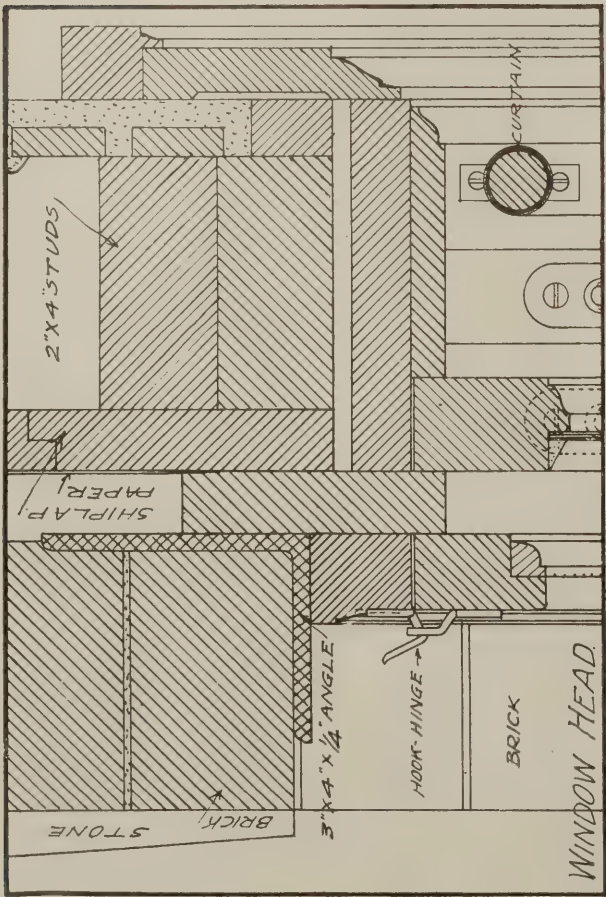


SECTION

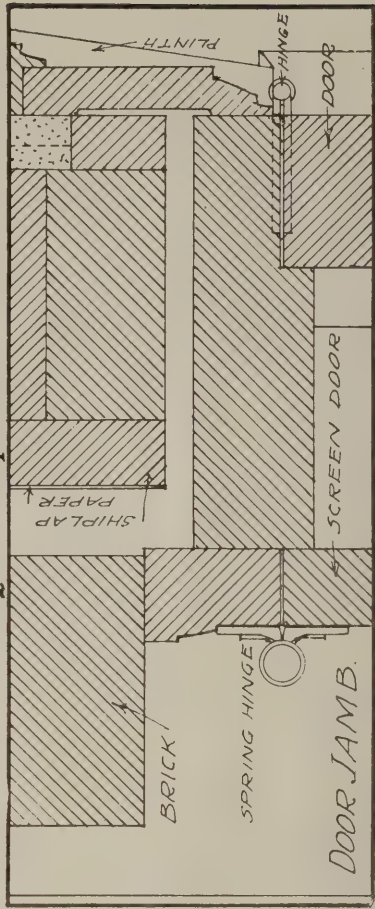
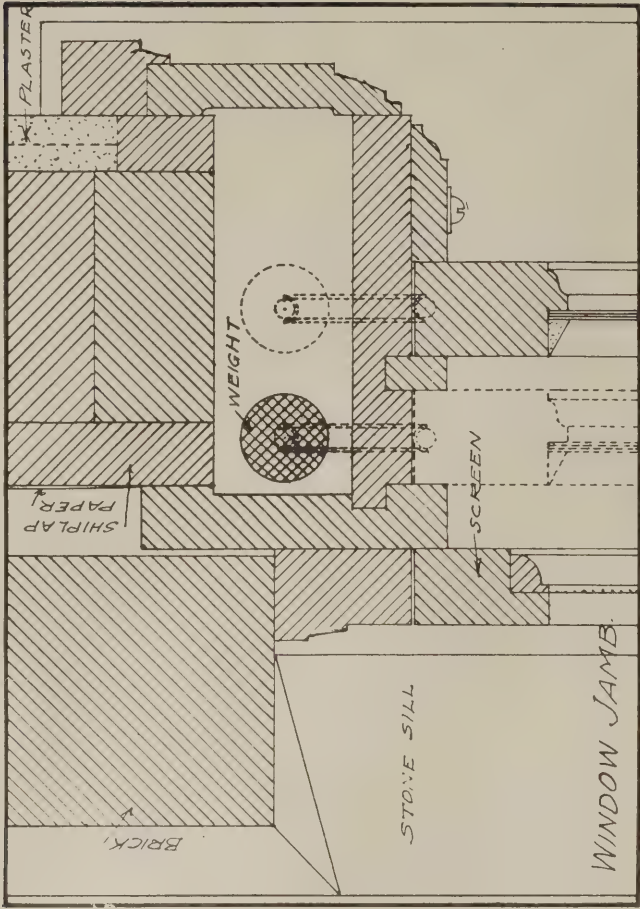


PLAN

Window Head and Window Sill Details



Window Jamb and Door Jamb Details



Details of Construction of a Box Sill

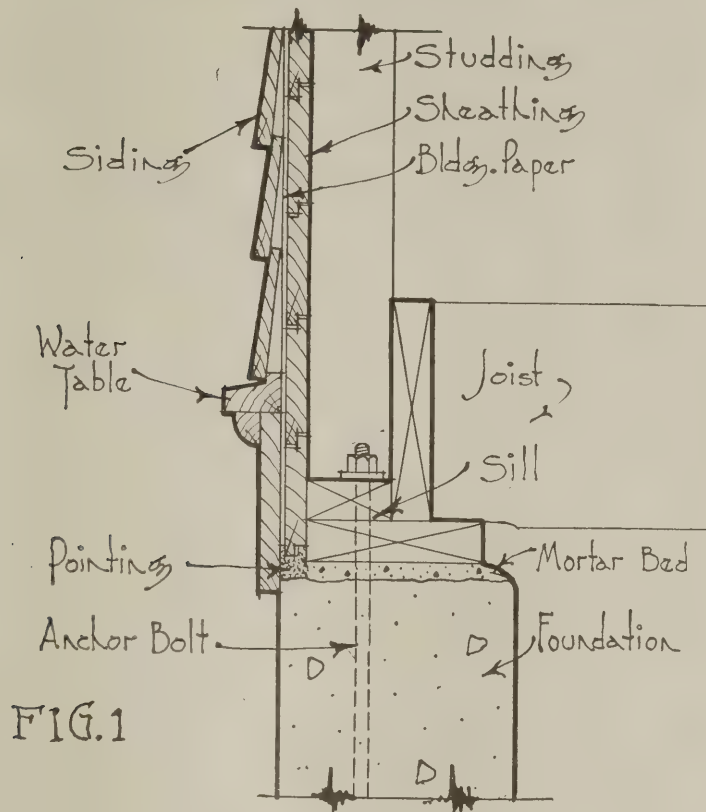
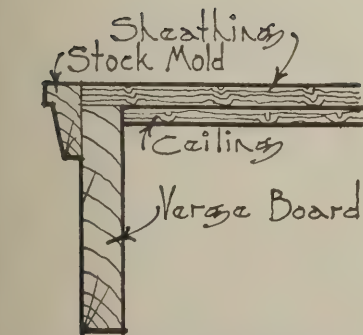
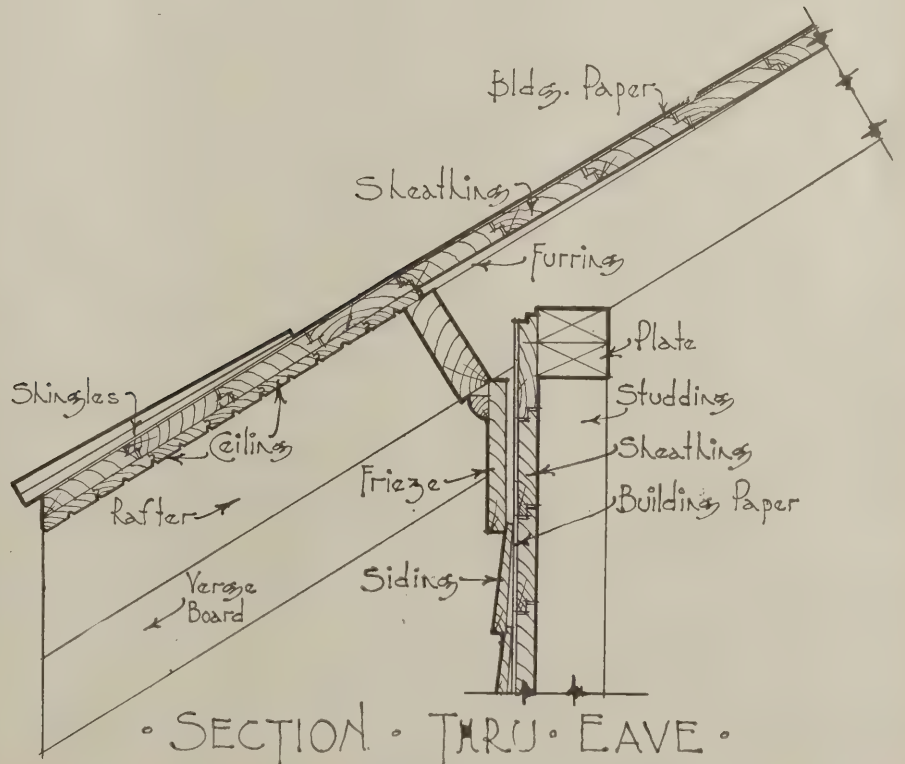


FIG. 1

• SECTION THRU SILL •

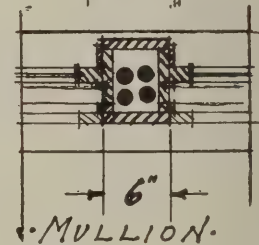
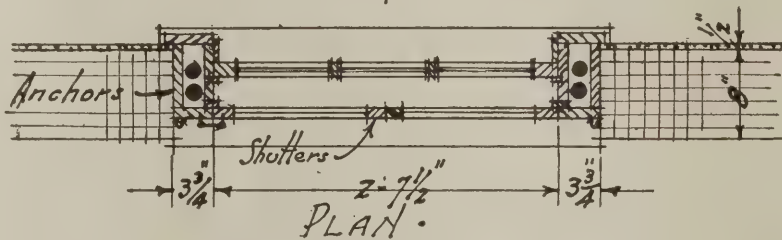
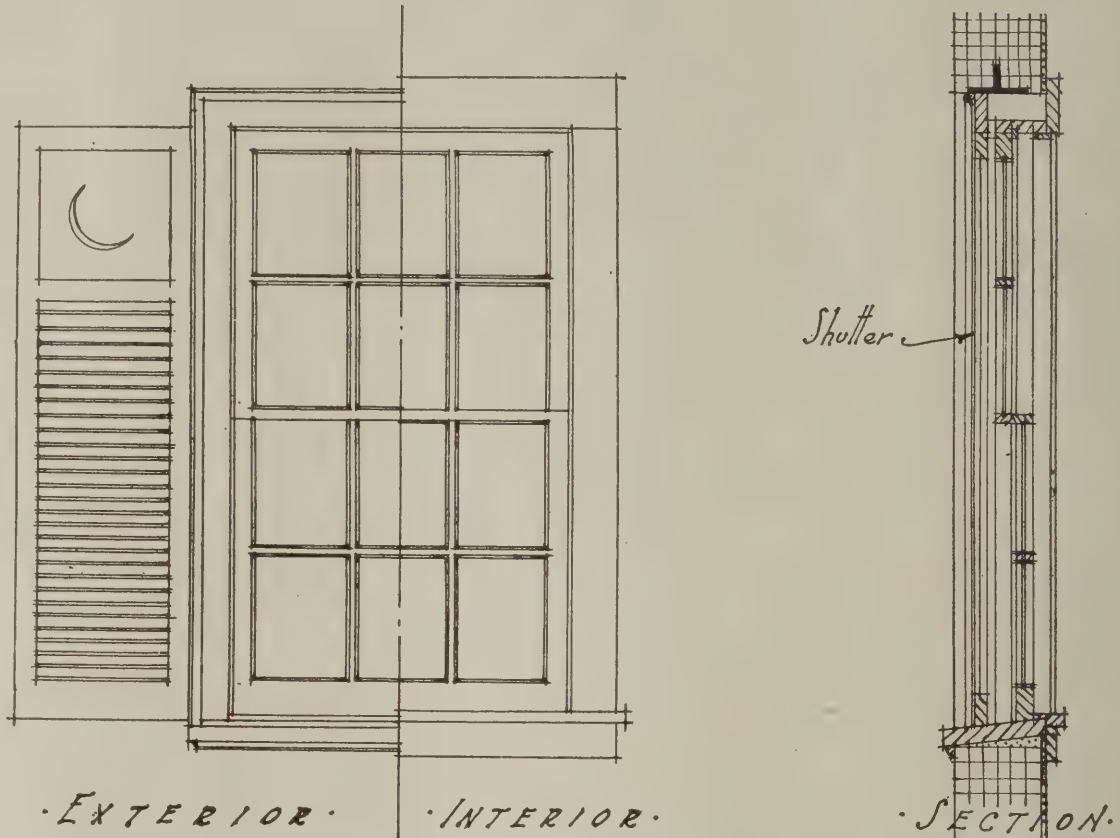


• SECTION THRU GABLE
• OVERHANG •
FIG. 3



• SECTION THRU EAVE •
FIG. 2

Windows in Hollow Tile Walls

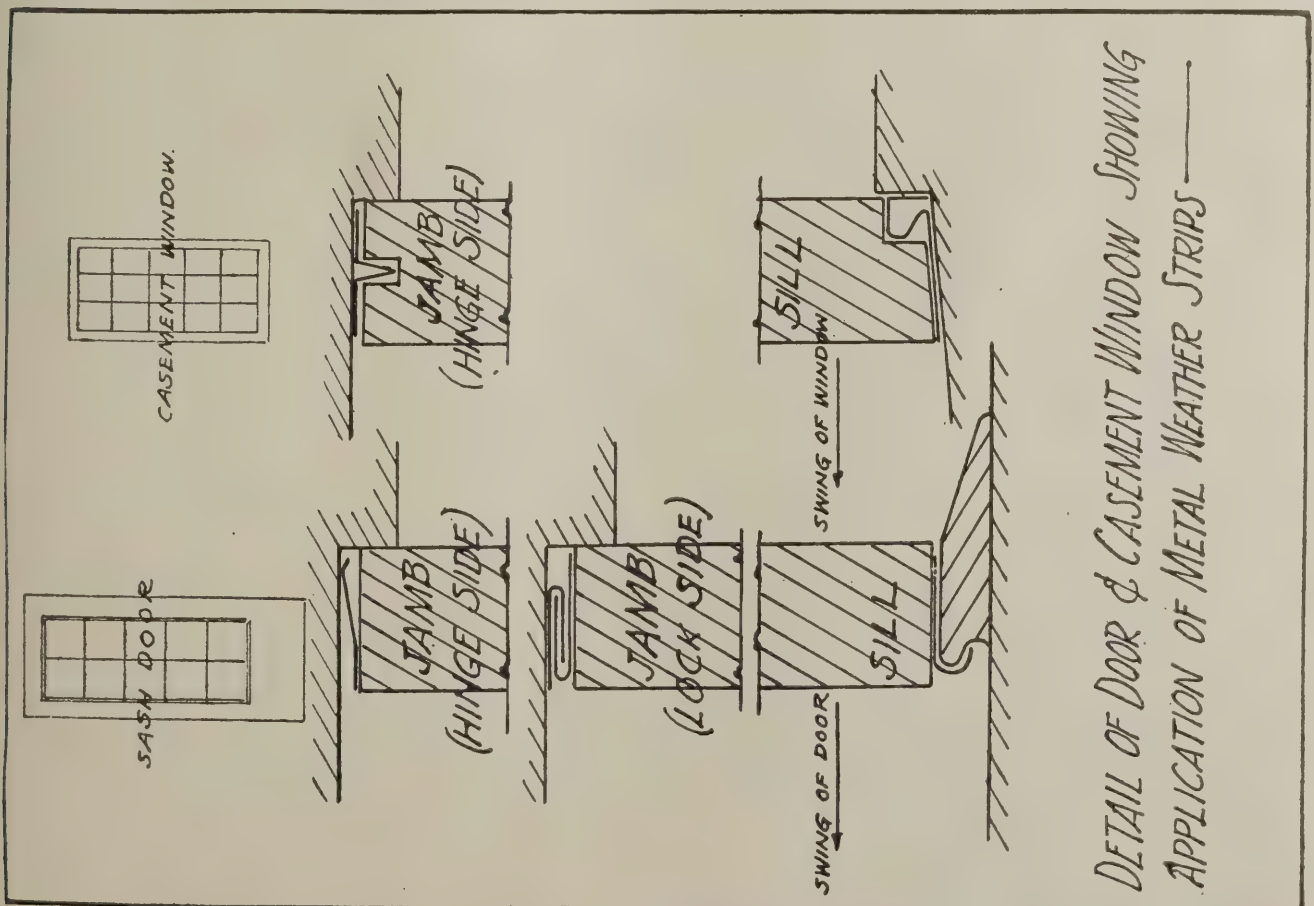
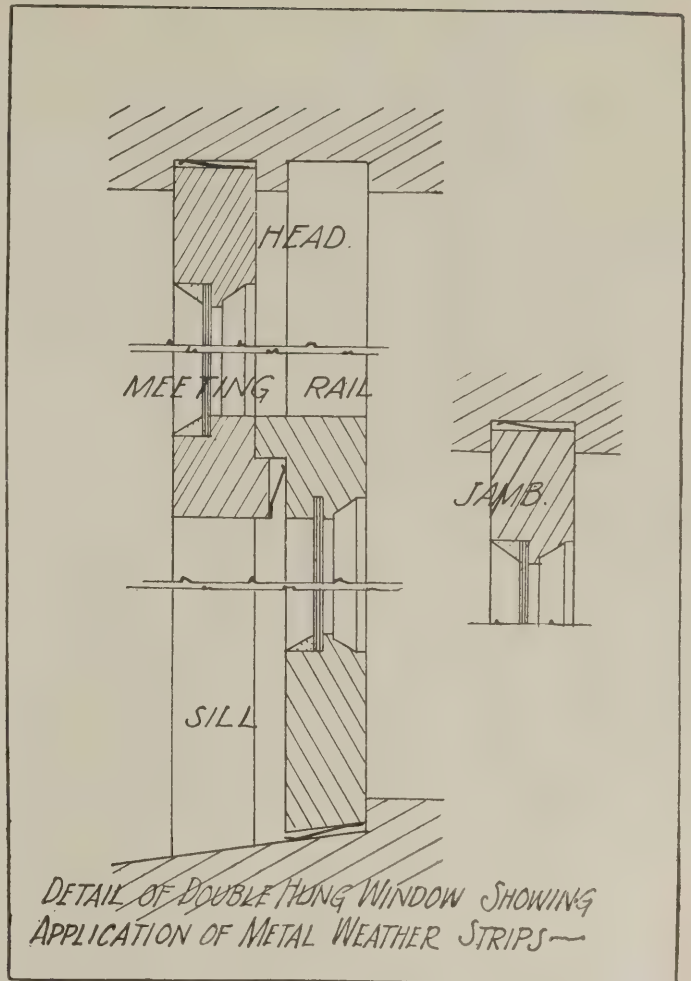
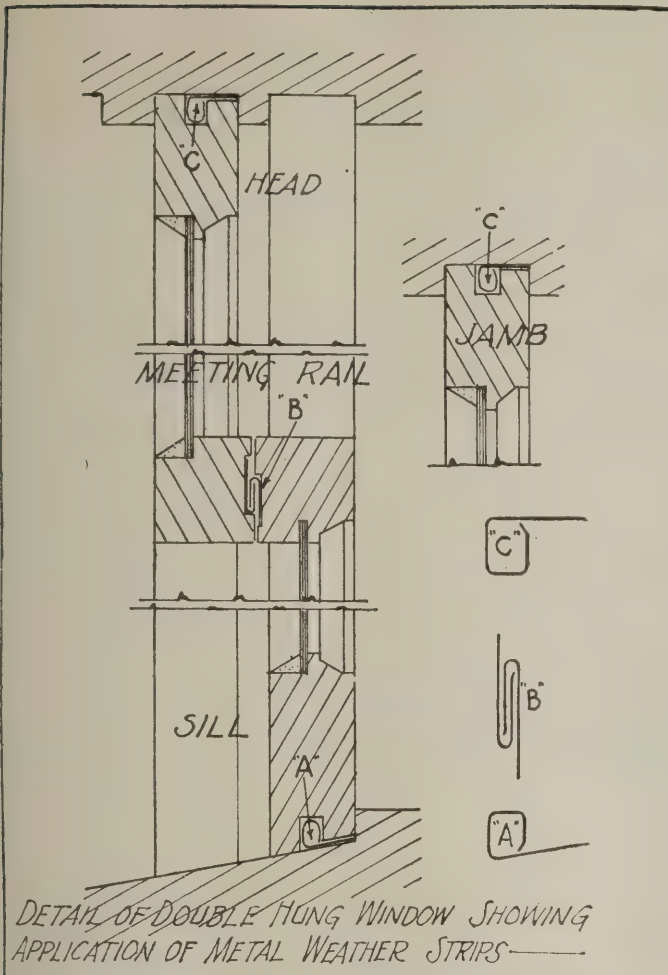


FOR DOUBLE HUNG SASH

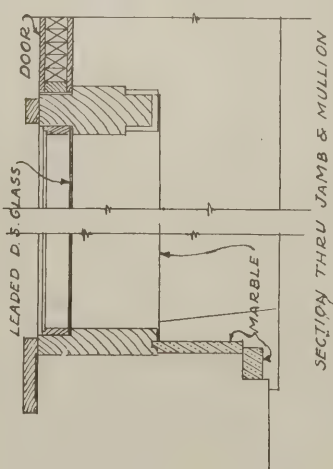


FOR CASEMENT SASH

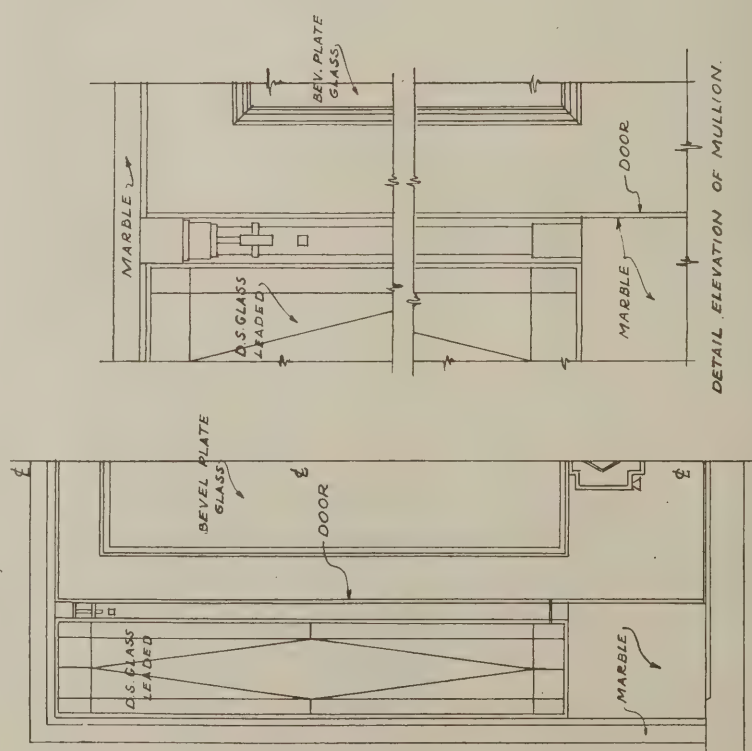
Weather Stripping



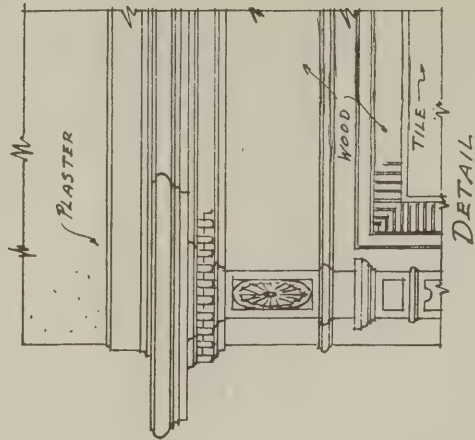
This Front Door is different from most of the recent designs. Note the use of side lights without sash, and also the use of a small piece of marble at the bottom of the sash.



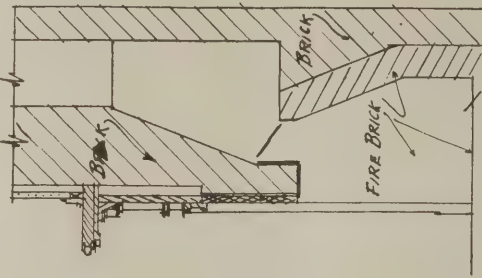
SECTION THRU JAMB & MULLION



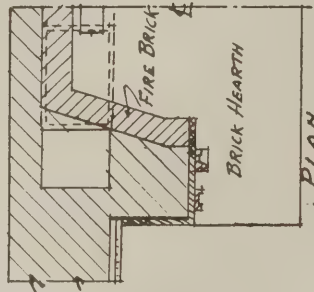
ONE HALF ELEVATION.
APARTMENT HOUSE. MAIN ENTRANCE.



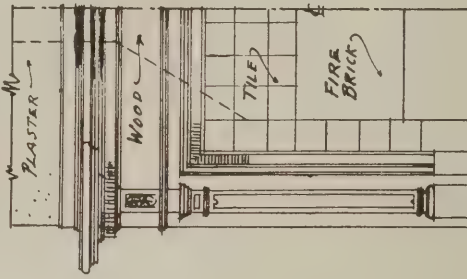
ELEVATION



DETAIL



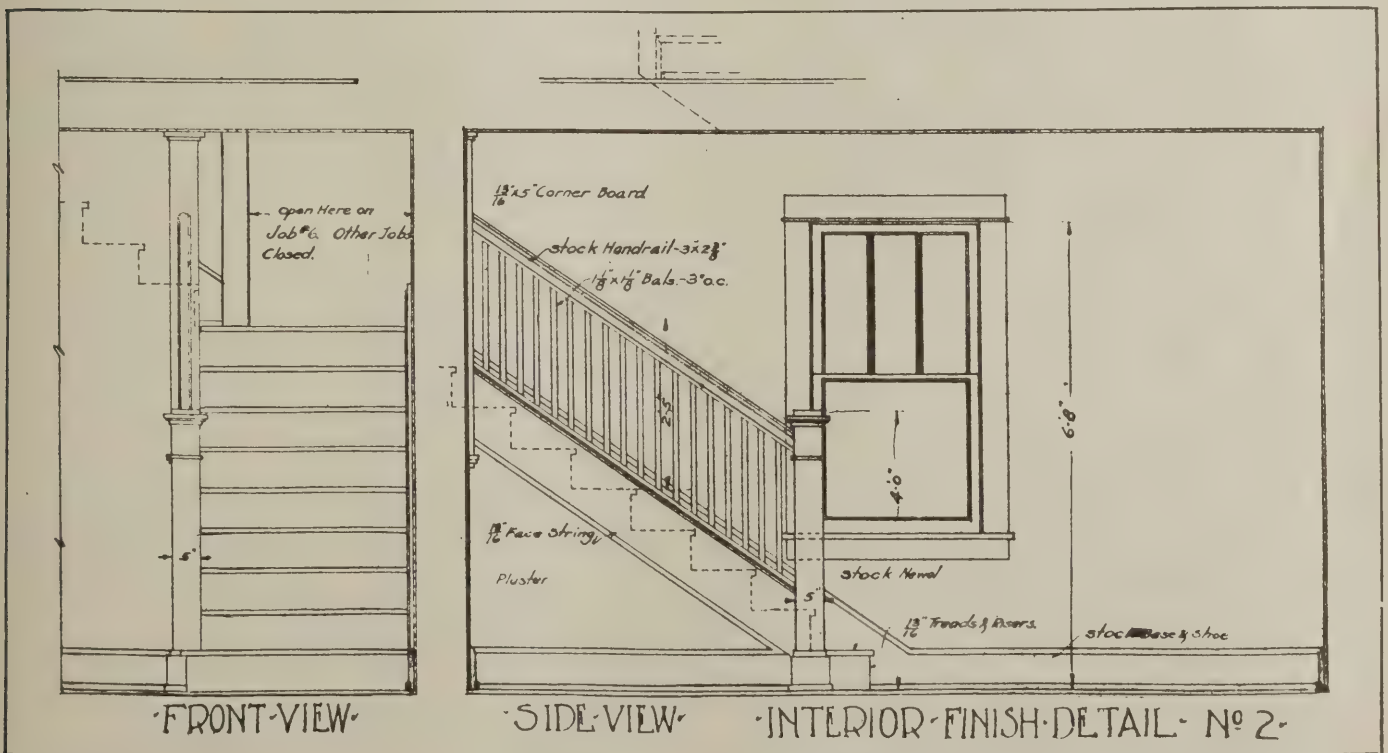
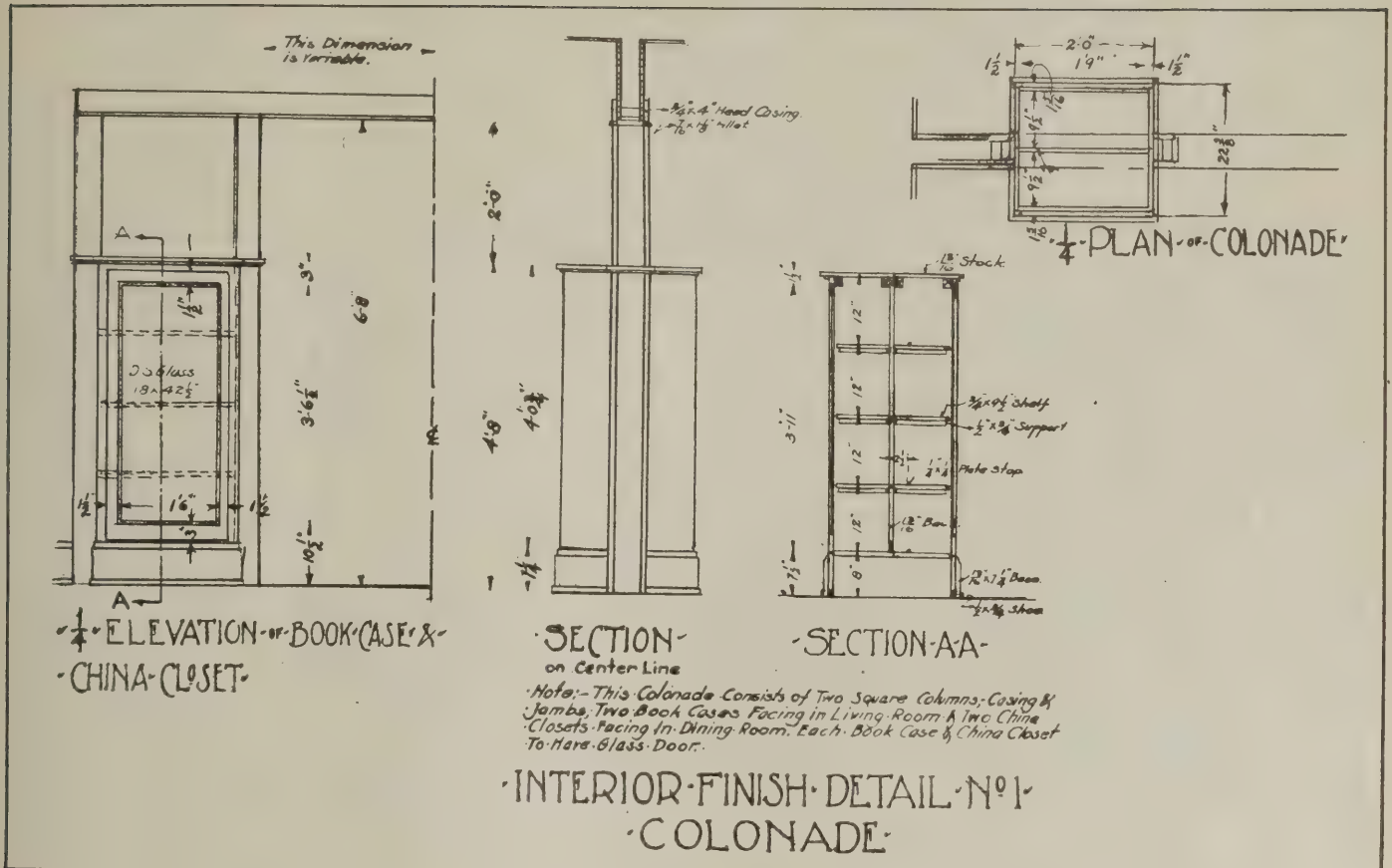
PLAN



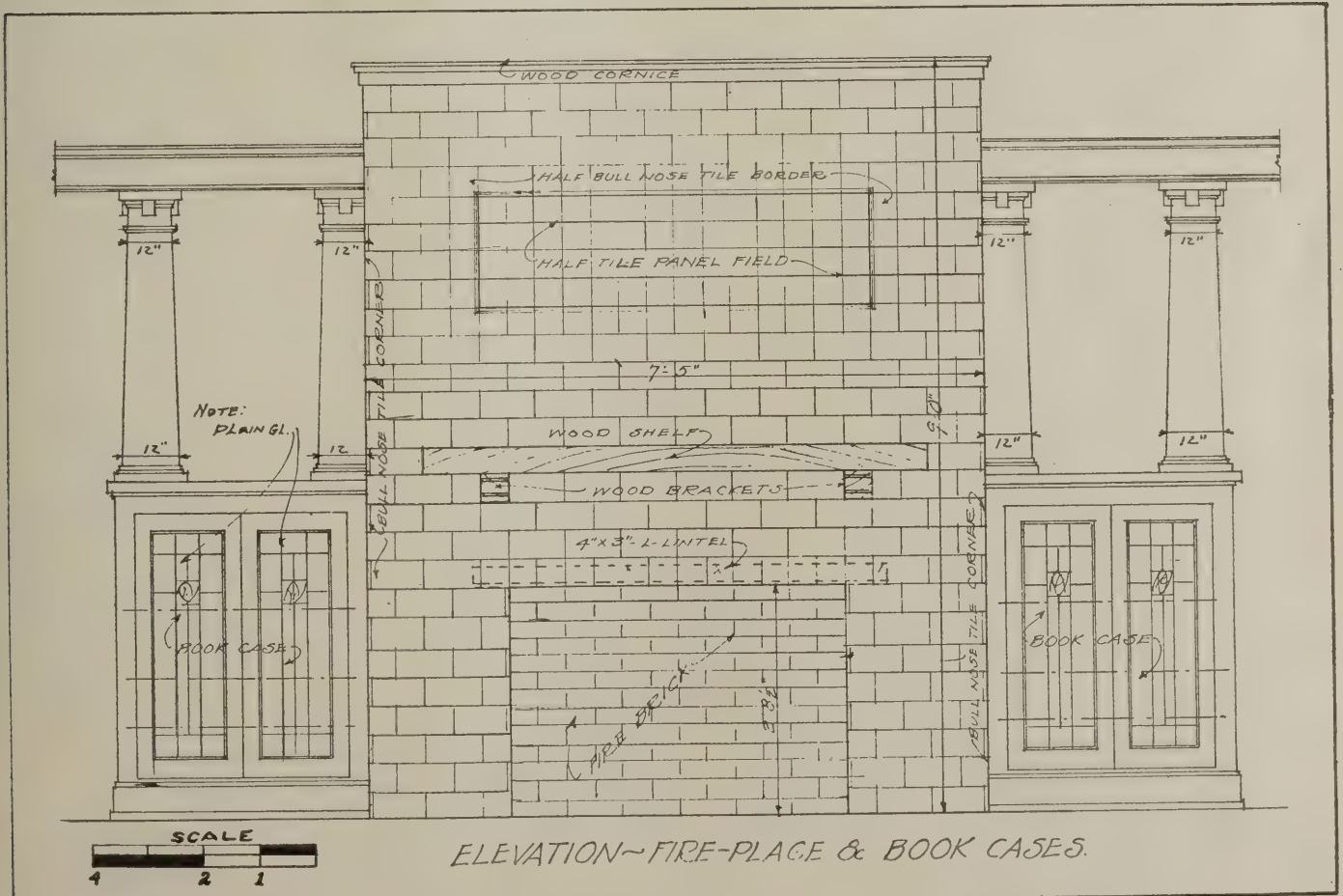
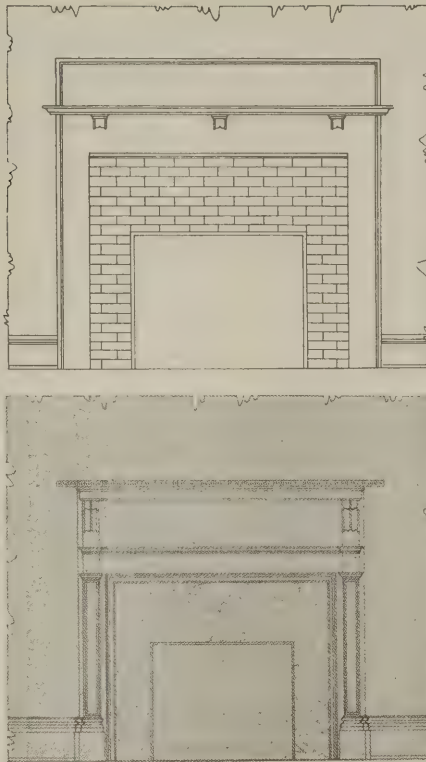
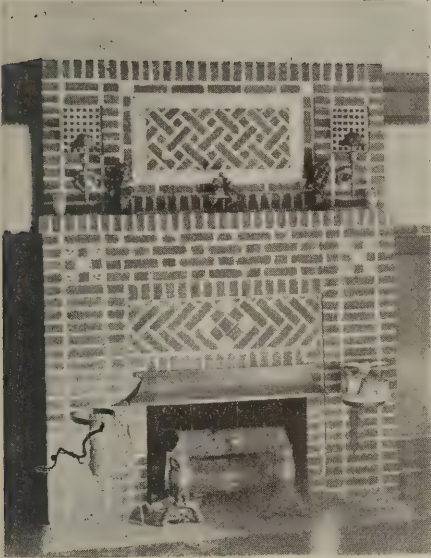
SECTION

DETAILS OF COLONIAL WOOD MANTEL

This detail taken from recently constructed Chicago apartment buildings shows an attractive Colonial Wood Mantel with tile facings and hearth. Mantles of this type are growing in favor as best suited to the average small room.



FIREPLACES



BUILDING
A
SQUARE
DOME
WITH AN
OCTAGON
TOP

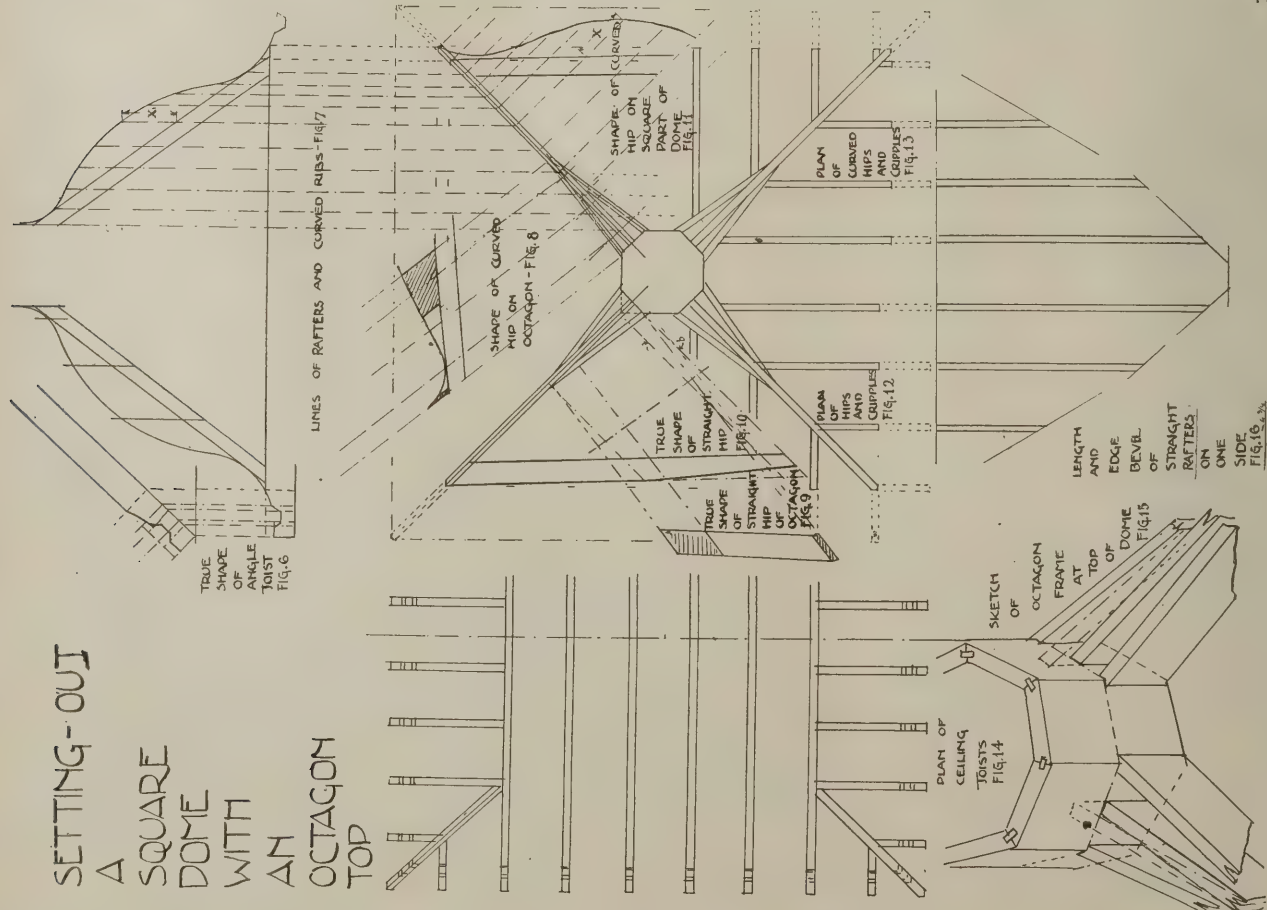
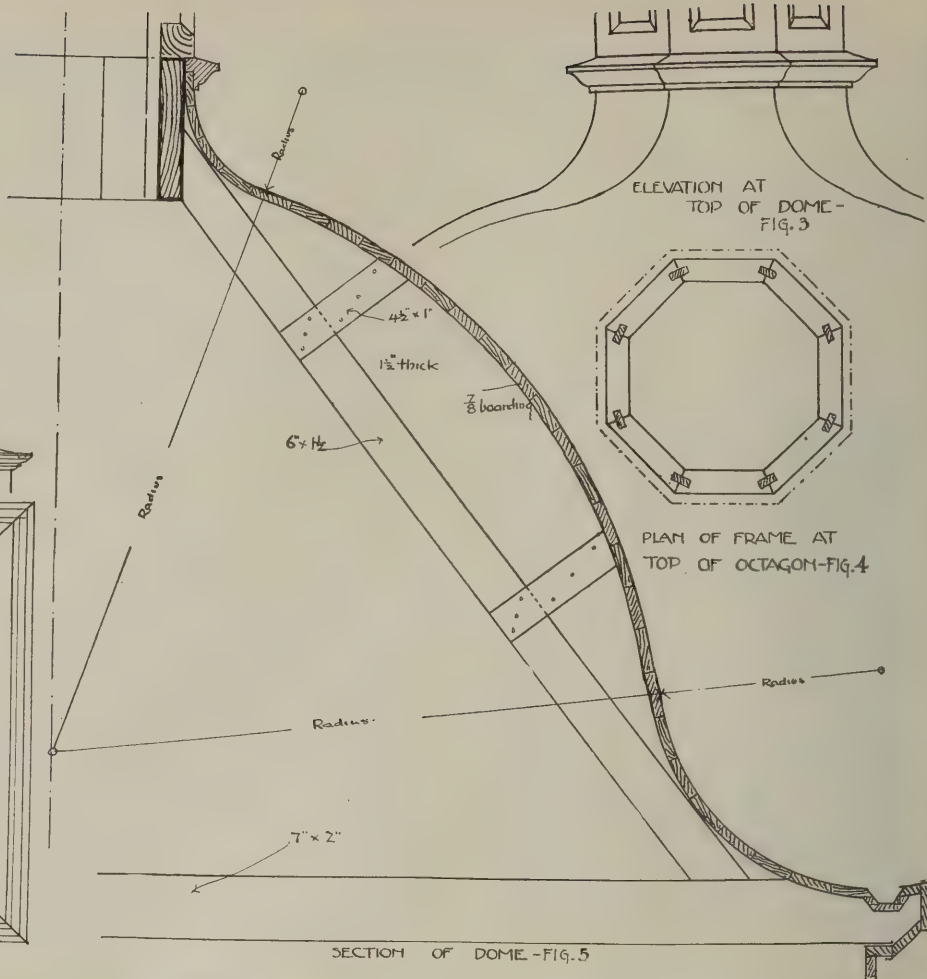
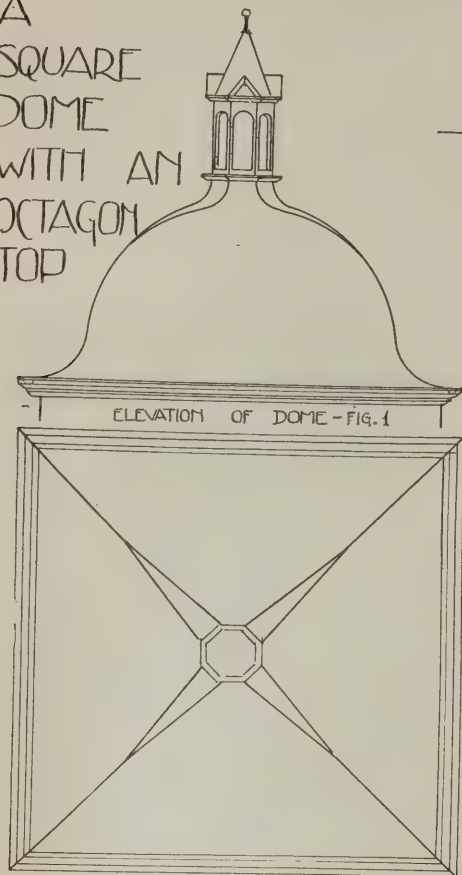
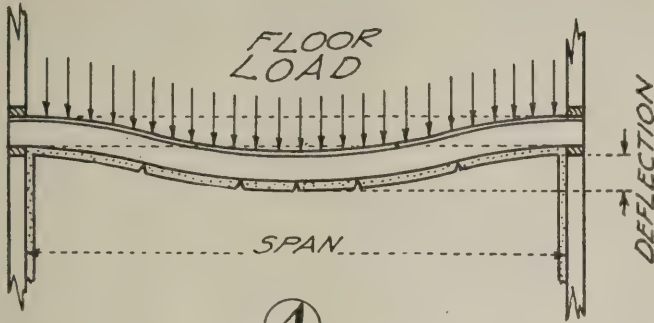
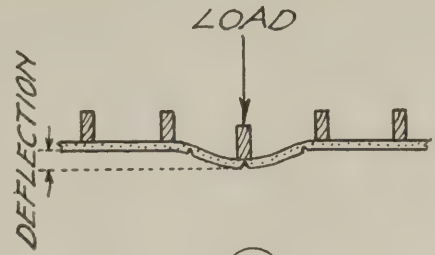


FIG. 1.



(A)

Plaster cracks crosswise of joists caused by excessive deflection.

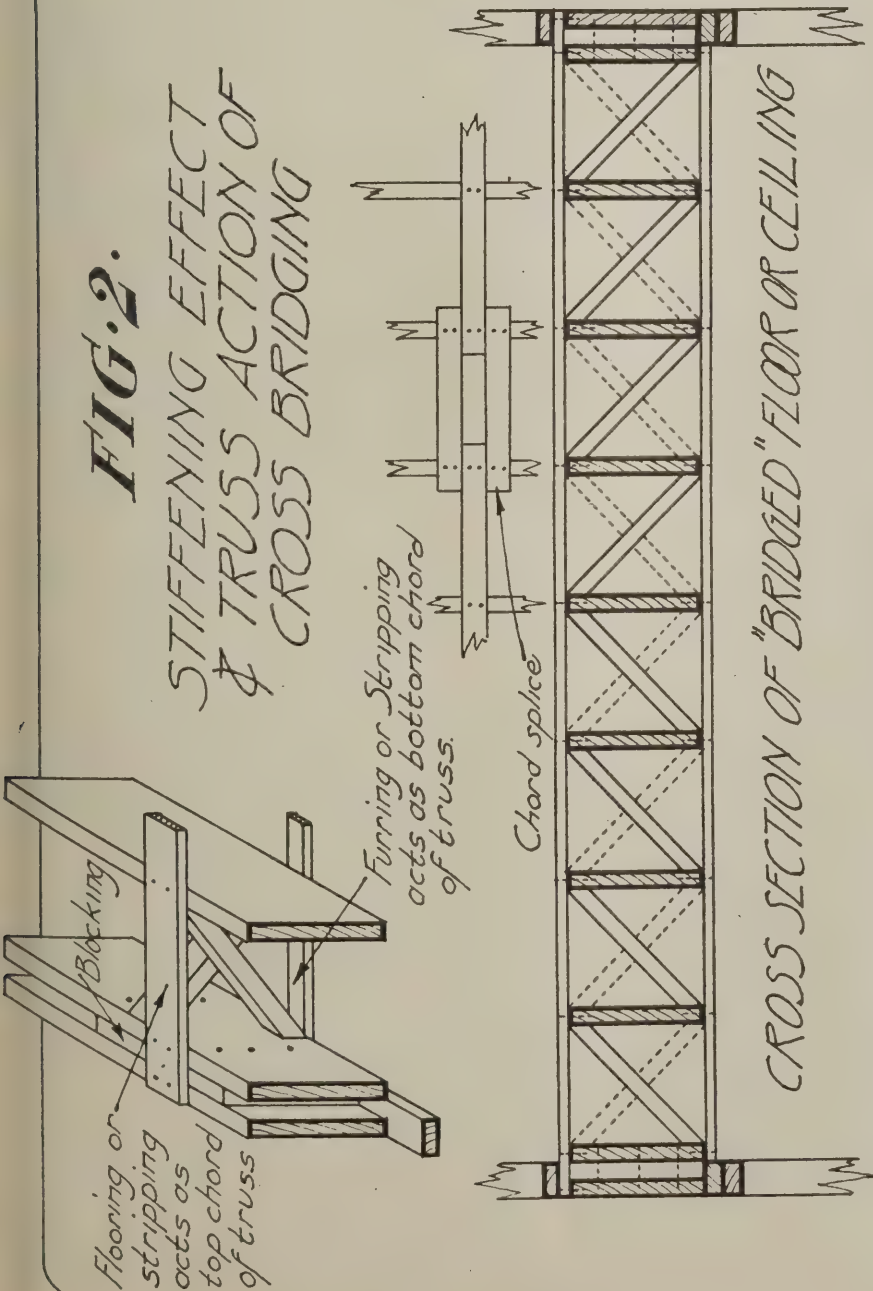


(B)

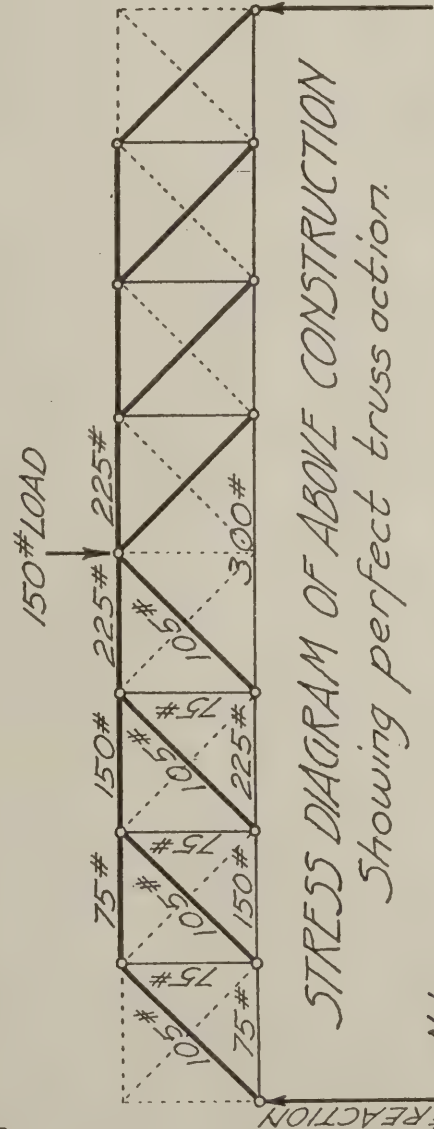
Plaster cracks lengthwise of joists caused by unequal deflection.

FIG. 2.

STIFFENING EFFECT
& TRUSS ACTION OF
CROSS BRIDGING



CROSS SECTION OF "BRIDGED" FLOOR OR CEILING



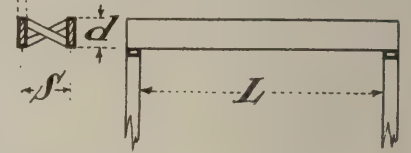
Note:

Portions diagrammed in heavy solid lines take compressive stress.
Portions in light solid lines take tensile stress.
Portions in light dotted lines act as stiffeners & bracing.

TABLE FOR DETERMINING THE SIZE, SPACING, & SPAN OF TIMBER JOISTS FOR THE SUPPORT OF FLOORS & CEILINGS.

Size of joist $b \times d$	Dist. on ctrs. s	MAXIMUM SPAN L		
		For the support of a floor & plastered ceiling	For the support of a floor only	For the support of a plastered ceiling only
2"x3"	12"	5'-6"	6'-5"	8'-5"
	16"	5'-1"	5'-7"	7'-9"
	20"	4'-7"	5'-1"	7'-4"
	24"	4'-3"	4'-7"	6'-10"
2"x4"	12"	7'-4"	8'-7"	11'-3"
	16"	6'-7"	7'-6"	10'-5"
	20"	6'-2"	6'-8"	9'-8"
	24"	5'-7"	6'-1"	9'-3"
2"x6"	12"	11'-0"	12'-8"	16'-6"
	16"	10'-1"	11'-2"	15'-3"
	20"	9'-2"	10'-0"	14'-4"
	24"	8'-5"	9'-2"	13'-7"
2"x8"	12"	14'-7"	16'-9"	21'-3"
	16"	13'-6"	14'-8"	20'-0"
	20"	12'-2"	13'-3"	18'-9"
	24"	11'-2"	12'-2"	17'-9"
2"x10"	12"	18'-4"	20'-9"	26'-0"
	16"	16'-8"	18'-4"	24'-4"
	20"	15'-2"	16'-5"	23'-2"
	24"	13'-10"	15'-2"	22'-1"
2"x12"	12"	22'-0"	24'-8"	30'-0"
	16"	20'-1"	21'-9"	28'-8"
	20"	18'-1"	19'-7"	27'-4"
	24"	16'-7"	18'-1"	26'-0"
2"x14"	12"	25'-7"	28'-7"	
	16"	23'-4"	25'-4"	
	20"	20'-9"	22'-8"	
	24"	19'-3"	20'-9"	
2"x16"	12"	29'-4"	32'-5"	
	16"	26'-6"	28'-8"	
	20"	23'-9"	25'-9"	
	24"	22'-0"	23'-9"	

$b=2"$



Notes:

The tabulated spans can safely be used for any kind of structural timber, and were computed on the following data:

LOADS

Wt. of joists @ 3 lbs. per bd. ft.
Wt. of double floor @ 6 lbs. per sq. ft.
Wt. of plastering @ 9 lbs. per sq. ft.
Live load on floors @ 40 lbs. per sq. ft.
All loads assumed as uniformly distributed over length of span.

STRESSES

Maximum fibre stress @ 1000 #/sq. in.
Modulus of elasticity @ 1,000,000 #/sq. in.

DEFLECTION

Live-load deflection, for floors, limited to $\frac{1}{36}$ " per ft. of span.
Dead-load deflection, ceiling only, limited to $\frac{1}{36}$ " per ft. of span.
Dead-load deflection, for floors, limited by safe stress on joist.

FORMULAS

Spans enclosed by heavy solid lines are governed by the live-load deflection, & were computed as follows:-

$$L_1 = \frac{6.27d}{\sqrt[3]{w_1}}$$

Spans enclosed by heavy dotted lines are governed by the dead-load deflection, & were computed as follows:-

$$L_1 = \frac{6.27d}{\sqrt[3]{w}}$$

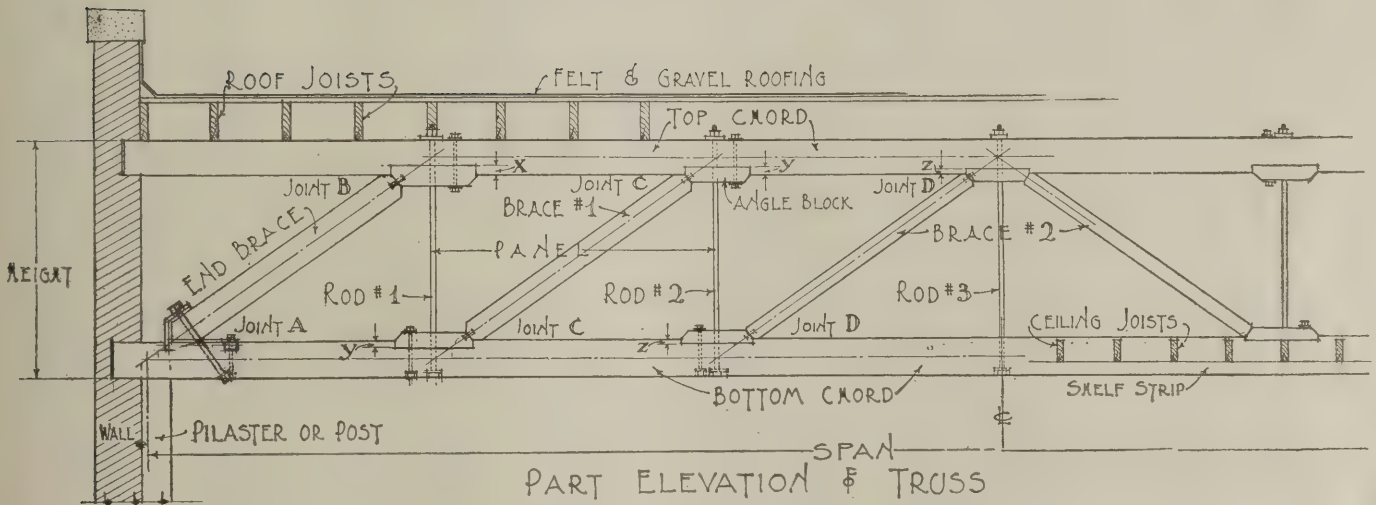
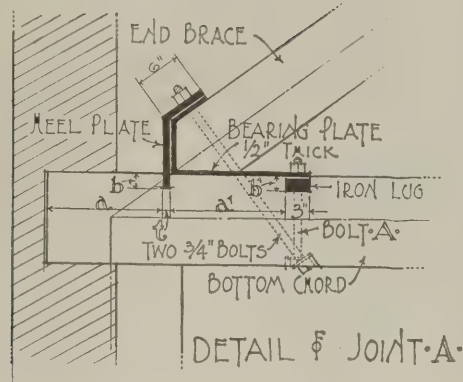
Spans not noted above are governed by the max. fibre stress caused by the total live load & dead load acting at the same time, & were computed as follows:-

$$L_1 = \frac{14.9d}{\sqrt{w_1 + w}}$$

L_1 = span in ft.
 d = depth of joist, in inches.
 w_1 = live load per lineal ft. of span.
 w = dead load per lineal ft. of span.



SIX-PANEL HOWE TRUSSES



CONSTRUCTION DATA FOR 6-PANEL HOWE TRUSSES																		
SPACING	HEIGHT	TOP CHORD	BOTTOM CHORD	END BRACE	BRACE #1	BRACE #2	ROD #1	ROD #2	ROD #3	DIMENSIONS, ETC., FOR JOINTS								
SPAN	HEIGHT	TOP CHORD	BOTTOM CHORD	END BRACE	BRACE #1	BRACE #2	ROD #1	ROD #2	ROD #3	a or a'	t	b or b'	BOLTS	DAP-X	DAP-Y	DAP-Z		
40'-0"	12'-0"	8" x 8"	8" x 8"	8" x 8"	6" x 6"	6" x 4"	1 1/4"	3/4"	3/4"	12"	3/4"	1 1/4"	TWO 3/4"	2"	1 1/4"	3/4"		
	16'-0"	8" x 10"	8" x 10"	8" x 10"	6" x 6"	6" x 4"	1 3/8"	7/8"	3/4"	15"	7/8"	1 3/4"	THREE 3/4"	2 1/2"	1 5/8"	3/4"		
	20'-0"	10" x 10"	10" x 10"	10" x 10"	6" x 6"	6" x 4"	1 1/2"	1"	3/4"	15"	1"	1 3/4"	THREE 3/4"	2 3/4"	2"	3/4"		
50'-0"	12'-0"	8" x 10"	8" x 10"	8" x 8"	6" x 6"	6" x 4"	1 5/8"	7/8"	3/4"	15"	7/8"	1 3/4"	THREE 3/4"	2 1/2"	1 1/2"	3/4"		
	16'-0"	10" x 10"	10" x 10"	10" x 8"	6" x 6"	6" x 4"	1 1/2"	1"	3/4"	15"	1"	1 3/4"	THREE 3/4"	2 3/4"	2"	3/4"		
	20'-0"	12" x 12"	12" x 12"	12" x 8"	6" x 6"	6" x 4"	1 3/4"	1 1/8"	3/4"	18"	1"	2"	THREE 7/8"	3 1/4"	2 1/2"	1"		
60'-0"	12'-0"	10" x 10"	10" x 10"	10" x 8"	8" x 6"	6" x 6"	1 1/2"	1"	3/4"	15"	1"	1 3/4"	THREE 3/4"	2 1/2"	1 3/4"	3/4"		
	16'-0"	10" x 12"	10" x 12"	10" x 8"	8" x 6"	6" x 6"	1 5/8"	1 1/8"	3/4"	18"	1"	2"	THREE 7/8"	3 1/4"	2 1/4"	1"		
	20'-0"	12" x 14"	12" x 14"	12" x 10"	10" x 8"	8" x 6"	1 7/8"	1 1/4"	3/4"	18"	1 1/8"	2"	THREE 7/8"	4"	2 3/4"	1"		
The Spacing Refers to the Distance Between the Centers of Trusses.		The Upper Figures of Each Division Refer to the Dimensions of Solid Sticks; the Lower Figures Refer to Built-up Members.					The Upper Figures Refer to the Diam. of Rods; the Lower Figures are for Washers.				SEE DETAIL OF JOINT A.				SEE JOINT B.	SEE JOINT C.	SEE JOINT D.	

Girders for Store Buildings

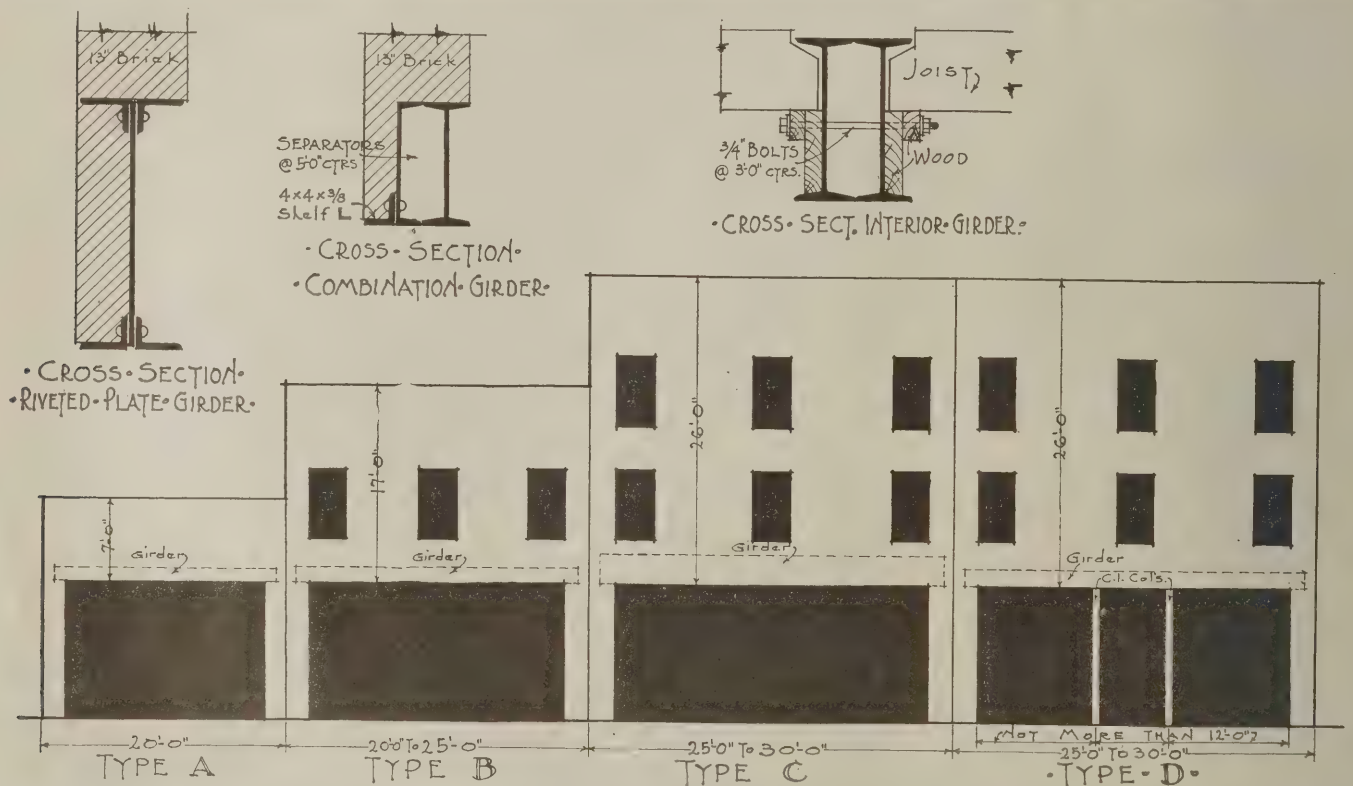
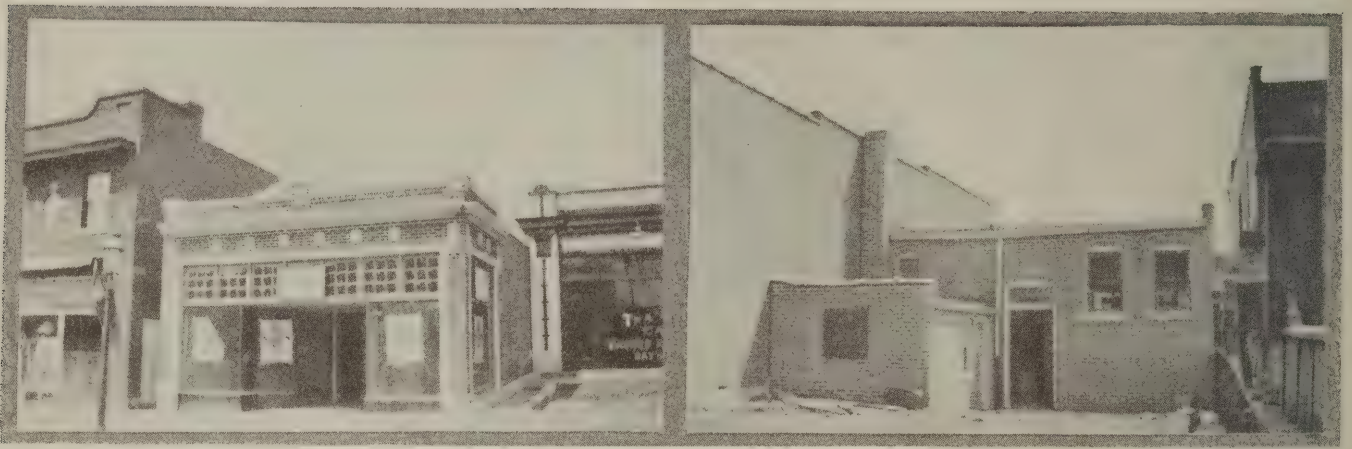


TABLE I.

DATA FOR FRONT GIRDERS			
TYPE	CASE	DESCRIPTION	MATERIAL
A	1	COMBINATION GIRDER WITH SKELF ANGLE	ONE 10" I 25# ONE 10" L 15#
B	1	DITTO	ONE 15" I 42# ONE 15" L 33#
B	2	RIVETED PLATE GIRDER	ONE WEB PLATE 24x3/8 FOUR FLANGE Ls 5x3 1/2x1/2
C	1	DITTO	ONE WEB PLATE 30x3/8 FOUR FLANGE Ls 6x4 1/2x1/2
C	2	DITTO	ONE WEB PLATE 30x1/2 FOUR FLANGE Ls 6x4 3/8
D	1	COMBINATION GIRDER WITH SKELF ANGLE	ONE 12" I 31.5# ONE 12" L 20.5#
D	2	DITTO	ONE 15" I 42# ONE 15" L 33#

IN CASE 1 THE FLOORS & ROOFS ARE ENTIRELY SUPPORTED BY SIDE WALLS.
IN CASE 2 THE FLOORS & ROOFS ARE PARTLY SUPPORTED BY FRONT GIRDER.

TABLE II.

DATA FOR INTERIOR GIRDERS			
CTR. TO CTR. OF GIRDERS	SIZE OF I-BEAMS FOR EACH GIRDER	SIZE OF BEARING STONE	WIDTH OF PILASTER
10'-0"	TWO 18" I 55#	16x16x10	17"
12'-0"	TWO 18" I 60#	18x16x12	21"
14'-0"	TWO 20" I 65#	20x16x14	21"
16'-0"	TWO 20" I 70#	24x16x16	25"

CONVENTIONS

National Conference on Concrete House Construction

The initiative in calling a national conference on house construction to consider the housing problem in the United States and Canada and to present and make available information regarding the most modern practice in house construction and housing projects has been taken by the National Conference on Concrete House Construction. All the building interests are invited to the conference, which will be held February 17 and 19 inclusive, at the Auditorium Hotel, Chicago. Programs may be obtained on application to the secretary, 111 West Washington Street, Chicago.

That this conference will go far to amplify and direct future building plans is assured. Primarily called for the consideration of practice in concrete house construction, the large number of subjects of general value on the program make this conference full of promise to every interest in the building industry.

For instance, the important subject of methods of financing home building will have a prominent place, and community planning, zoning, fire protection and similar phases of the housing problem will be gone into thoroughly.

Among the organizations co-operating in the work of the conference are the American Concrete Institute, the Associated General Contractors of America, the Concrete Products Association, the Portland Cement Association, the Illinois Society of Architects, the Illinois Chapter of the American Institute of Architects, the U. S. League of Building and Loan Association and other associations of local and national influence.

The opportunities afforded those who attend the conference to obtain the benefit of practical experience and well-considered, varied, and illuminating discussions will be of a value difficult to overestimate. That some preparation in collecting and arranging one's individual experiences to present to the conference in orderly fashion will be a distinct aid in giving directness and force to the discussions should be obvious, more particularly as the committees now being formed cover specific features, among others of

- Architecture and Design
- Community Planning
- Financing Permanent Homes
- Fire Prevention and Insurance Rates
- Building Codes
- Monolithic Concrete Houses

Special Unit Houses
Concrete Block Houses
Concrete and Cement Roofing

What place different forms of construction may take in the conference will depend on the degree of interest which brings them forward for discussion. The big idea is the promotion of housing and standardized practice based on the best obtainable experience. Those who have

1920
Building
Will
Surpass
the
Highest
Building
Record
this
Country
has
Ever
Known

nothing to bring can come and get something and those that have something can make it better under the test of criticism and suggestion.

The American Concrete Institute, the Concrete Products Association, the Concrete Block Machinery Association, and the American Concrete Pipe Association will also meet during the same week as the National Conference on Concrete House Construction at the Auditorium Hotel.

The character of the attendance makes this conference full of promise. Here

architects, contractors, community planners, cement product manufacturers, industrial and real estate development concerns, building and loan associations, and all the varied interests included in the housing problem will have an opportunity to propose, discuss, compare, suggest and criticize their ideas and their works in an orderly, progressive, constructive fashion. That the benefits to be derived from this conference will be so obvious that measures will be taken to perpetuate its work in future conferences is almost a foregone conclusion.

National Association of Builders' Exchanges

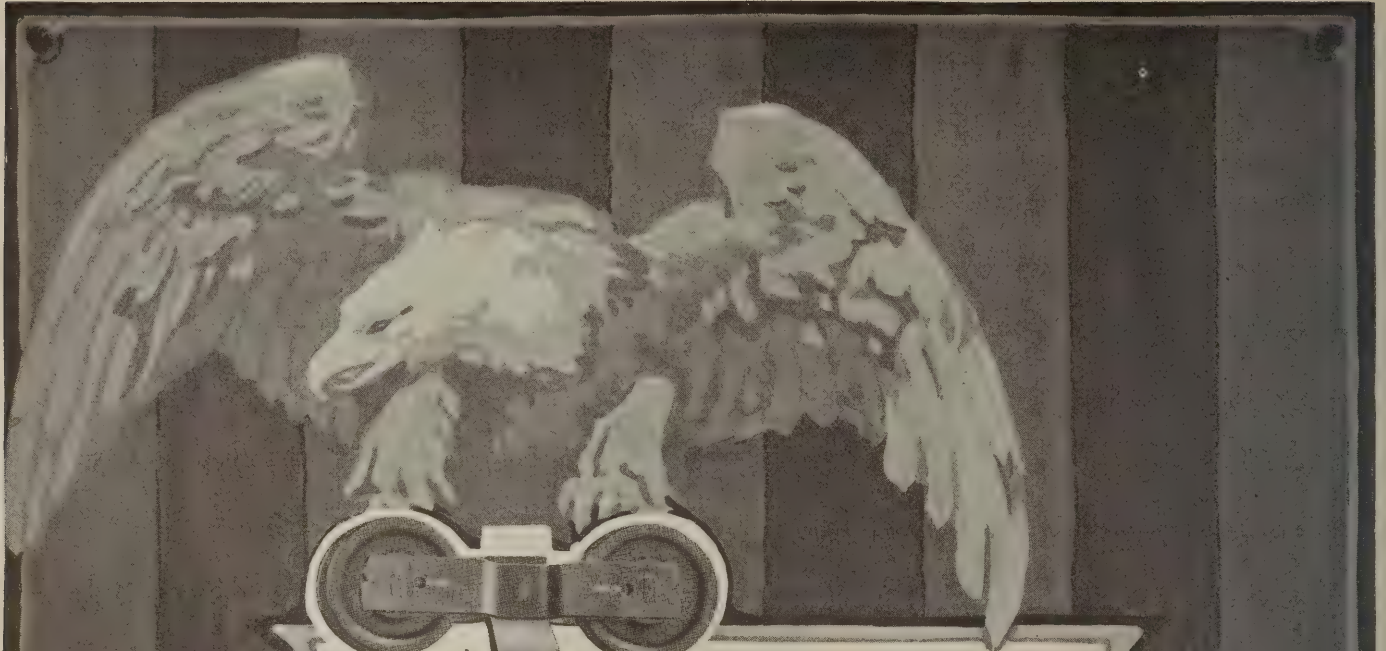
One of the most important gatherings of the National Association of Builders' Exchanges will be the 1920 convention at Indianapolis, January 12 to 15 inclusive. It is the most important because the conditions to be overcome are more complex than ever before.

National Association of Building Trades Employers

The newly-organized National Association of Building Trades Employers, the preliminary proceedings, constitution and by-laws of which appeared in the October issue of NATIONAL BUILDER will meet in Indianapolis on January 12 to 15. This organization will have local branches in all cities and will handle the labor situation on both the open and closed shop bases.

Master Builders' Association of Wisconsin

The eighth annual convention of the Master Builders' Association of Wisconsin, which will be held at Racine, Wis., January 7 to 9, promises to be one of the most profitable of the highly profitable conventions of that body. This association is one of the best, if not the best, organized in the country in its comprehensive work to take care of all the interests of the builders. It has been fortunate in selecting officials not only of fine attainments but of distinct devotion to the work of the association from a spirit of service. The committee reports and the proceedings therefore of the approaching convention, under such leadership at this time promise to be of unusual value to every builder. They will appear in NATIONAL BUILDER.



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NATIONAL BUILDER

Volume 63

Chicago, February, 1920

Number 2

The Situation

SO LONG as the public is willing to pay any price asked, and in fact so long as individuals and business concerns are bidding against each other for both material and service of all kinds, prices must continue to advance.

The often-repeated declaration that "the country has a shortage of more than 1,000,000 homes" may be reasonably expected to have a more solid basis of fact next year than it has today. The reason for this expectation is that the country is expanding. Its business is expanding. Manufacturing concerns are seeking factory locations. They are finding desirable locations. But how about the labor to run the factories? Where are the workmen and workwomen to live? The housing accommodation of the town or city is short of the needs of the new enterprise or enterprises. A housing program then is arranged for one, two or three hundred or more houses. Advertisements are sent broadcast for carpenters, masons and laborers. Placards are even placed on the walls of buildings under construction offering higher wages than the workmen on the job are receiving. The union scale and the contract price becomes a joke. The professional builders keep faith with each other as far as they can, though, under some circumstances they face ruin under the uncontrollable competition of large enterprises that can afford to stand the loss of high building cost because it is a mere incident in the way of obtaining the profits of their manufacturing business.

It is true that workmen who leave their jobs in response to the lure of higher pay find that they have lost in the long run through other expenses and personal discomfort. Some time must be allowed for the men to realize that all is not gold that glitters, and that the labor organizations that serve the interests of their membership best are those that hold contracts inviolable.

With respect to building materials, the railroad administration still holds the building industry at the bottom of the preferred list for car accommodation. The Dow Service reports that in consequence no building material can be moved by rail until all other preferred industries have had car service and there are cars to spare for the building trades.

This means an artificial shortage of material on top of an actual shortage.

That this condition of insufficient transportation in the building industry and in other industries is giving an immense impetus to the use of motor trucks is obvious. But motor trucks and automobiles cannot help solve the transportation problem without good roads.

Freight Rates
Will Probably
be Advanced
About 20 to
25 Per Cent
After March 1.
This Advance
Must be Ad-
ded to Deliv-
ered Building
Material.

Elaborate plans for good roads are under way, although these plans are being shaded by the alleged difficulty of obtaining road material in sufficient quantities.

Speculative building in the cities promises to be carried on with cautious reserve, while suburban home building and building in the country promises to

continue to boom indefinitely. Good roads and automobiles and motor trucks will continue to bring home sites, hitherto unavailable because too remote, within easy distance of large commercial centers, and will have a continuously favorable effect on building enterprises.

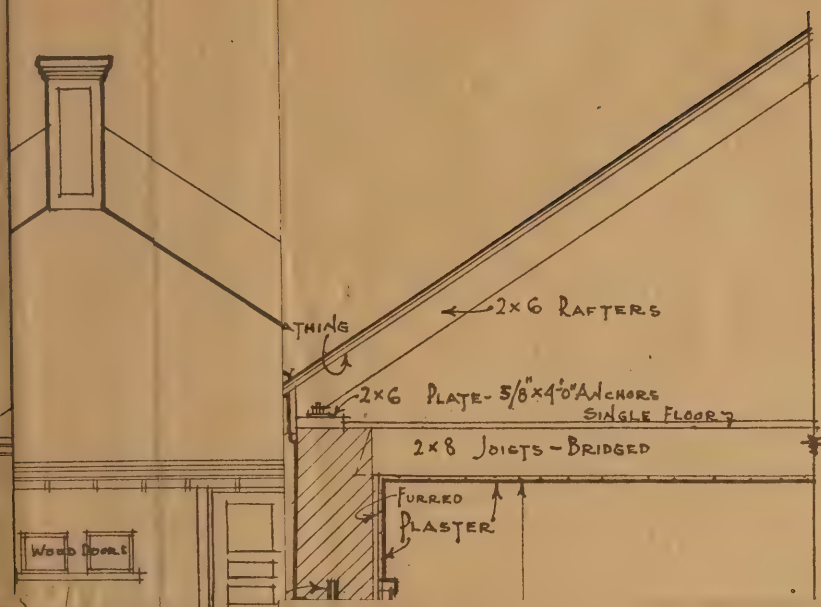
The top of the building materials market will, in the opinion of authorities, be reached during the coming summer and will be adhered to until well into the autumn of 1922. Prices will not reduce so long as production is arbitrarily limited and cost maintained by high wages. The market of the material man being narrowed by high prices, his business is not helped but rather injured by these circumstances, and thus the contradiction is seen of the material man trying to hold buying within reasonable bounds to enable him to hold his customers until increased production can permit him to serve them more liberally. As these men are seemingly working against their own interest, a deeper insight into the real condition and the future will show that their course of action is in the nature of a struggle to keep from being submerged, and this they hope to do by keeping their business moving in as wide circles as possible. Reputation and a business name must be kept identified with an industry by constant activity, and the effort is to keep too many eggs from getting into one basket.

Freight rates which will be definitely determined after March, are the subject of considerable uneasiness. The cost of materials will be influenced by these rates, and from all accounts they promise to be stiff enough to offer no lessening of prices.

Expectations that demand from abroad for building material would make an additional drain upon domestic sources of supply appear to be without much foundation, as recent reports indicate that with characteristic thrift, continental Europe is utilizing its own resources in many varied and unusual ways for building materials, and in fact that Europe is showing more vigor in production work than America. So much so, indeed, that the probability of the high prices offered here will bring to our shores imports of building material, Belgian structural steel and Canadian brick having already found their way to our eastern markets.



A FOUR-FAMILY APARTMENT BUILDING—Ben Gartside, Jr., Architect, Davenport, Iowa. Full working drawings in this issue—Supplement No. 473



Builder

ARY, 1920

ENT No. 473

PARTMENT BUILDING

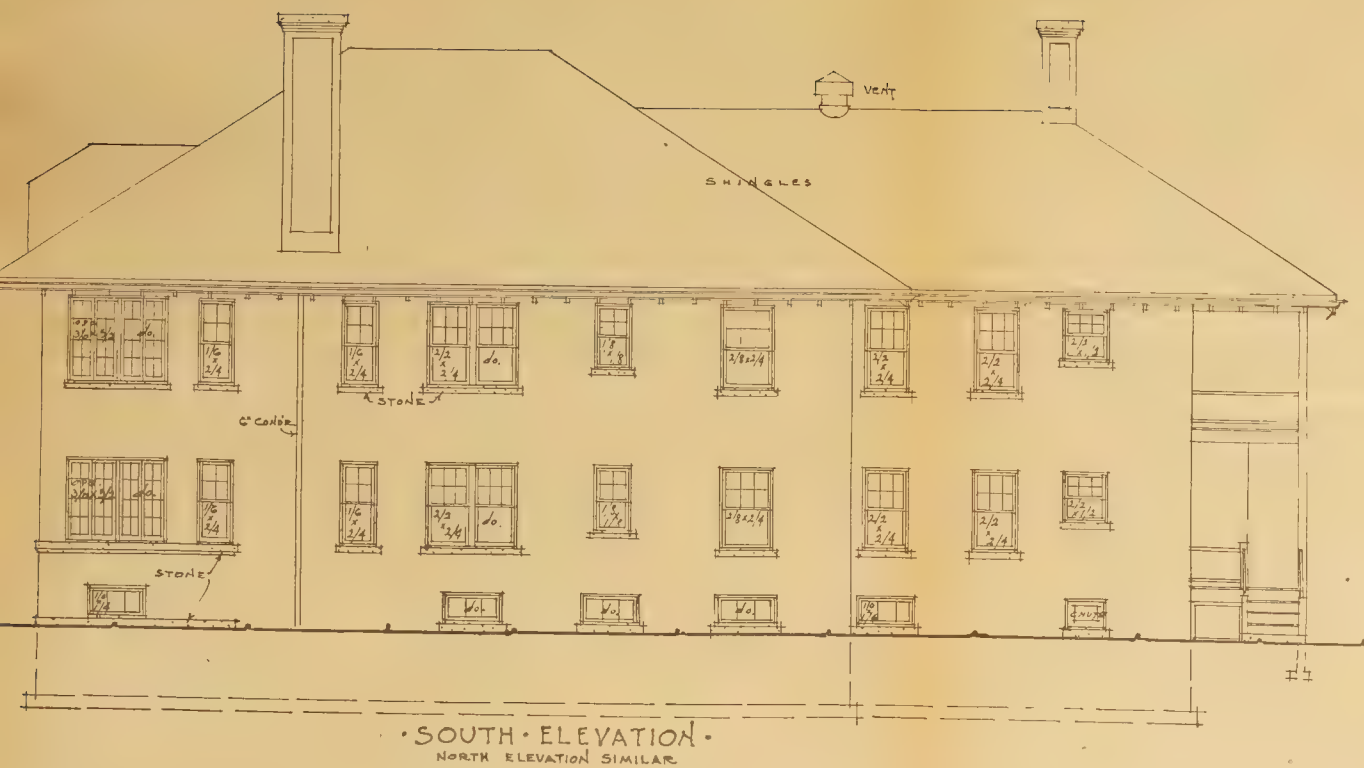
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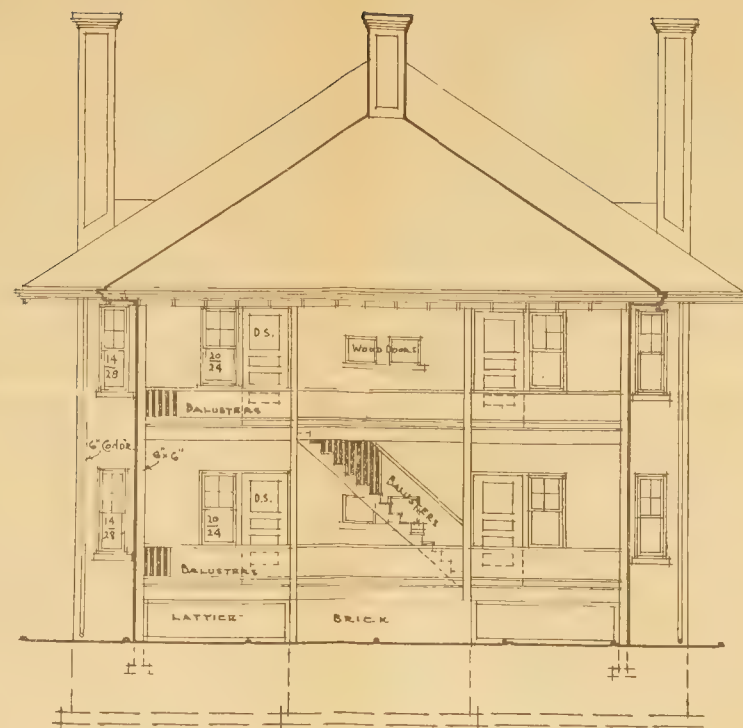
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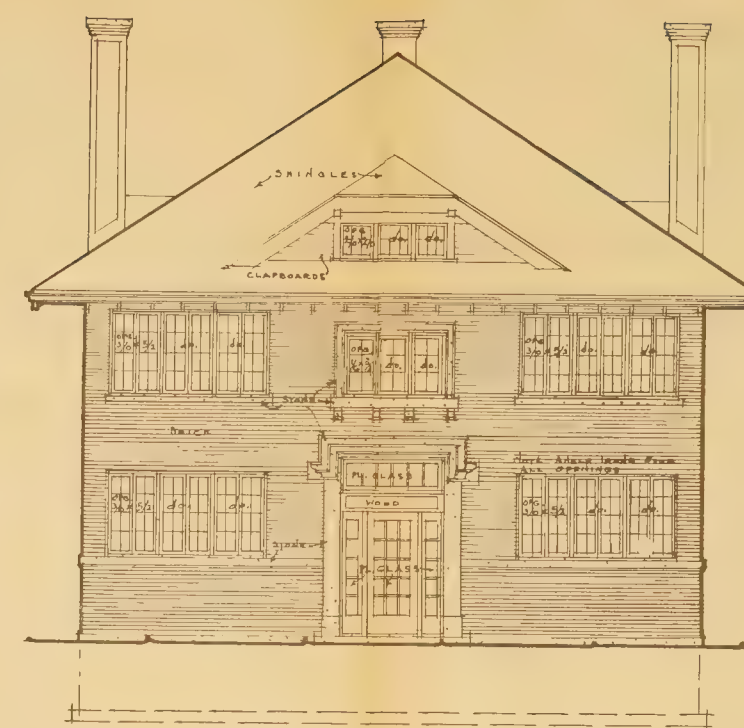
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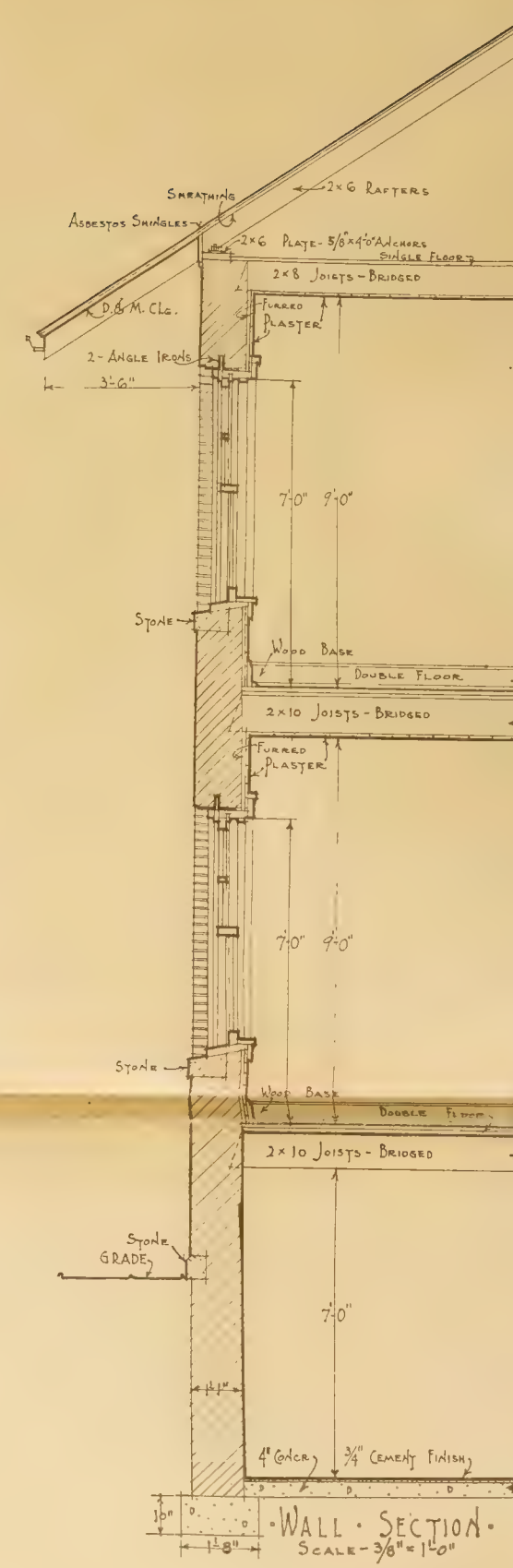
• SOUTH ELEVATION •
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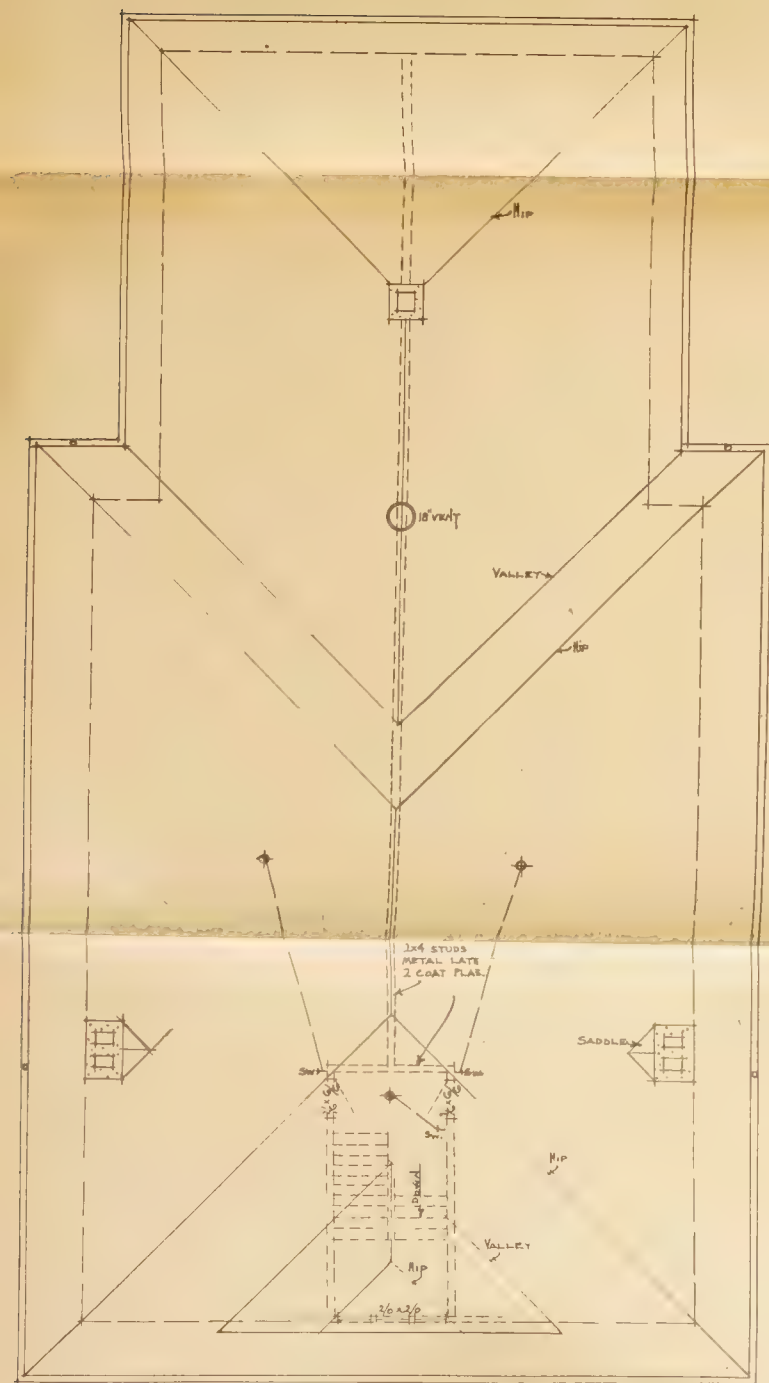
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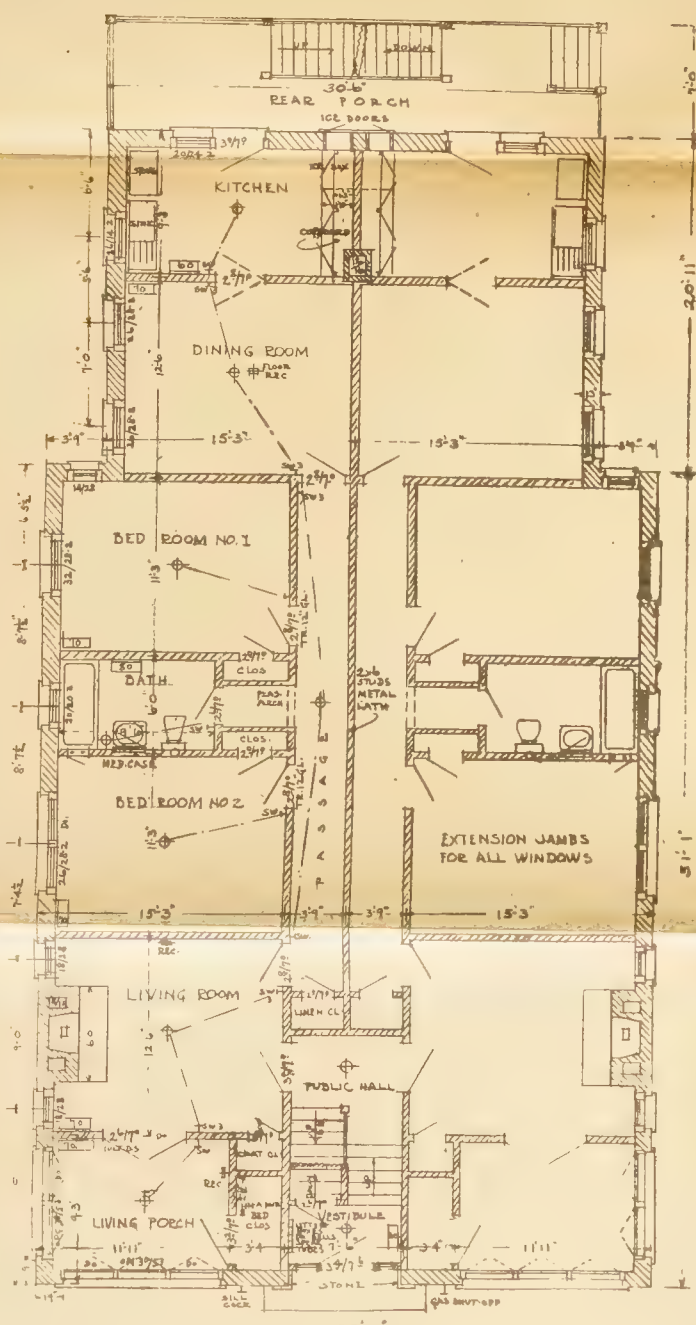
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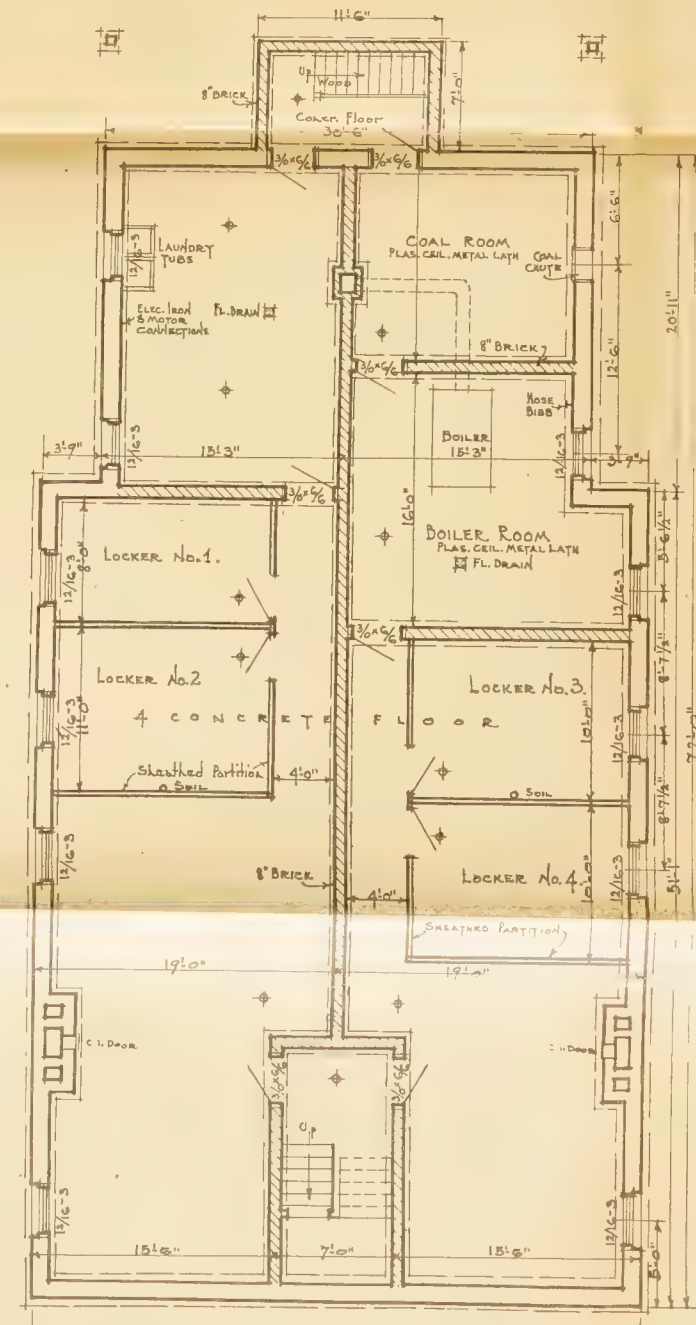
• WALL SECTION •
SCALE - 3/8" = 1'-0"



• ATTIC & ROOF PLAN •



• FIRST FLOOR •
SECOND FLOOR PLAN IS THE SAME AS THE FIRST FLOOR PLAN



• BASEMENT PLAN •

National Builder
FEBRUARY, 1920
SUPPLEMENT No. 473
A FOUR-FAMILY APARTMENT BUILDING
Ben Gartside, Jr., Architect
Davenport, Iowa

Scale for plans 1/8 inch equals 1 foot. Wall section 3/8 inch equals 1 foot.
Photographic reproduction and description in reading pages.
File for future reference

A Four-Family Apartment Building

Supplement No. 473

THE most important requirement of a successful builder of apartment houses lies in his ability to produce a building which comes nearest to satisfying a number of conditions. The conditions to be met are variable, but in general consist in utilizing the lot to the best advantage and at the same time keeping in mind the investment value of the property. Whether a full apartment building or one which is a combination of stores and apartments will prove the most profitable depends on the local conditions and often requires considerable study and investigation.

There should also be a thorough understanding of the living requirements of the class of tenants whom the building is to serve and the amount of money that they will pay out for rent. It should be clearly understood that although a man may build his own home largely to suit himself, he can scarcely succeed in cramming an undesirable apartment down the throat of a renter.

The client's attention should be called to the fact that it is the poorest sort of policy to put up a shoddy apartment house. There is probably no class of dwelling that receives more abuse than does the average apartment. Unrestrained children, slovenly housekeepers and careless menfolk will reduce a poorly constructed building to the appearance of a wreck within a few years, they then move into a new building and start all over again. This means one of two things, either the building must be periodically repaired at considerable expense, or it must be rented to more or less undesirable tenants who cannot afford to pay much rent. The latter course is usually disastrous, and the building goes from bad to worse until it becomes a dead loss. These evils can be almost entirely overcome if good, sound workmanship and materials are put into the building in the beginning.

The average tenant in every community is somewhat exacting with respect to the built-in features of an apartment. He will usually demand one or more wall-beds, a sun porch, built-in refrigerators, kitchen cabinets, cases for china and books, a fireplace, a rear porch, a tiled bathroom, clothes closets in each bedroom, and a closet for linen, and another for coats. He will also expect the basement to contain a laundry and dining room and storage lockers. Both the exterior and interior appearance also

influence the judgment of prospective tenants.

The exterior of the apartment house which forms the February Supplement, is a simple and straightforward han-

terior that is durable and highly fire-resistant.

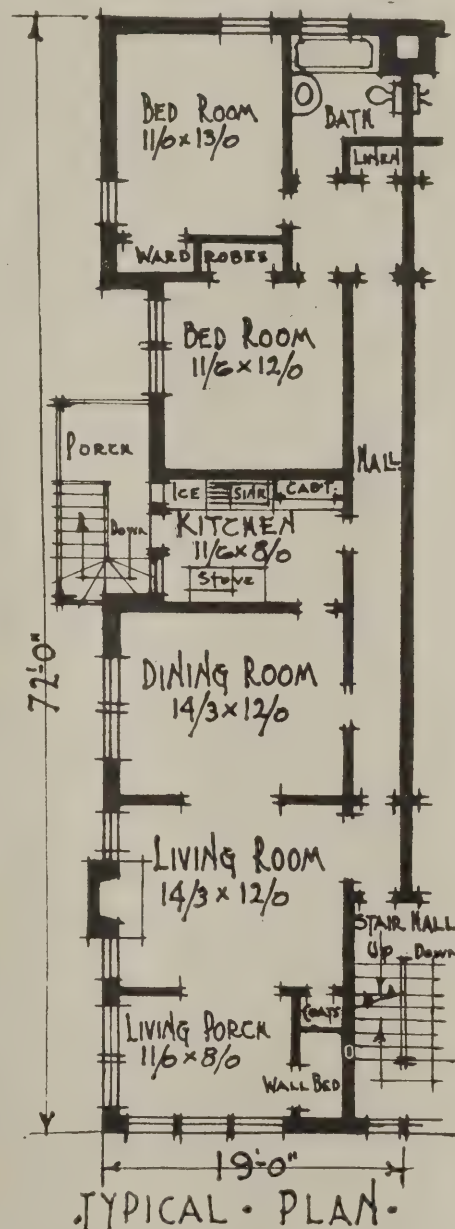
The basement walls are of vitrified brick with a cement floor throughout. The ceilings over the boiler and coal rooms are plastered on metal lath to minimize the danger of fire spreading from these rooms. The laundry contains extra connections for the attachment of electric irons and washing machine motors. Gas laundry stoves are also provided. An improvement would result if two laundry tubs were added and placed back to back to the ones provided, and the four tubs placed near the middle of the room. A locker is provided for each tenant and there is ample storage space for screens, storm doors and so forth. In fact, it would be possible to arrange for janitor's quarters in this portion if desired.

The apartments are reached from a common stair hall. Each apartment contains five rooms, a bath and a living porch. The living porches are provided with wall-beds and thus become the equivalent of an extra bedroom. The living rooms contain coat closets and fireplaces. There are linen closets in the halls and each bedroom has closets. The kitchens are equipped with outside icing refrigerators and with built-in cabinets. Each pair of kitchens has a rear porch in common.

A fire wall runs through the building from top to bottom, separating the apartments of each floor. This wall is of plaster on metal lath and would doubtless prove effective for its purpose. Some building codes, however, would require a masonry wall in its place.

An objection that is sometimes raised to this type of building is that the inner hall is so long. Nevertheless, this type of plan offers an excellent solution for the apartment building on a long, narrow, inside lot. Halls such as this may be fairly well lighted by means of obscure glass in the kitchen and bathroom doors.

The question of whether the living room and the dining room should be located at opposite ends of the building with the bedrooms between, as in the present case; or whether the living room, dining room and kitchen should be grouped at one end with bedrooms at the other, as in the accompanying sketch, is largely a matter of local preference in this regard. The scheme shown in the sketch makes the more public part of the house seem larger and in a way,



ding of the problem. The entrance is dignified and well designed. The stone trimmings are well handled and the pitched roof is a welcome relief from the flat roofs that are generally used on apartment buildings. The roof of this building is of asbestos shingles and these, together with the brick walls, form an

more impressive, it also renders the bedrooms more private. On the other hand, it prohibits cross ventilation in the kitchen, increases the cost of rear porches and requires a longer inner hall. The size of the rooms and the total floor

area remain approximately the same.

In building apartment houses, as in every branch of building, it will be found that the arrangement is largely a matter of compromise. To add one desirable feature, another must usually be sacri-

ficed. The ideal building that suits everybody has never been built. This is the reason that the successful designer often deliberately sacrifices his own ideas for the sake of those of his client's—the man he is to please.

A Few Words to Our Readers

NATIONAL BUILDER is published exclusively in the interest of architects and builders and contractors. It does not aim to reach the general public. It does not sell plans or books or materials for building.

The editorial staff of NATIONAL BUILDER is made up of practical architects and builders. Their work is to show what is being done in the construction field in all parts of the country. They are bringing to you, each month, a presentation of what is being accomplished in the way of modern design, construction and construction details of a character and quality that you could obtain only by long and expensive travel, careful note-taking and the employment of numerous draftsmen. As a medium of exchange of ideas in design, and emphasizing the money value of good design and the importance of the professional architects and builders by showing their accomplishments in its pages NATIONAL BUILDER in no sense aims to supplant the just dues to the architect-builder responsible for these designs and constructions. It does not therefore do more than offer to its readers "a monthly convention of what can be collected of the best thought and accomplishment in the construction field."

NATIONAL BUILDER treats every description of construction material on its merits. It exhibits what has been done and what has stood the tests of time and the elements, just as in design it shows what has successfully met the needs for which the designs were worked out.

The editors of NATIONAL BUILDER are at the service of its readers to supply information of all kinds pertaining to building construction.

Letters requiring answers by mail must be accompanied by a self-addressed stamped envelope. A number of different inquiries should not be written on the same sheet—to do so means delay. Put each inquiry on a separate sheet; each one with your name and address. Some of your inquiries have to be referred to authorities for additional facts, others can be answered at once. Therefore, questions on different subject matters should each have a sheet to itself. Inquiries for plans are referred to the architects and builders. Inquiries

for books are referred to the publishers direct.

It will be noted that a "Questions and Answers" department begins in this issue. In this department questions of general interest and answers of general interest will appear each month. The value of obtaining expressions of opinion and experiences on various phases and

Inquirers for Designs and Plans Shown in These Pages are Referred to the Architects and Builders Responsible for Them.

practices in the construction arts are obvious. The authority of text-books and other authorities can be made more forceful and better appreciated by the detailed experiences in the building practices of the hour. This department will to a large extent be run by the architects and builders themselves. In its pages they have an opportunity to answer each other, and to discuss the merits of any of the articles in other pages of this publication. It is an architects' and builders' "get-to-gether" department that will grow in value as you use it. In writing for this department you can send photographs or sketches, but be as brief and direct as you can. Don't be "windy." You can also tell of books that have helped you, or that you think should be corrected for errors. We are in the midst of the greatest building problem of the ages. Co-operation is the only way that the problem can be solved. There is a large opportunity for co-operation of a very effective kind through

these columns, and you are cordially invited to take your part as indicated.

NOTICE TO BUILDERS AND OWNERS OF GARAGES

W. C. Muehlstein, building engineer for the Industrial Commission of Wisconsin, writes that because of the increase in the automobile business throughout the state many new garages are being opened, and present owners are enlarging and improving their existing quarters. Right now the cost of building material is high, and in many localities some materials are even unobtainable. Due to this condition, plans for remodeling of many old buildings, non-fireproof and of a bad type of construction, and the use of cheaper grade of materials, are being considered by builders or prospective owners of garages. If these plans were permitted to be carried out the result would be very greatly increased fire hazards and dangers of building collapse.

The Wisconsin State Building Code, issued by the Industrial Commission, has very definite requirements for the safe construction of public buildings and places of employment, including garages. The intent of this building code is to maintain reasonably good standards in the construction of buildings, so as to protect employes and other frequenters in buildings from the dangers of fire and unsafe construction. The requirements of the building code have full force of law by legislative authority, and violation of any of its requirements is punishable by a heavy fine. A copy of this code (free) can be obtained from the Industrial Commission, Madison.

The attention of all owners and builders of garages is called to the requirement that plans and specifications for all new garages, or additions to garages, or remodeling of old buildings to be used for garages, must be submitted to the Industrial Commission for approval before work is started. Some owners and builders have caused themselves needless expense by proceeding with the construction or remodeling without its having been properly approved, which, when discovered by a building inspector, was found to comply not at all with the building code requirements, and had to be changed.

A Builder Who Came Back

This is a Story of a Builder Who Failed and Failed Again, But Out of His Failures Won Success. Why He Failed and How He Came Back is Here Told for Your Profit

SEVERAL years ago Robert Seitter of Chicago was in a rut. He was engaged in the business of building houses

ing problem with an effort to find out what mistakes he had made.

He turned the possible reasons over

ager and business man; his jobs had run smoothly, and he enjoyed the confidence of all with whom he came in contact.



Plate 1—This shows a few of the houses that were built from the plan shown in scheme "C." The corner houses have a slightly different plan. Note the variety in the appearance of the individual houses

and selling them, but even though he worked his head off his profits were so small that at the end of a year he often found that he had barely made day wages. Just why this should be so Mr. Seitter couldn't understand, and finally, owing to several unfortunate circumstances he found that his surplus money was entirely wiped out. He was broke!

Now Mr. Seitter isn't the sort of man that would allow one reverse to scare him out of the building game, and he knew that his business dealings had been such that he could arrange for more money with which to begin all over again. But he wasn't satisfied to do this. He realized that his recent losses would have scarcely dented his bank roll if he had properly cashed in on all of the work he had done in former years.

He decided therefore, to get out of the building game for a while. He felt that as a spectator he would have a better chance to study the other fellow's methods and maybe in this way learn just what had been wrong with his own business.

A small farm which he had saved from the wreck of his business offered an opportunity for him to get away from his former work, and so he temporarily became a farmer. His spare time, however, was devoted to studying the build-

and over in his mind. He was a hard worker; had done a fairly large volume of building; was considered a good man-

Nevertheless the money hadn't come in as it should.

On the other hand, many of his former



Plate 2—One of the steel buffet kitchens that proved to be space savers. Note the numerous shelves, the drawers, sliding work board, and the grouping of stove, sink and refrigerator



Plate 3—Every house has a flower box. It is such individual touches that mark the difference between the builder who thinks and the one who merely thinks that he thinks

competitors also deserved good marks on all of these points, yet they too, hardly made ends meet. Finally it occurred to him that maybe here was a solution. Maybe all of them were on the wrong track; following the same methods and making the same mistakes. For one thing, he realized that they all carried a common handicap from the fact that houses often remained unsold for weeks or even months after they were completed. A half-dozen or more unsold houses tie up a lot of money and the interest eats up the builder's profits in a hurry, in fact he is often compelled to unload at a sacrifice in order to save his skin. Of course, Mr. Seitter had already considered the fact that maybe the competition was too keen for any builder to make money in this line, but now he began to wonder if the fault didn't lie in a lack of competition in methods, rather than in too much competition in point of numbers.

Following up this idea, he decided to attack the problem from another angle. Instead of continuing to study his competitors' methods, with which he had long been familiar, he would begin to look over the entire field to see what might be learned of builders' methods in other sections of the country. But it was of course not practicable for him to travel from place to place to study these methods, and he was stumped for a moment.

Now Mr. Seitter had long been a subscriber to NATIONAL BUILDER, but as he expresses it, "had felt that I knew all of the practical points in my line of building and did not suppose that I could get any real benefit from a trade journal." However, he now remembered that articles dealing with the builder's profession all over the country were appearing regularly and that maybe he could learn something to his advantage

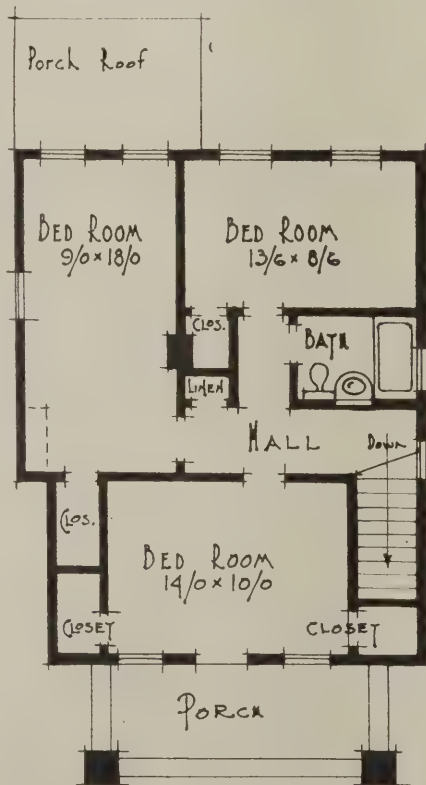
if he would try *studying* these articles instead of merely reading them.

This decision quickly brought results. An article on an industrial housing development pointed the way. This article described a group of houses in all of which the same type of floor plan was used, but the outside of each house was entirely different in appearance. It occurred to Mr. Seitter that he and his competitors had been building row upon row of houses that were so much alike

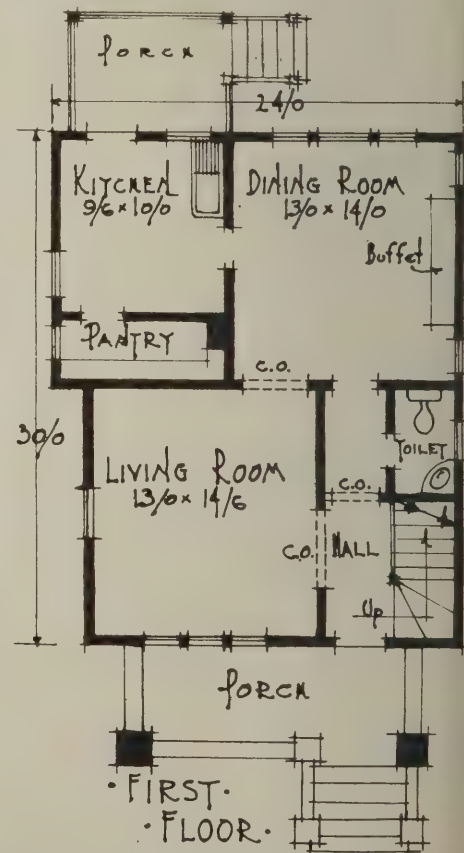
in appearance that there was really no competition when it came to selling them, and not only that, but it was likely that many people would not consider buying a house from a builder because they did not want to own a house that looked exactly the same as those of the neighbors for blocks around. He felt that probably there were enough of these people to make it worth while for him to develop this idea and start out again.

He immediately sold his farm and with this money, together with an additional amount supplied by two associates whom he interested in his new scheme, he began operations in Oak Park, Illinois, last spring. Two houses were first built, using the design shown in Sketch "A."

Here a new difficulty presented itself. The available lots were only 72 feet deep and there was a building restriction that required at least a 10-foot setback from the property front, and it was found that this design used up too much yard space, as it left a back yard scarcely 18 feet deep. Many prospective buyers took one look at the back yard and fled. Another thing, these houses have 6 rooms, which seemed to be more space than the average buyer required. So this design was given up and the one shown in Sketch "B" was substituted for the next two houses. This design was more favorably received and these two houses were sold. Not, however, until they had been

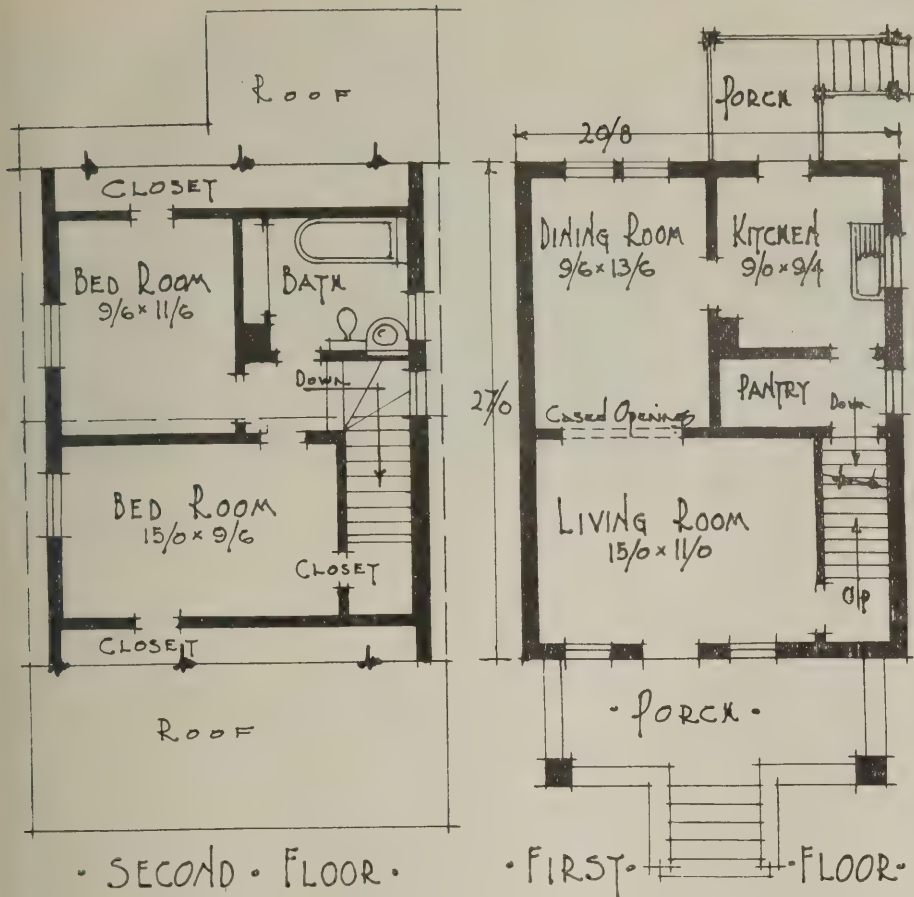


• SECOND FLOOR •



• FIRST FLOOR •

Sketch A—Six rooms and bath. The partition between living room and hall might be omitted, thus adding four feet to the living room. Two like this were built



Sketch B—Five rooms and bath. Very compact, and in this case, found to be more in demand than the larger houses. Two like this were built



Plate 4—One of the corner houses, showing the pergola entrance, flower box and trellis. The planting of shrubs will add to the attractiveness

contain all of the essentials of a complete kitchen. They are sanitary, attractive and compact to a degree. After the buyers looked at the exterior and then saw the buffet kitchen, there was nothing left to do but sign on the dotted line. The house was sold!

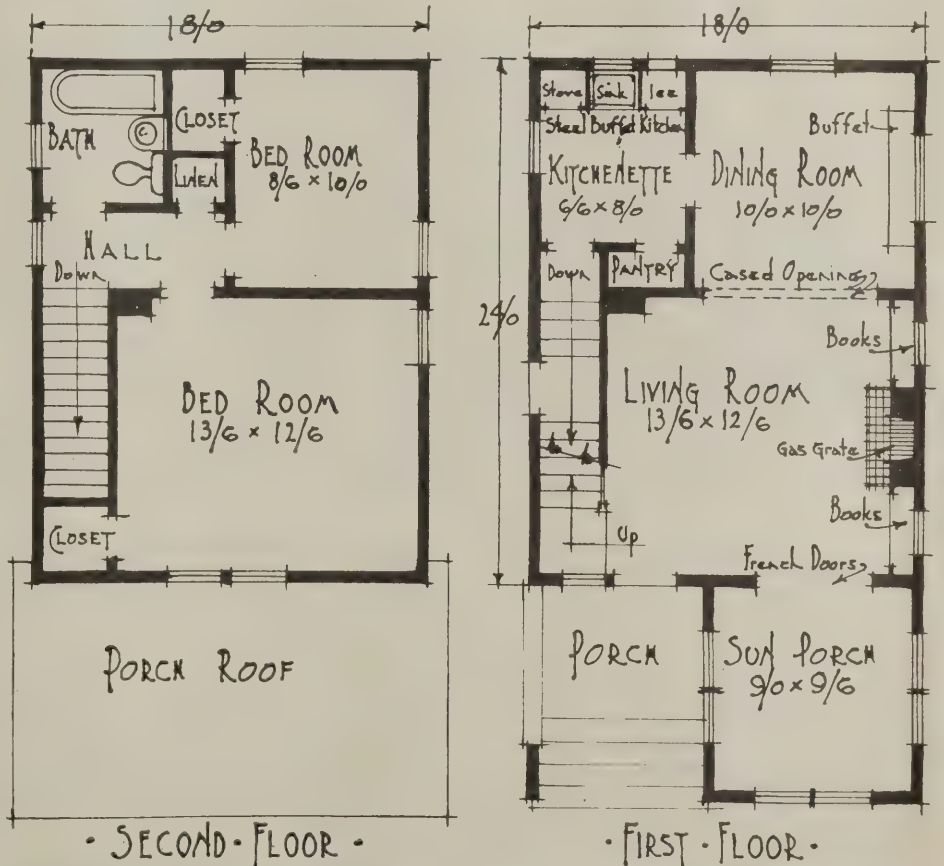
The houses measure only 18 feet wide

completed and staid unsold for some time.

Mr. Seitter now began to work toward a design that would permit a further reduction in the size of the houses. He cut out the rear porches entirely, thus reducing the cost of the houses accordingly, and adding 7 feet to the length of the back yards. Then substituting kitchenettes for kitchens, made it possible to cut 3 feet off the length and 2 feet, 8 inches from the width of the house itself. These changes resulted in the design shown in Sketch "C."

This design proved to be a winner. Twenty-four houses were built from the same plan, yet no two of them look the same from the outside. Different combinations of materials, roofs, porch treatments and so forth resulted in a series of houses that offer a large variety in appearance. To say that this scheme was a success puts it mildly. It was a riot, and the houses were sold before they were finished. In some cases the owners moved in before the plumbing fixtures were all set. At the same time, other builders' houses were fully completed and waiting for buyers.

The absence of a rear porch did not influence the sales and the kitchenettes were a big factor in their favor. This was largely due to the buffet kitchens which were built into them. The buffet kitchens are made entirely of steel and



Sketch C—The one that rang the bell. The use of steel buffet kitchens permitted this house to be condensed to only 18 by 24 feet. Twenty-four like this have been built



Plate 5

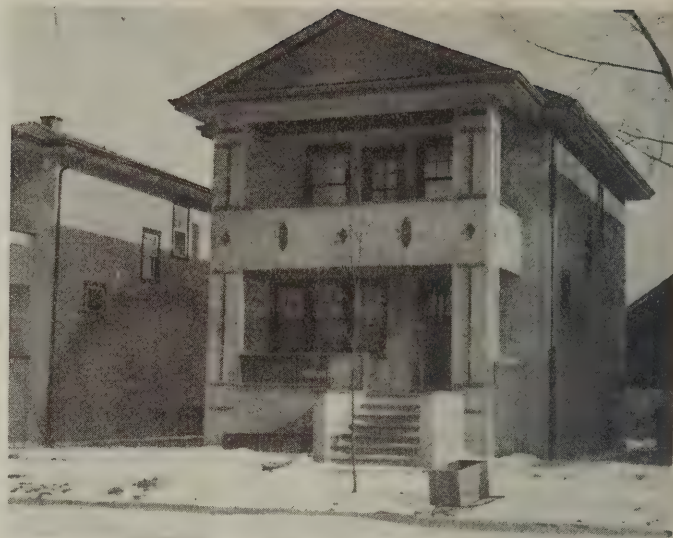


Plate 6

Plate 5—One of the type "A" houses. This was the first type built, and although attractive, it did not seem to meet the requirements of the buyer. Plate 6—Another one of the type "A" houses. The inserts are of wood planted on the stucco

by 24 feet long. Each contains a living room, dining room, kitchenette, two bed rooms, a bath, and a full basement. All have grade line entrances to the kitchen and basement. Some of the houses have sun porches. The living rooms have gas grates and the dining rooms have built-in buffets. The walls below grade and the chimneys are of concrete blocks, the

latter lined with tile flue lining. The roofs are of asphalt shingles.

The materials used for the exterior walls contribute largely to the variety offered in the appearance of the houses. Rough sawed clapboards, smooth siding, stucco and asphalt shingles were used for this purpose, singly or in combination.

It is hardly possible that Mr. Seitter's

solution can be exactly applied to another builder's problem, but it is hoped that this story may be of assistance in diverting other builders' thoughts into more profitable channels, and some benefit be gained from studying this builder's experience, stimulating an interest in outside methods from which new ideas may be turned to personal use.



Plate 7



Plate 8

Plate 7—Mr. Seitter does not confine his work to small houses. These are a couple of his six-flat buildings. Plate 8—"Sign here"! Mr. Seitter isn't above wearing overalls, and has found that his appearance of "being on the job" helps to sell his houses

On the next page begins a series of articles on How to Go About Estimating in an Orderly Way. In clear, plain, simple language, the safe, sure methods are told. This is one of the most valuable offerings ever made to the practical construction industry.

Plan Reading and Estimating

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IN ANY DISCUSSION it is wise to establish certain points upon which everyone agrees in order that there may be a common ground of understanding upon which to base further develop-

In the following articles the method of attacking the problems of estimating will be that of making an intensive study of a particular building.

An estimator before doing any work

to the right of the first heading—General Conditions—there should be such explanatory notes as Bond, Insurance, Damages, Heat, Fences, etc. This list is more in the nature of a reminder than

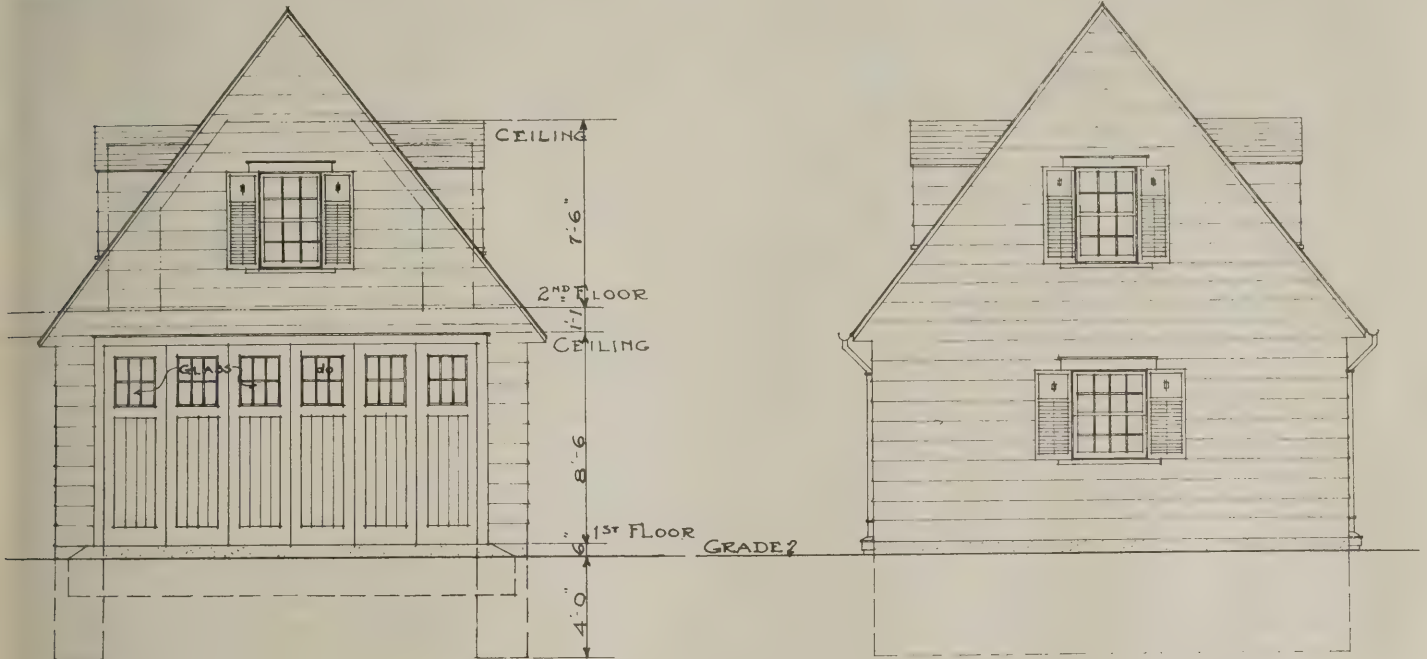


FIGURE 1

Garage designed by Charles C. May, Architect, New York, the plans and elevations of which are here used in demonstration, of the principles set forth in this first article

ments. In the present case there must be a few points established before going into the study of plans and estimating. It must be understood that at the present time any figures relating to cost are subject to change at any moment. Probably in the future the figures given in the following article will be looked upon as having an historical interest only. Therefore, the reader must understand that any figures given in any of the following articles are given only for the purpose of illustrating methods and should be verified in every case should the reader attempt to do any estimating in his own locality.

It might also be well for the reader to procure a handbook on estimating, such as the one prepared by Frank R. Walker. Constant reference will be made to this particular handbook and it would be well to verify such figures by actual references. Also there are other handbooks such as those issued by certain portland cement companies and by lumber associations which will be given as references from time to time.

usually establishes certain methods of procedure which serve as checks on his memory and also facilitate the work. If a man is doing a great deal of estimating work it is well for him to have a printed list made out as a check. This list can be taken from the "Summary of Estimate" found on page 19 of Mr. Walker's book, but it should be arranged in a somewhat different form. It is well to list the general headings in one column and number each heading as follows:

1. General conditions.
2. Wrecking.
3. Excavating.
4. Caissons or piling.
5. Water-proofing.
6. Granolithic work.
7. Masonry.

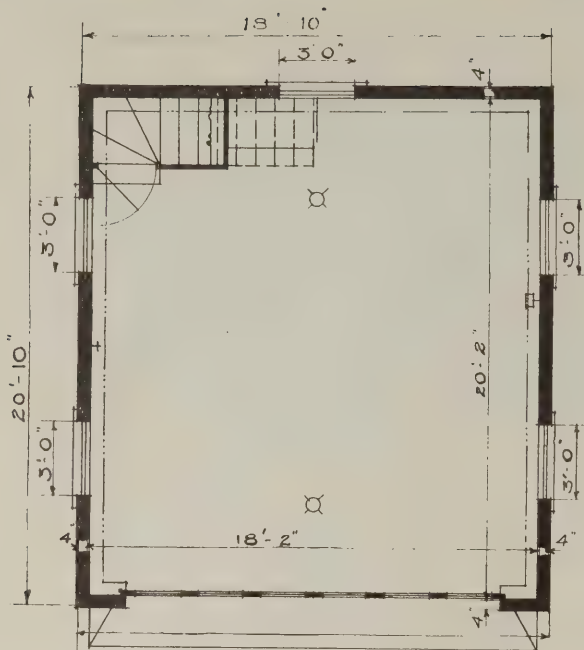
This list should be continued down to such items as dumb waiters, vacuum cleaners, mail chute, and other numbers and spaces should be allowed for any special items which may occur.

In another column to the right of the one already enumerated there should be some explanatory notes. For instance,

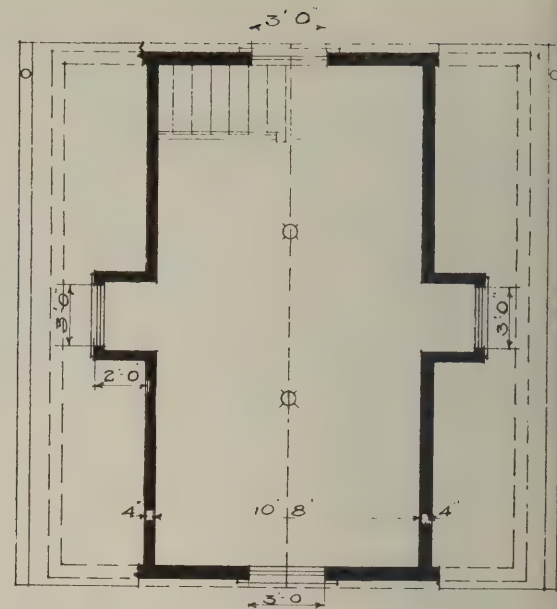
anything else. Another column of "sub-bidders" should be given and then the final column of the cost of each item.

Another sheet in which the General Conditions are enumerated thoroughly is of great value. On this sheet there should be printed a list such as follows:

- Bond.
- Permit for Water.
- Permit for Vault, Areas, Bay Windows.
- Liability Insurance.
- Fire Insurance.
- Surveys.
- Plans, Specifications, Blue-Prints, Photos.
- Temporary Offices, Telephone, Stationery.
- Temporary Fences, Bridge, Platform.
- Temporary Sheds, Storerooms, Water Closets.
- Temporary Runways and Stairs.
- Temporary Heat and Light.
- Temporary Elevators, Derricks, etc.
- Temporary Smoke and Exhaust Pipes.
- Temporary Closing of Building and Partitions.
- Temporary Window Screens



FIRST FLOOR PLAN



SECOND FLOOR PLAN

FIGURE 2

Watchmen and Signal Lights.
Removing and Replacing Water Hydrants.

Removing and Replacing Poles and Wires.

Removing and Replacing Sewers and Drains.

Repairing Streets and Pavements.

Removing Rubbish, Cleaning Floors and Windows.

Protecting Work from Damage during Erection.

Protecting Adjoining Buildings during Construction.

Repairing Damages to Adjoining Buildings.

Cutting for Other Trades.

Pumping and Bailing.

Special Tools, Plant, Scaffolding.

Superintendent's Salary and Transportation.

Special Municipal Licenses.

Foreman and Timekeeper.

Contingencies.

Across from these items columns should be arranged in which the cost of each item would be listed. A very wise method to follow in making the estimate is either to place the cost in the cost column, or if there is no cost to be placed against such an item, let us say such as "blue stone," there should be a line drawn through to indicate that at least the item has been considered and accounted for. In other words, there should be no empty spaces and a glance at the estimate sheet should show that

every item has been given due consideration.

The estimator can make out his own list either in accordance with the ones given herewith, those found in handbooks on estimating, or in accordance with his own practice, but he must have such lists before him in formulating his work.

The problem which will be attacked in this article is that of a small garage which was designed by Mr. Charles C. May, a New York architect.

In order to make any problem of this kind practical complete working drawings must be shown and, therefore, in Figures 1, 2 and 3 are given respectively the plans and elevations of this garage.

The estimator referring to his first estimate sheet will underline certain of the items which he finds called for in the specification. He will find, for instance, under the heading of "Masonry," the trench walls will be constructed of concrete. In the first column of his estimate sheet will be found the heading Masonry Work. In the second column on the same line may be the words "underpinning, concrete, brickwork": He will underline the word concrete. Under the heading of "Carpentry" the sub-notes occur such as roughing, centers, rough hardware, and he will underline roughing and rough hardware. These underlined words simply act as reminders based upon the specification. Aside from having the trench walls of concrete, the floor of the garage will also be of concrete and the ramp leading up to it, and on top of this concrete on the floor and ramp there will be a one-inch finish of cement mortar made in proportions of one part cement to one and one-half parts sand.

For this particular garage there will be a wooden frame constructed of 4x4-inch sills, 2x4-inch studs, 16-inch on centers and double at the open-



FIGURE 3

ings, bridging, plates, 2x-inch floor joists 16-inch on centers, 2x6-inch rafters 16-inch on centers. On the outside there will be shiplap siding or sheathing over which there will be clapboards. The roof will be shingled.

The inside finish will be plaster—cement plaster on galvanized metal lath for the first floor, and patent plaster on wood lath for the chauffeur's quarters on the second floor. There will be metal gutters and leaders, small heating plant which will be described later, electric wiring and certain electric fixtures.

In order to obtain information with regard to the above items it will be necessary, of course, for the estimator to have carefully prepared plans and specifications furnished him by the architect.

Under the first item in the first list, that is, General Conditions, all the items in the second list will have to be considered. As this building will be erected by a carpenter contractor, on the premises of an owner who already has located his house on the lot, there will be no need for the contractor to furnish a bond or to secure a permit for water, as in the present case the water is on the premises; nor will it be necessary for the contractor to secure permits for a vault, areas, or projecting windows. On the other hand, liability insurance must be paid, and this will amount to \$12.00. The method of computing this will be explained later. Fire insurance and surveys will be paid for by the owner, and the plans, etc., will be furnished by the architect.

In running down the remainder of the list no charge will be made until the item "removing rubbish, etc." is encountered, for which an item of \$10 will be reasonable to allow. In a case such as this there is no definite computation upon which to base an estimate. Under the heading of "Cutting for Other Trades" it is reasonable to assume that such cutting will require the time of the carpenter for one day and as we will assume in the following article an arbitrary figure for carpenter labor of \$8 per day, this item will cost \$8. For Special Tools, Plant and Scaffolding, on a job of this kind, \$50 is a reasonable figure, and under the item of Foreman and Timekeeper, the wages of such a man must be entered. It would probably take about one month to build a garage such as shown in these figures and the wages for such a foreman will be approximately determined upon as \$240. Assuming that one-half of the foreman's time will be taken up in looking after the overhead items of the job, the amount estimated upon for overhead should be \$120. The final item for contingencies will be covered by an arbitrary figure of \$25. The total will be then:

Liability Insurance	\$12
Removing rubbish, etc.....	10
Cutting for other trades.....	8
Special tools, plant and scaffolding	50
Foreman and timekeeper.....	120
Contingencies	25

Making a total of \$225. This amount will be set against the first item in the first list. The second item in the first list is "Wrecking or clearing the site." It will be noted that in this case there will be no work performed under this item and, therefore, in the column allowed for costs there will simply be a line drawn to indicate that this item has been considered.

Under the heading of Excavating comes the first consideration in which the actual process of estimating must be employed. In order to make this process intelligible the author advises the use of additional record sheets. For his own

Beginning with a Garage, this series of articles on plan reading and estimating will progress to include larger and larger buildings. Get your fellow-builders interested. The more your competitor knows about building the safer he is. It is the fellow who doesn't know that you must fear the most, for in killing himself he hurts you also, and the reputation of the industry.

particular use he has developed a set of sheets called "Calculation Sheets," having the following headings: sub-contract, description, calculation, total quantity, unit material cost, material cost, unit labor cost, labor cost, insurance rate, and insurance. In working out estimates the author cautions against the use of any particular figures which will be used in this or later articles. The contractor or architect will find a great variation in costs of material and costs of labor as well, as there is great fluctuation in the efficiency of labor at the present time. The figures given herewith are merely arbitrary and are used simply for the purpose of indicating methods of procedure.

If a calculation sheet is used similar to the one referred to above, under the first heading is placed the word Excavat-

ing. In the second column under the heading Description will be placed the words "Trench work—trench one foot wide, four feet deep." Then comes the heading of Calculation. In all calculation the first item to be considered is indicated by the word RATE or unit cost of labor. In this particular instance the amount of excavating a man can perform in a day will be considered as five cubic yards per man per day. If labor is getting 60 cents per hour, the cost for an 8-hour day is \$4.80 for 5 cubic yards, or 96 cents per cubic yard. To this is made an addition of 50 per cent for trench work, which will make a rate of \$1.44. In this manner the rate is established.

The next item to be considered is the quantity of earth to be removed. According to the plans it will be noted that the inside dimensions of the garage are 18 feet wide by 20 feet long, allowing 6 inches for the width of the walls the outside dimensions will be 19 feet wide by 21 feet long. Dimensions given on the drawings are to the outside stud lines and are 2 inches within these figures. The foundation walls will extend to the outside dimensions. There will be a trench wall at the rear and one on each side, and two small sections of wall in the front, and there will be no wall where the ramp is indicated. The dimensions of the rear wall will be 17 feet long by 1 foot thick and 4 feet deep, making a total number of 68 cubic feet. The two side walls measure each 21 feet long, one foot thick, and 4 feet deep, and as there are two the total cubic contents will be 168 cubic feet. The two sections of the front wall will contain 8 cubic feet, making a total of 234 cubic feet or 9 cubic yards. As this is all the excavation necessary on the job it only remains now to enter the quantity and rate under the proper heading. Under the total quantity should be placed the figure given above—9 cubic yards of earth removed—and under the unit labor cost should be placed the figure \$1.44, indicating the cost per cubic yard. The labor cost on this job will therefore be \$12.41.

Some estimators leave the item of liability insurance until the last and lump this sum for the entire job. The author considers this poor practice and believes in determining the actual rate for each kind of labor and determine the liability insurance in accordance with this rate. If this is done the columns indicated under rate and insurance must be filled out.

Although there are many figures given in many different states for liability risks, the figures given herewith will be selected from those given by Mr. Walker in his book for the state of Illinois. The rate for concrete floors and pavements not reinforced, will be the rate which will cover this item and is given for the state of Illinois as \$2.07 for every

\$100 of payroll. Therefore, on a payroll contemplating \$12.41, the insurance would be 26 cents. To indicate that this is all there is to the excavation the estimator should draw a line across his calculation sheet.

As a general note it might be stated that all records pertaining to work of this kind should be kept so that it will be possible to check against the estimate the actual cost of construction. Records such as these are important for a foreman to check his payroll.

The limits of this article do not permit for treatment of the entire estimate of this garage, and Article II will follow shortly, completing this estimate.

Watch Your Materials



Some builders spend a good many hours shopping around to save money on material and then lose all they saved through carelessness of some workman. This man is not going to let his cement be damaged by soaking up water from the ground.

Service Tests of Concrete-Floor Treatments

The January Technical News Bulletin of the Bureau of Standards reports that a number of surface treatments for concrete floors have now been under test for 18 months. Some of the surface coating materials which appeared to be in good condition at the end of one year of service are now wearing away in places where they have been subjected to the greatest use. The panels which were treated with the chemical hardeners, such as magnesium fluosilicate,

sodium silicate, and zinc sulphate solutions still appear to be in very good condition. The panels treated with a

solution of aluminum sulphate have now been in use for about nine months and so far the results are very satisfactory.

Safety First



This barrier keeps pedestrians out of the danger zone

Most specifications contain a clause which is intended to protect the owner's interests in case of personal injuries suffered by the general public during the progress of the work. Aside from this point, accidents on a job often reflect on the builder's capability and damage his reputation as well as his pocketbook.

Most of the accidents of this nature occur on the street sides of buildings under construction and are caused by materials falling onto pedestrians below. Most building codes specify that a covered passageway shall be provided over the sidewalk and roofed with two-inch planks, wherever the height of a new building exceeds four stories in height and is closer than ten feet to the sidewalk.

It is highly important, however, that the builder should go even further in his efforts to protect the public; a brick falling from a height of only three or four feet will most certainly do no good to a pedestrian who may be struck by it. The accompanying photograph shows the way in which one builder prevents pedestrians from walking near the inside edge of the sidewalk. The railing is made of triangular shaped uprights to which 1x4 strips are nailed, thus making a barrier that keeps pedestrians out of the danger zone. It seems

however, that if the uprights were reversed and the 1x4 strips nailed to the vertical leg, the railing would be more effective and would not offer such an opportunity for careless people to stumble over the lower portion of the uprights.

Measuring Pole



An eight or ten-foot measuring pole laid off in feet, with the end divisions marked in inches, will often come in handy on the job.

A One-Man Mill

Saving Money With Machinery on the Job. A Motor Truck was Used to Keep the Material Distributed to the Several Houses

NEAR Rye, N. Y., is a section known locally as Ryegate. Ryegate Homes, Inc., is a company organized by Mr. W. L. Drake to develop this community,

was made to get the buildings enclosed before disagreeable weather set in. The problem of getting window and door frames was serious. The local mills

framework for a house, the man at the saw could start right in on the window and door frames. Having all the sawing done by one man at one place enabled



All of the framing, including window and door frames, for these and twenty-six similar houses on the same job, were cut by the one-man mill

and is building homes that are unusually attractive and at the same time are mighty good investments. Associated with Mr. Drake is Mr. Urwin J. Magill, Architect, who designed the houses now under construction.

Some of the methods employed by this company could be used profitably by other builders.

The selection of material was given much thought. Telephone conduits were chosen as the most practicable material for basement walls and a place was found where they could be purchased at reasonable rates, if taken in carload lots. Telephone conduits can be stacked out in the open without danger from the weather; are easily handled and lay up rapidly.

One of the large housing companies in Bethlehem, Pa., had a large stock of window sash left over when its war activities ceased. The Ryegate Homes Inc., immediately adopted four standard sizes and ordered all its sash from Bethlehem. For the first story windows a large size was chosen; for the second floor a smaller size; for pantries, bath rooms and basement windows still smaller sash were ordered. The fourth size was for high, narrow windows, for casements and groups. Using these standard sizes not only enabled them to cut the cost of the sash, but simplified the glazing and the milling of the frames.

Operations were started on the fifteenth of September and every effort

could not be depended upon to deliver them as quickly as they were needed and ordering them from any great distance meant taking chances on delays in transportation.

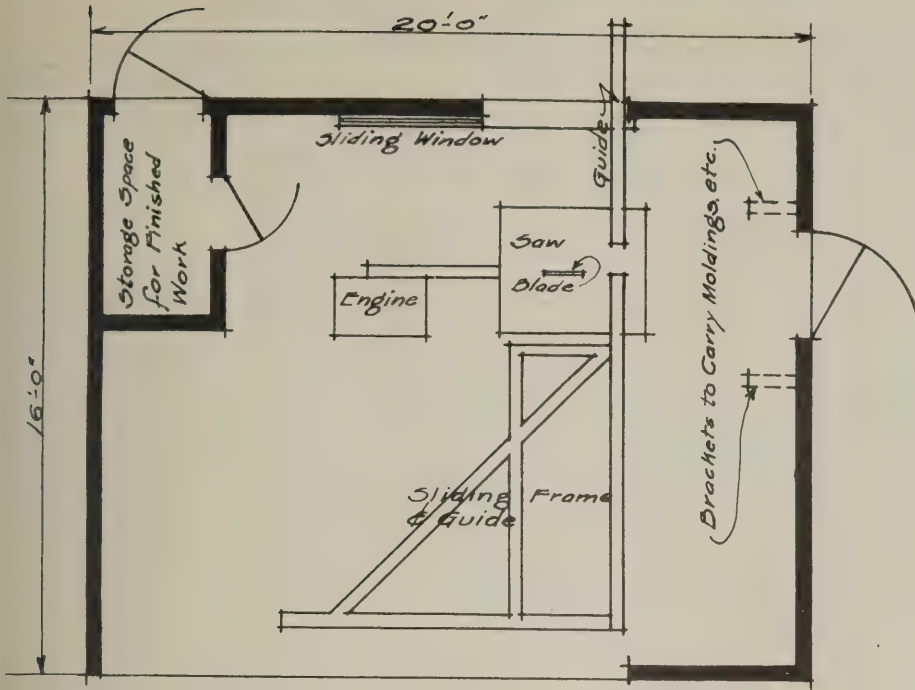
The final solution of this problem proved most fortunate. A shed was built on the premises and a saw rig was installed. A 3½-h. p. gasoline engine furnishes the power. By means of this power saw one man has cut all the framing for the twenty-seven houses erected to date. After completing the structural

the workmen to get just the material they wanted, at the time they wanted it. Another item that must not be overlooked is that this system reduced the wasted material to a minimum. The short pieces were carefully sorted and stacked near the saw shed, instead of being scattered all over the grounds. When bridging or other small pieces were needed they were readily available. The saving in time and material surprised everyone on the job.

Each house was numbered and the



In this one-man mill enough material is cut and frames built to keep fifty workmen busy



Plan of the one-man mill

building superintendent gave the man at the saw a list of all the material needed each day for each house. Right here the standard sizes for windows saved money. Instead of a complicated order for a dozen or more different sizes, the requisition would call for so many No. 1 and so many No. 2 frames for House No. 18.

Given a week's start it was found that this one saw could keep fifty carpenters busy. At this writing (November 15) it

is three houses ahead of the men and the money and trouble it has saved could hardly be estimated.

Each house has a small one-car garage. These garages were rushed up ahead of the houses and are used for storage of cement and other material that must be protected from the weather.

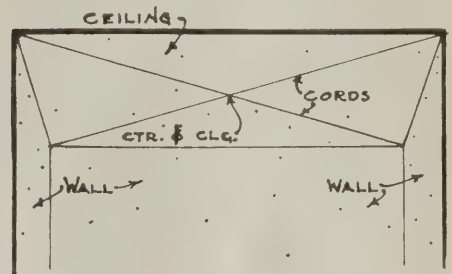
A light motor truck is used to keep the workmen supplied with material. As soon as a batch of frames, say, are completed, the truckman loads them in and

picks up any other material that may have been ordered for that particular building. Consequently only the supplies actually needed are in evidence at the job.

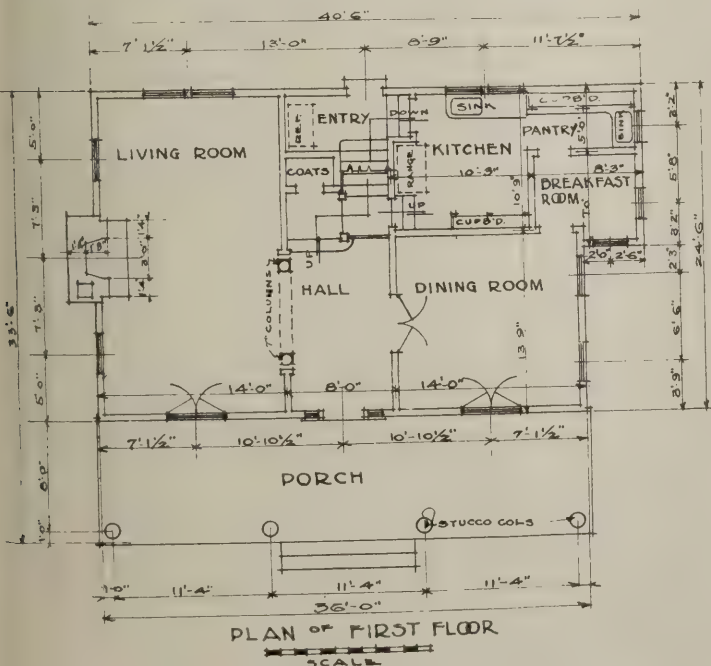
The superintendent keeps a record of the material consumed on each building. Another record shows what the saw has used and this must check with the superintendent's record. The superintendent checks his record of materials used against the original purchase order and the difference shows the amount that should still remain on hand. The time-keeper is also "storekeeper" of the materials in the supply houses (garages). His records serve as a check on the superintendent's records.

To Find the Center of a Ceiling

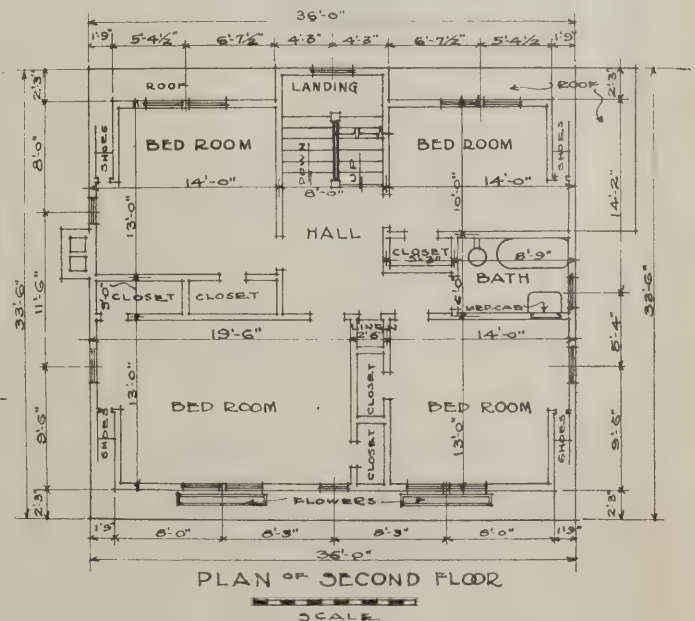
It is often desired to find the exact center of a ceiling so that lighting fixtures, plaster centerpieces, and so forth



may be accurately placed. Stretch two strings diagonally across from corner to corner of the room; then crossing point will be the center of the ceiling, as shown in the accompanying sketch.



PLAN OF FIRST FLOOR



PLAN OF SECOND FLOOR

Another standard plan

Construction Details--Triple Window

By A. Benton Green

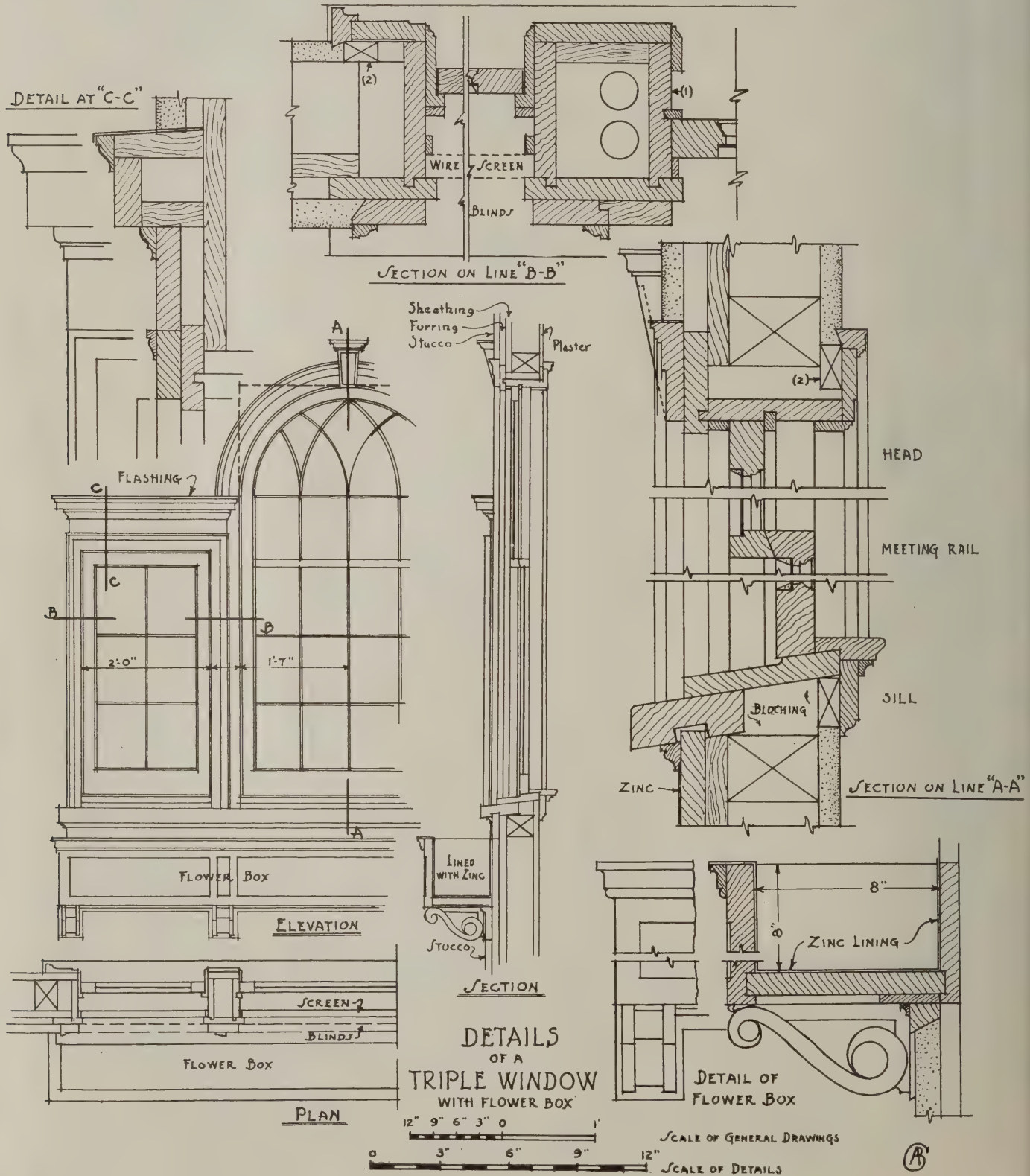
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A WINDOW in the Palladian motive, so characteristic of the Colonial type of architecture, is the subject of our

first article on common, up-to-the-minute construction details.

The advantages of this form of win-

dow are quite obvious. Its pleasing outline, the additional light and ventilation it affords and the aristocratic air it im-



parts to a building, explain in part its popularity.

The drawing herewith illustrated shows a double sash, square-headed window in the center, and casement sashes at both ends. This arrangement may be varied. Thus the end windows may be fixed or pivoted or double hung. The center window, on the other hand, may be a double casement sash. The semi-circular portion on top may be made either an integral part of the upper sash, as here shown, or it may be constructed entirely independently, with a transom bar separating the lower from the upper section. In the latter case, the semi-circular sash may be fixed, hinged or pivoted.

Instead of the particular style of window chosen to illustrate this article, any of the variations just described might have been taken. We have selected this one because it is the most common and typical. Once the reader has mastered this type, he should have no difficulty in understanding, designing or constructing any of its variations.

The flower box, although not a necessary adjunct to this class of window, is a most desirable feature. It adds beauty to a part that might otherwise be quite prosaic in detail. The consoles at the bottom, lining up as they do with the mullions above; the sunk panels of the box, being made of the same width as the corresponding sashes above—all tend to unify the various details and produce a most attractive mass. It might be well to state at this point that a flower box should be lined with zinc and not with copper, as plant life is unfavorably affected by the latter material.

Let us now study our drawing plate in greater detail. The general drawings in the lower left-hand corner, comprising a plan, section and half elevation, show a complete assembly view of the triple window. The heavy lines with letters at both extremities, indicate the cuts at which the various detailed sections shown on top and to the right, are taken. The corresponding letters with which both details and general drawings are designated make them easy of recognition.

In the section through the jamb, "B-B," the principal member is the pulley stile (1). Although here shown $\frac{7}{8}$ -inch thick, it may be made $1\frac{1}{8}$ or even $1\frac{3}{8}$ -inches thick, depending upon the size of the window and the grade of workmanship sought. This stile should be tongued into the blind stop, as here illustrated, if a perfectly rigid frame is desired. These tongues, besides insuring accurately fitting sashes make an excellent water-tight joint and are therefore recommended for high-class work. The space in back of the stile is reserved for the weights. These are usu-

ally made of pig iron, about $1\frac{1}{2}$ inches in diameter, and are so located that their centers come in direct line with those of the sashes. To the left of the weight pocket is shown a casement window, hinged at one side, and opening and closing like a door. The inside trim is worked out of $\frac{7}{8}$ -in. material and has a $\frac{7}{8}$ -in. back band. The latter is provided with a feathered edge, which is planed off to fit the unevenness of the plaster. Instead of the feathered edge, a small moulding may be substituted. This moulding is set in the angle formed by the back band coming in contact with the plaster. Grounds, such as are shown at (2), are placed about all openings to provide a nailing for the trim. In fastening the trim care should be taken to drive the nails through the grounds and not through the plaster. The outside casing is cut in back as shown to provide a good clinch for the stucco. Note the provision made for wire screens and for blinds or storm sash. When the latter are contemplated the casing should be at least $1\frac{1}{8}$ -in. thick.

The figure to the left of the jamb is a sectional elevation of the head of the casement window. A slight incline is given to the uppermost member and the surface is then covered with tin, copper galvanized iron or other suitable sheet metal. This flashing is carried up behind the stucco about 4 inches and overlaps the crown mould. Blocking is inserted to give the necessary projection to the cornice of the modified entablature. No extended discussion is entered into on the design of the trim and the construction of the sash because they are similar in every respect to those shown in the section through the jamb.

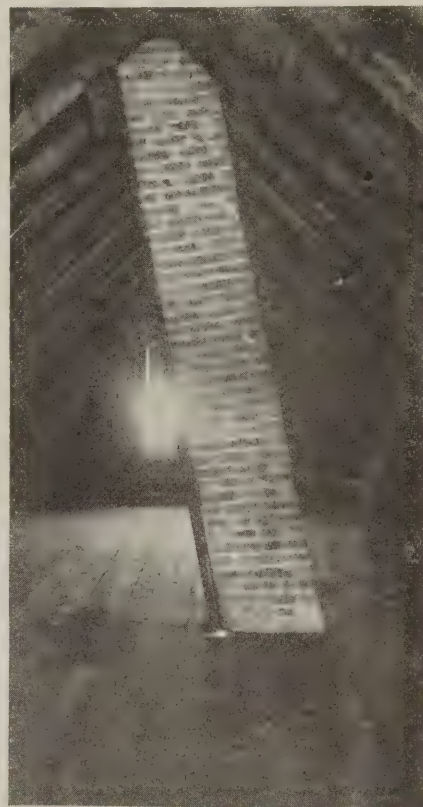
To the extreme right is a vertical section through the head and sill of the central double-hung window. The observations made in connection with our discussion of the jamb, apply of course to the section through the head. The meeting rail is bevelled, as shown, to insure a weather-tight joint when the sashes are brought together. The section through the sill possesses many features that will prove of particular interest to us. In the first place there is the rebate directly underneath the lower sash. It acts as a sort of drain for any water that may have worked itself down to that point. The second rebate is formed by the double sill. A single sill for so wide a span would be liable to warp or twist. The use of a sill and subsill, built up and supported as shown, well nailed or doweled together, eliminates the possibility of such shrinkage. The undercut in the exterior sill to receive the finishing of wood directly over the flower box, is just another device to keep rain and wind from entering through this joint. On the interior, the sill is finished with a

stool, bed-mould and apron, applied in the usual manner.

Defective Chimneys

Insurance underwriters state that twenty per cent of our dwelling house fire losses have been traced to defective chimneys.

The chimney shown in the accompanying illustration is a case in point. This chimney is supported by a 2x4 nailed to the attic floor at the bottom and to the rafters above. A number of cracks have developed in the mortar joints both at the floor and at the roof. There is a



A constant source of danger

constant danger that sparks will find their way through these openings, thus setting fire to the bone dry wood. There was no excuse for this dangerous construction excepting that the builder evidently was laboring under the impression that the only place for a chimney to show on a roof is at the ridge. Such reasoning is not only faulty from a standpoint of "looks," but also reflects upon the "practical" ability of the profession as a whole. The average man is apt to condemn a whole profession for the sins of an individual.

Examples of ignorance or carelessness such as this chimney offer reasons for the enactment of laws requiring the licensing of builders, so that a man would think twice before inviting the cancellation of his right to practice the profession.

Doors and Their Outlets

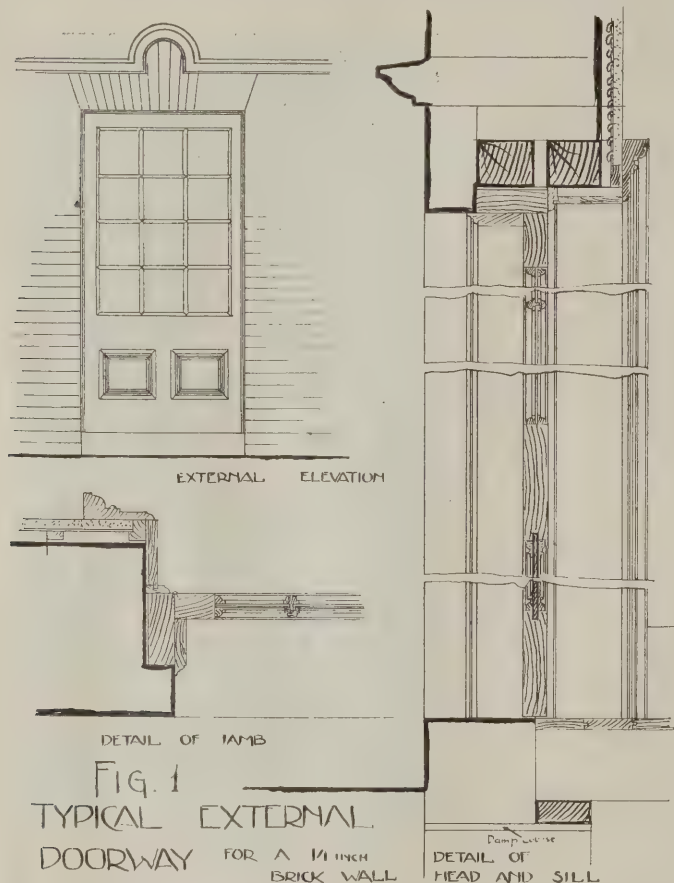
By John Y. Dunlop

THE mouldings used for doors are of designs in most cases made up of Greek or Roman mouldings. Joiners, as a rule, are very little concerned about the style the mouldings belong to, their practical classification is generally "raised" and "sunk" mouldings. A moulding which

at the bench, and in mitering them into their place, try what we would, we had no success in getting all the members to come in. If we got the two outside points to match then the center members were a long way out, and the man whom I was working with insisted that

leaded glass and should be narrow. With the ever-increasing cost of building, however, there is a tendency to do away with the double door at the entrance and to use just the outer door with a few glass panes in the framing.

The door shown in Figure -1 is a



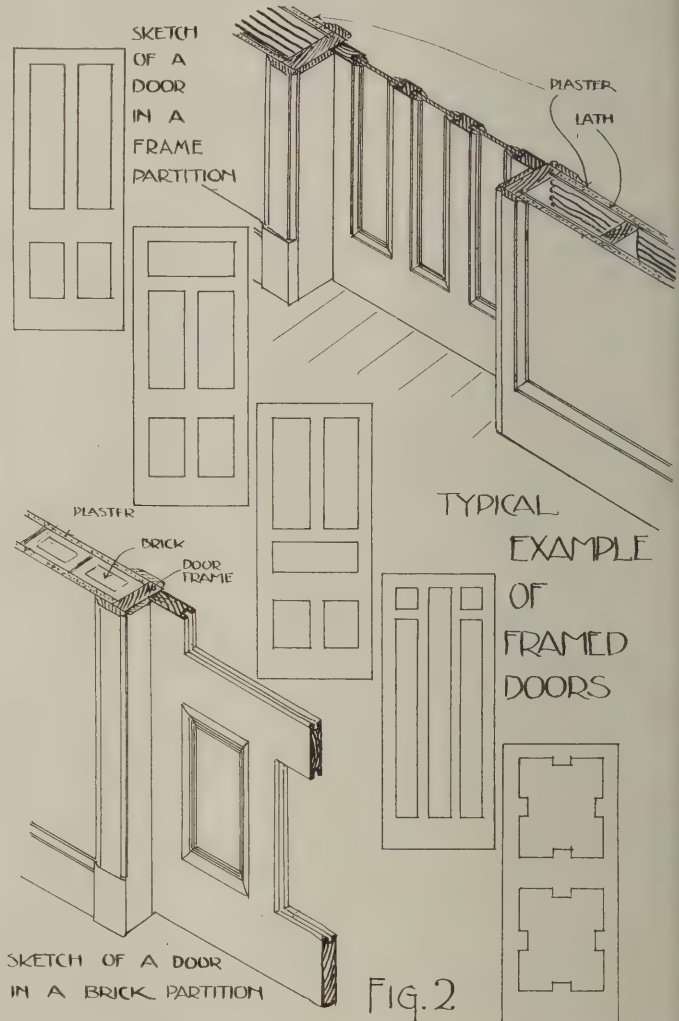
projects past the surface of the framing is called "raised" moulding, and a door with such a moulding is more expensive than one with a sunk or flush moulding.

I thought at one time that all the moulding joints in the corner of a panel were straight miters, but I discovered very early in my training that this is not always the case. On one of my early jobs we had some doors with circle rails, which were tangent to the stiles, with the result that a long acute angle was formed by the junction of the stile and rail. In ordering the mill to get the mouldings ready the foreman's instructions were that both the circle moulding and the straight moulding were to be made the same shape, which was the right way.

In due course the mouldings arrived

the mouldings were wrought wrongly. Finally, however, we found that it is not possible to join two mouldings such as I have referred to, with a straight miter. The required miter is curved and the shape of the curve varies as the radius of the circle moulding.

In regard to external doors themselves, in good work a small vestibule is generally formed between the front door and the glass door which opens into the room or hall. Where the width of the vestibule is over three feet the vestibule usually has the door in the middle and side-lights at each side of the door. The side-lights often have



typical example of an English glazed door, and is made with a $4\frac{1}{2}$ -inch stile on the lower part and reduced to $3\frac{1}{2}$ inches wide at the glazed portion. The door frame is placed in recesses or checks built in the brickwork. In such cases the frame is built flush with the brick jambs, and the stops are made wide enough to cover the joint between the brickwork and the door frame. When the door is opened the nose has a slight tendency to lift clear of the floor.

The inner part of the jamb is finished with a moulded and grooved facing on the inner edge of the door frame, and the groove is made to receive the jamb

casing on the sides and top. The wall casing is then fixed to the edge and to the ground, which finishes the plaster. The same finish is shown at the head of the door with the plastered wall above.

In England a door of this type is always hung what is known as a half bull at the top and full bull at the bottom. That is, the hinge at the top projects out past the line of the door a distance equal to half the pin of the hinge, while the bottom hinge projects the full size of the pin. By this arrangement, when the door is opened, the nose has a slight tendency to lift itself clear of the floor. Six-inch hinges are used for a door of this kind and if the job is a first-class one, three hinges should be used.

One of the things which is seldom done now is to cover the ends of the tenons with a strip sunk in the edges of the stiles. In my young day we were trained so that after we had fitted and hung the door temporarily we would take it down and unscrew the hinges; then plow out both edges one-half inch broad and a quarter of an inch deep. This groove was then scraped out on each side with an old piece of a saw blade, so that it was wider at the bottom than at the top, thus forming a dove-tail groove. A wooden strip was then wrought out and fitted into this channel. Remember, this meant that the sunk strip had to be driven in from the end of the stile, and along the whole length of the edge of the door. The strip on the hinged stile was then again cut for the hinges; the hinges were screwed on, and the door finally fixed up to the frames. In those days, however, we did not fit and hang a door in 45 minutes, not by a jug full!

The designs of the framing for the doors which are shown in Figure 2 are every-day examples, and it should be noticed that in every example but one, a 9-inch broadlock rail is used. The reason for this must have been brought about by the universal adoption of the long mortise lock, but I am not inclined to think that this is the best that could be done in framing the door. With the lock mortised into the door a good bit of the inside part of the lock rail is taken away and a very valuable part of the construction of the door interfered with. A better arrangement would be to have a rail above the lock and one below, with the mortise lock on the stile between the rail, as indicated in the third example from the top. The arrangement of the framing of the door second from the bottom is not the best for strength, still the lines give height to the appearance and that is what is wanted in many cases.

Two sections of an internal door frame are shown. The lower one is for a brick or tile partition and the upper one for

wood. Door frames such as these are usually set before the mason builds up his partition. Two wood bricks are built in against the frames and when the partition has set the door frames are nailed up at each of these points.

The door frame shown in the stud partition does not have double studding around the opening. The frames are set as for a brick wall and the partition built around them in a similar manner. The back of the jambs may be grooved, as shown, to receive the laths or a 1x4 may be nailed on the back for the same purpose. The frame at the top, however, should be doubled, to take the weight and prevent sagging.

Very often stud partitions are deafened by nailing a fillet on the middle of each side of the studding in the partition. These fillets are then lathed on each side with short lath and the surface between the studs is coated with plaster. The studs are then lathed in the usual manner for the finished surface of the wall.

The methods of finishing the doors are shown in the sketches, and in the top view two arrangements are shown for the one door.

Metal Copings

In some instances it is desired to give a parapet coping a somewhat different treatment from that which can be economically obtained with stone or concrete. In such cases sheet metal may often be used to good advantage. Of course, stone can be carved, or concrete can be molded to almost any shape or form, but stone carving is rather expensive, and it is often difficult to obtain the required snap and the sharp arrises

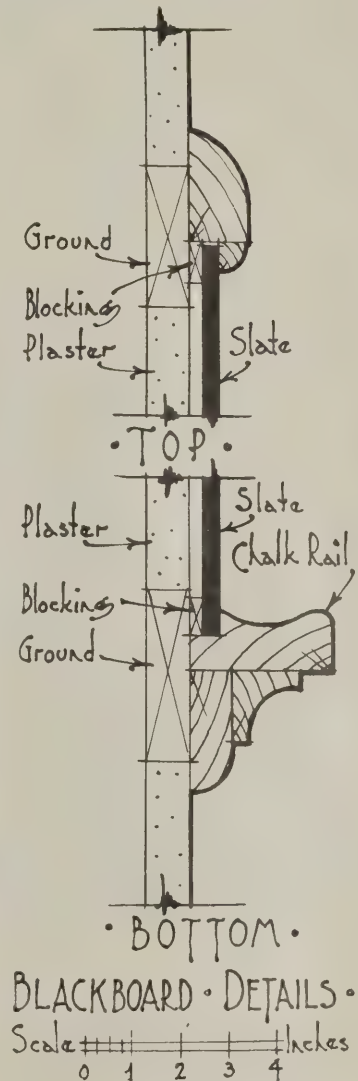


for small moldings in concrete. This difficulty, however, diminishes as the size of concrete moldings increases.

The accompanying photograph is by no means cited as an example of good design, but it does illustrate the idea and will serve as a suggestion that may be elaborated on by interested builders.

Setting Blackboards

W. S. asks for information about fastening slate blackboards to walls. The accompanying sketch shows sections through the top and bottom of a blackboard frame. The finish at ends should be similar to that of the top.



The frame should be set perfectly level and true and securely nailed to the grounds. The slate should be backed at all edges and joints, and, wherever necessary, with glued pine blocks, so that no slate will yield to pressure. Joints should be well filled with glue before bringing together and should fit tightly and be perfectly flush so that chalk marks may be readily made across them. At completion, all glue should be scraped from the slate and the joint rubbed or scraped to a perfectly smooth surface.

Building With Clay Hollow Tile

By Warfield Webb

WITHIN the past few years there has been a noted increase in the use of clay hollow tile in construction work. This is awakening in the minds of a large number of builders and architects the merit that such material contains for all kinds of building. Aside from the important feature of fire resistance, clay hollow building tile has other advantages that are vital. It is not essential to use skeleton steel construction in the erection of high buildings with clay hollow tile. Reinforced concrete columns and

sired the walls are built with hollow tile supported on columns and girders constructed with concrete, reinforced with steel bars. In such a structure it is not essential to use any other form of structural material. It is even possible to use a combination of concrete and tile for lintels of short span, though preference is usually given to concrete for this purpose. The foundation is of concrete, and the roof and floors can be constructed with concrete joists and tile fillers, thus making a building entirely

is no need for the elimination of the extra cost, then there can be the most elaborate plans worked out for decorative purposes.

Clay hollow tile makes both the matter of durability and cost less a problem. The question of its architectural possibilities is not limited to any particular style, and it is possible to construct a very cheap building with this material, or on the other hand a most elaborate and costly one. It being a fireproof commodity in the first place, and the



Hollow tile is used extensively for industrial housing developments

girders make the larger use of this material unnecessary, and at the same time give the desired strength to the structure. Both architects and contractors, who are giving the matter any study see the advantages of this combination of materials for structural purposes where heavy duty construction is demanded. This is only another factor that makes for greater use of this material, and it has been found upon comparison that there is often real economy in the use of hollow clay tile for all kinds of structural purposes.

If a strictly fireproof building is de-

of materials that will withstand the ravages of fire.

For the exterior coating of the walls, cement stucco is nearly always used, making the walls pleasing as well as durable. There is no limit to the decorative possibilities of stucco when used on hollow tile walls, and this adds another reason why the use of tile is desirable.

However, it is not necessary to cover the tile with stucco because there can be placed on the building a veneered wall of brick or stone of any kind, and in this way it is clearly to be seen how the wall can be treated in various ways. If there

fact that it possesses dead air spaces, adding warmth in winter and coolness in summer, are factors that enhance its popularity.

The architects and contractors cannot too frequently or deeply impress upon the public mind that, for the man who wishes to erect a modern home, for the man who wishes to build a mansion, or for the man who desires to construct a skyscraper, there is in hollow tile an excellent structural material for buildings in which the matter of fire resistance must be considered, together with cost and durability.

ENTRANCES



Plate 1—An old colonial door in Philadelphia. Note the elaborate carving of the arch band and on the angle of the jamb.

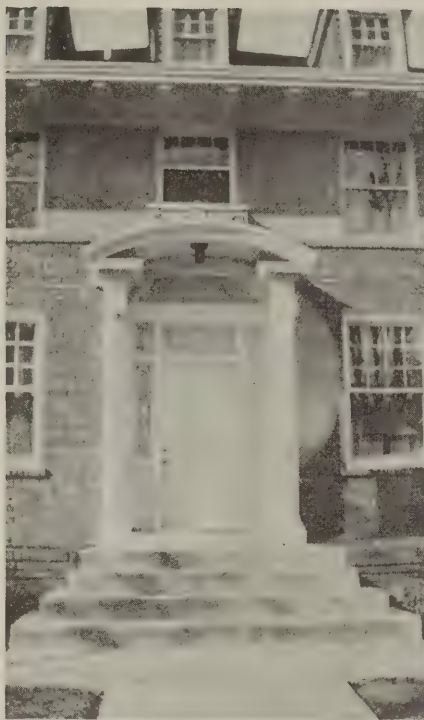


Plate 2—Good millwork combined with good taste are responsible for this attractive entrance.

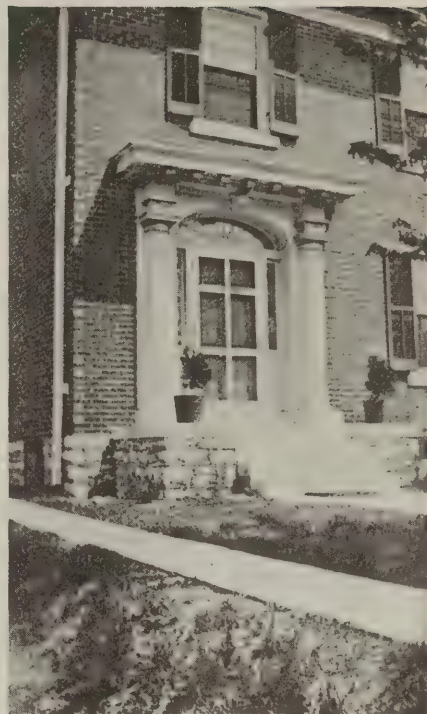


Plate 3—A rather clumsy treatment. The composition is "squatty" and the detail is coarse and heavy.



Plate 4—A semi-circular hood supported on stucco brackets forms this unusual entrance.



Plate 5—An inviting entrance that expresses hospitality. The broad hood is supported on turned brackets and has a flower box built into the roof.

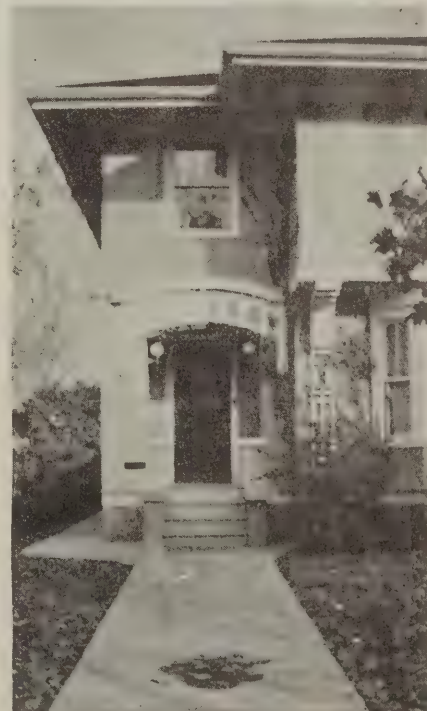


Plate 6—This photograph isn't distinct, but it shows the idea. A shallow entrance porch with an arch ornamented by wood patterns planted on the stucco.

Kitchen Cupboards

KITCHEN cupboards are often a source of controversy and hard feelings between housekeepers and builders. Very often a builder constructs a cupboard according to *his* ideas of the subject and without consulting the woman who is to use it. Almost invariably this practice results in a dissatisfied client; the housekeeper feels that she has been cheated and will raise her little hammer against the builder whenever an oppor-

perts have been at great pains to develop "model kitchens" and to set down rules for guidance in placing kitchen equipment, but it should be understood that every woman is a law unto herself when it comes to her kitchen, and that two women—no matter how practical minded—will seldom agree as to its arrangement. Then, too, kitchens have a disagreeable faculty of being "different." Individual requirements for windows,

dust-catching top, and the superior general appearance, make the high type a decided favorite.

Combination cupboards, that is, those that are placed between the kitchen and the dining-room and have doors on both sides are considered highly desirable. By this scheme the "show dishes" may be displayed in the dining-room and at the same time are convenient for setting the dining table and for dishing up food in the kitchen. If desired, the food may also be served through the combination cabinet.

It may be said, however, that this feature has been highly overrated and that combination cabinets are seldom used as a means of serving food; their other advantages are sufficient reason for their popularity. The old way of building combination cabinets was to use a side-board or buffet treatment on the dining-room side. The present tendency, however, is to form a china cabinet on this side with its bottom shelf several feet above the floor. This reduces the expense and makes a simpler and better looking treatment. A sketch of such a combination cabinet is shown among the accompanying illustrations. Combination cabinets usually have glazed doors on the dining-room side and wood paneled doors in the kitchen. Glazed doors on both sides show up the china to better advantage, but, of course, allow a free view of the kitchen from the dining-room.

Closed front cabinets are those in which the entire face is enclosed by doors. In this type it is customary to



Fig. 1—A cupboard with lots of storage space. The back would be easier cleaned if it were made of smooth lumber instead of "Vd" ceiling

tunity presents itself. The remainder of the house may suit her perfectly, but she will forget all of that when she thinks of the unsatisfactory cupboard.

The best way to avoid all of this is to consult with the housekeeper and get her viewpoint. In this way a booster, instead of a knocker, is made, and the result will usually mean that other jobs for the builder are made among the client's friends.

Location

The location of the cupboard is of great importance. Every effort should be made to place it in the position that best suits the housekeeper's methods of working. Of course, in houses that are already built, the location for a new cupboard is largely governed by the available wall space, but in new houses there is nothing to prevent the cupboard space from being planned in advance and given the *best* location. Efficiency ex-

doors, chimneys, and so forth, usually make it impossible to utilize a so-called model plan.

It is generally agreed, however, that the kitchen cupboard should be near the sink so that dishes may be dried and put away at one operation. This location has an added advantage when the cupboard contains a work space for the preparation of food.

Types

The type of cupboard is largely determined by the location and the available wall space. Whether the cupboard shall be of the high type, extending to the ceiling, or of the low type, extending only to a height that will allow one to reach the top shelf from the floor, usually depends on the amount of money that is to be spent. The high type costs slightly more, of course, but the added storage space that may be obtained for seldom used utensils, the absence of a

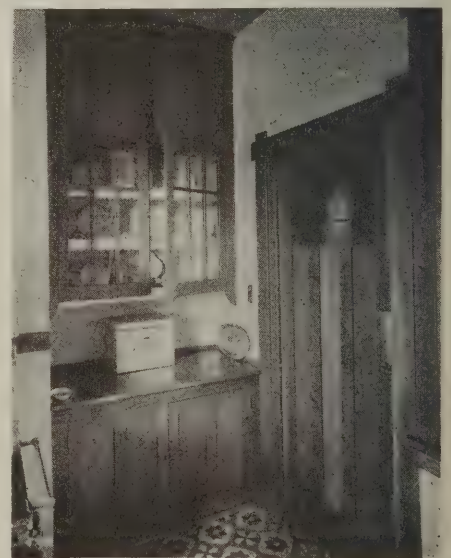


Fig. 2—A compact little cupboard suitable for a small family. It is a variation of the flush type and fits into the niche as though it belongs there

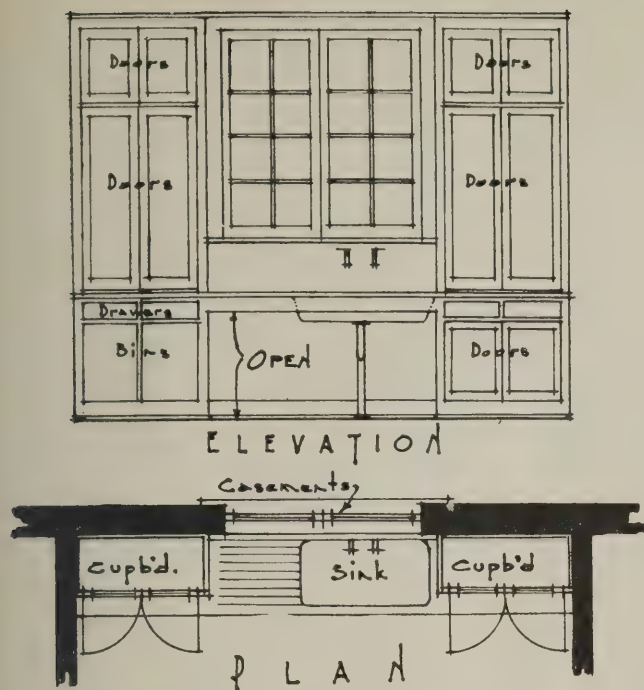


Fig. 3

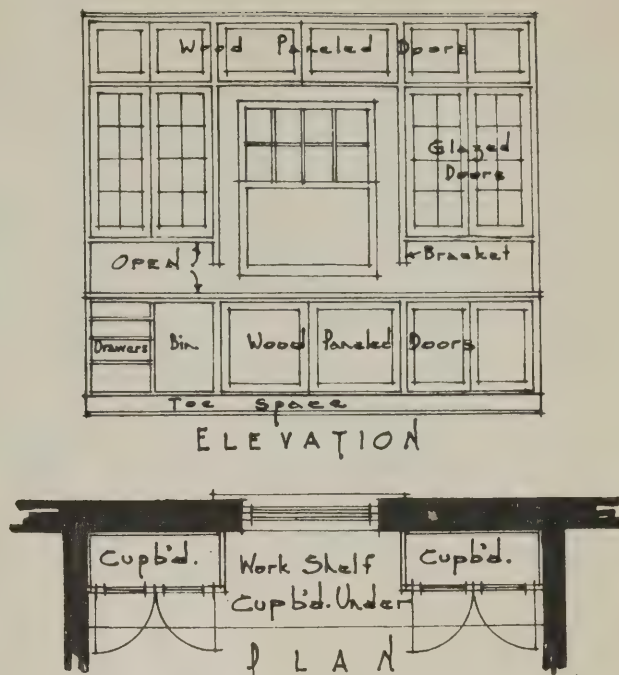


Fig. 4

Fig. 3—A high type cupboard with a self-contained sink and drain board. This is a closed front cupboard and should be provided with sliding work boards. Fig. 4—Cupboards built around windows are desirable. This is an open front type and provides a splendid work shelf

provide a sliding work board that may be pulled out to form additional work space when needed. The greatest disadvantage with the closed front type is that when the work space is in use it must be cleared off every time the doors are opened or closed. Of course, sliding doors may be used, but many women object to them.

Open front cabinets have an open space or recess between the lower and upper portions. Unless the lower or base portion is very shallow, the work space thus formed is usually considered sufficient without providing a sliding work board. It is advisable, however, to provide a narrow chopping board—say, 12 inches wide—that may slide under the working shelf.

Flush base cabinets are those in which the face of the base portion is flush with that of the upper portion. They are seldom considered desirable, as the base portion is usually too shallow to receive bulky articles and is not deep enough to form a suitable work shelf on top, although a sliding work board will remedy the latter defect. In extended base cabinets the face of the base portion extends beyond the face of the upper portion.

Flush type cabinets are built in a wall so that the front is flush with the wall. The semi-flush type has the upper portion flush, while the base portion projects into the kitchen. Projecting types have their backs against the wall and the entire cabinet extends into the room. They are most common, as it is usually diffi-

cult to obtain enough depth to accommodate the flush types.

Shelves

The success of a kitchen cabinet depends largely on the depth of the shelves. If the shelves are too narrow to take the dishes and utensils, the housekeeper is likely to go scalp hunting. The shelves in the upper portion are frequently made only ten inches wide. This is too narrow, as ordinary dinner plates are full ten inches in diameter, and some are larger. It is safer to make these shelves eleven inches wide, and twelve is better. It is seldom necessary to make them wider, as platters and other large pieces may be stood on edge. Of course, this is not true of combination cupboards, and for these the shelves should be about fifteen inches deep. Four feet is about the limit of unsupported length for ordinary shelves that are to be used for china, as longer shelves are apt to sag dangerously.

The work shelf should be about two feet deep and four feet long, the longer the better, but a work shelf deeper than two feet makes it difficult to reach the upper shelves in the china compartment. The top of the work shelf should usually be from 2 feet, 8 inches to 2 feet, 10 inches above the floor. The standard height is 3 feet, but every inch counts when reaching for the upper shelves in the china compartment, and the lower the base, the lower the upper shelves may be placed. Most women also prefer the lower base, as they find it a more comfortable height for working. The

shelf in the base compartments is better if it is only about half as deep as the compartment itself. This allows tall articles to be stood in front of it and makes everything more accessible. All shelves should be adjustable for height. Metal pins set in holes bored in the ends of the cabinet are better than the old method of notched strips. The metal pins are cheap and easily applied and do not serve as dust catchers, but they should fit tightly so they will not work out of the holes. The holes are usually $\frac{3}{4}$ -inch in diameter and for china shelves are usually bored at $1\frac{1}{2}$ -inch centers, measured vertically; 3-inch centers are close enough for other shelves. When long shelves are used, an additional line of holes is sometimes made in the back of the cupboard. China hooks for hanging up cups may be screwed into the bottom of a shelf. They should be placed about $3\frac{1}{2}$ inches on centers both ways and should be located on the same side at the door which opens first.

(To be continued)

The Magic of Building

An exchange states that a woman called Architect James W. Plachek, of Berkeley, Calif., on the telephone recently and stated that she wanted plans drawn for her new home, to be a two-story and basement building of ten rooms and a separate garage, the cost to be \$5,000. "Madam," said Mr. Plachek, "you don't want an architect; you want a magician!"

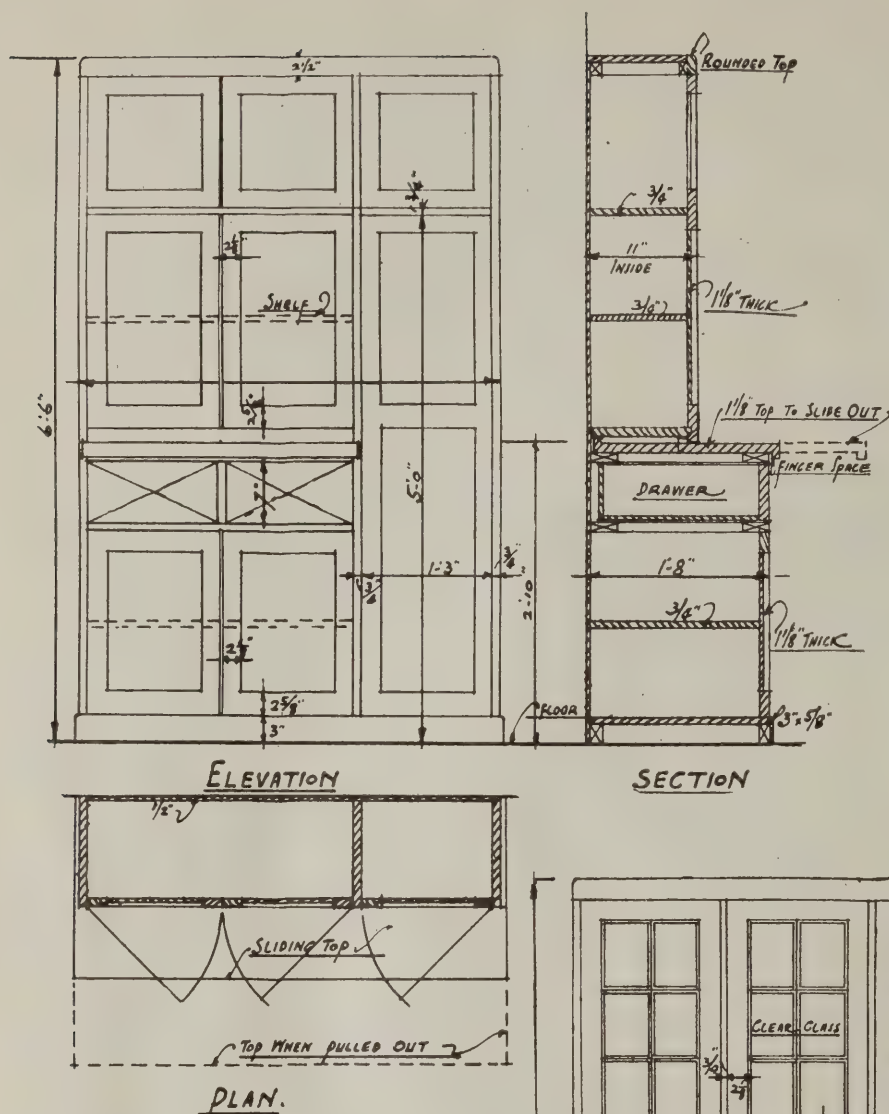


Fig. 5—Cupboard adopted by the Ontario Housing Committee. This is of the low type with closed front and sliding work board

Making Up Veneered Panels in the Shop

By R. Newbecker

EVERY building contractor knows that where a job calls for a fair amount of standard size panelling, such as $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch in thickness, it is cheaper to procure these pieces from a mill making a specialty of this line of work.

There arise, however, numerous occasions where the builder turning out his own mill work is called upon to furnish a panel of special size, or thickness, where if this work was let out to a mill the price for same would often absorb a goodly portion of the estimated profits. Therefore it would seem of prime importance for the building contractor to

learn to successfully turn out panel work in his own shop.

You may think there is no trick in gluing up several pieces of wood and then covering the same with a veneer facing. Very true, indeed, there is not; but what assurance have you that a job of panelling will turn out satisfactorily? You may have the impression that turning out your own panel work may be easy and safe if you merely follow the methods generally in vogue in handling ordinary workwork in the shop. However, after some time, when you are called to replace a stairway riser in one building, an odd wall panel in another, and a door panel somewhere else, you will come to the realization that turning out built-up woodwork with heavy core-bodies is not as easy as it superficially seems to be—that is, if they are to be of the variety that lasts.

To begin with, we will take under consideration the ordinary flat panel work where the thickness of the same would be, say, not over $\frac{1}{2}$ or $\frac{5}{8}$ of an inch. Of course it must be understood that all stock, whether core stock—that is, the inner layer—as well as the outer face veneers must be perfectly free of all

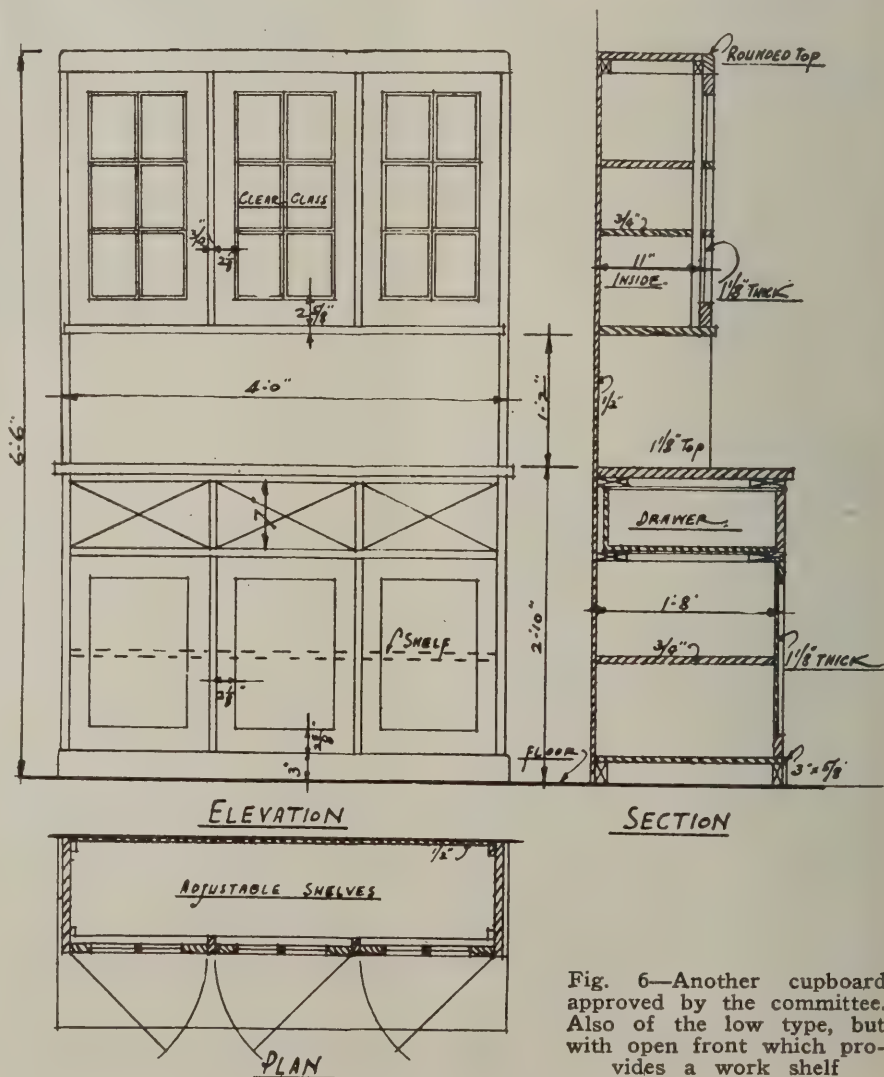


Fig. 6—Another cupboard approved by the committee. Also of the low type, but with open front which provides a work shelf

moisture. To pick up a lot of odds and ends around the shop and proceed to use them up in panel work without previous re-drying to remove all possible chance of excess moisture in the stock, will not do. Built-up woodwork, if it is to be made to last, must be absolutely free of all moisture before being glued up, otherwise panels will warp, twist and check to such extent as to make them useless. Where veneer work is required not exceeding $\frac{5}{8}$ -inch in thickness, it is best to build it up, as the regular panel manufacturers do. That is, having the veneers and core bodies of as nearly equal thicknesses as circumstances will permit. This is the best way for turning out door panels, which as a rule are faced with yellow pine, red gum, birch or oak. Furthermore, it must be understood, that whether turning out built-up work in 3-ply or layers, or in 5-ply or more layers of wood, to bring the product up to the required thickness, the grains of the different layers should always cross each other. In 3-ply work the center piece is usually laid with the grain running the width of the panel, while in the next layer the grain runs the length of the same. If more than 3 layers or ply in thickness is desired, this procedure is usually reversed and the stock is glued up in such manner that the grain of the face veneers run the length of the panel in question, unless special requirements demand running it the opposite way.

In gluing up stock with a thick core the most serious mistake that is usually made in the shop is the temptation to glue the face veneer right onto the core body without any crossbanding. This method should always be avoided. The core body probably being glued up of numerous pieces of different woods, when the same comes into contact with the moisture in the glue, some will swell more than others, and in drying out others will shrink more, thus giving the face veneer an uneven surface which as a rule is not discernible in the finished product until the same is in position and has received several coats of varnish. One panel of this kind will often spoil the entire effect of a room finished with the most beautiful woodwork and workmanship.

In turning out built-up millwork or panels with center cores, or "bodies" as they are often called, due consideration must always be given to the nature of the face veneers so that there will be an even stress or pulling power on each side of the panel. For instance, if you veneer a panel with one side oak and the other side red gum, you will have some job on your hand to prevent the same from warping. Red gum being more of a moisture absorbing nature than oak will swell in greater proportion. If both veneers are subjected to moisture a

strain is set up in the panel of sufficient force to warp the same out of shape.

In placing veneered work in new buildings, there always arise peculiar conditions which the builder must guard against if he does not wish to have good veneer work spoiled. Ninety per cent of the trouble experienced in having good

safeguard against moisture trouble of this sort. For the builder who turns out his own panel work, the best course to follow in a case of this kind is to use the same kind of wood on the back as on the face. The wood on the back can of course be of a much cheaper grade. Then before putting the veneered stock

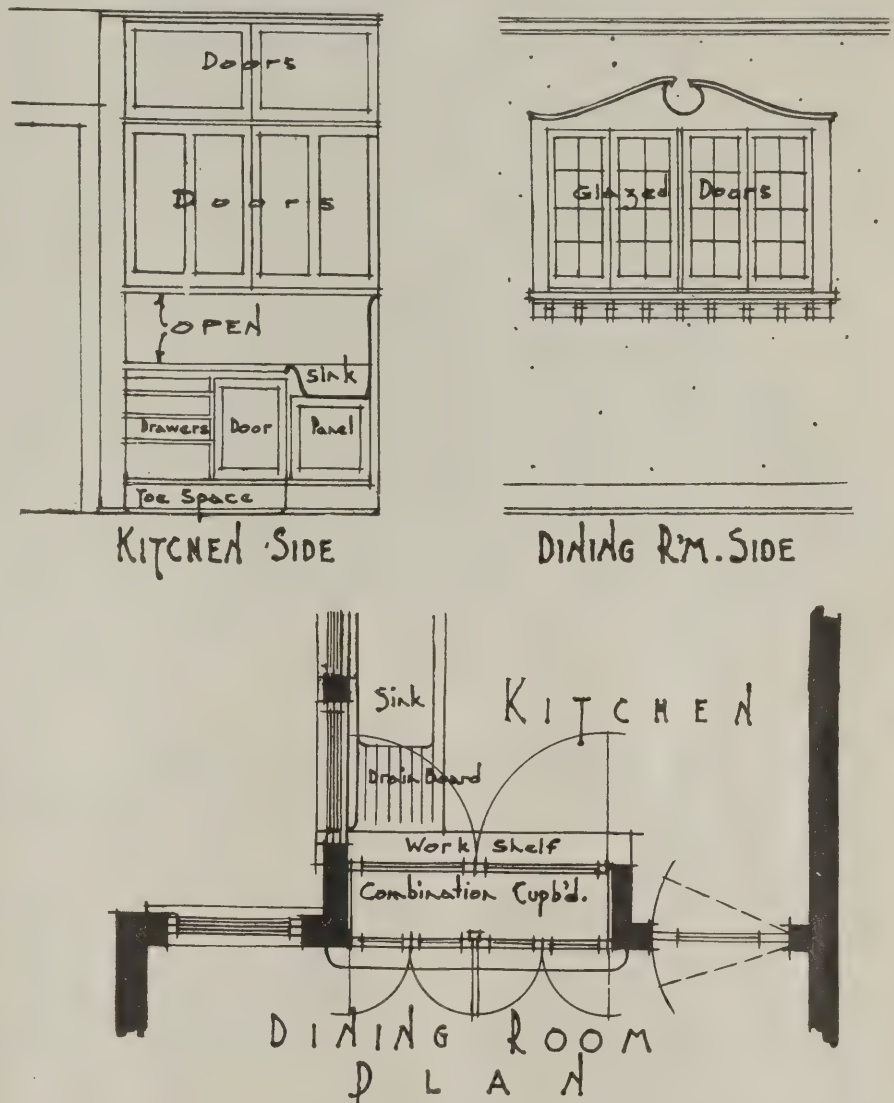


Fig. 7—A combination cupboard with high china cupboard on the dining-room side. This type is growing in popularity

veneer work spoiled on the job before the same is ever placed in position, is due to moisture in new walls. Architectural requirements may call for veneered or built-up work in buildings subject to excessive moisture. This naturally causes swelling of the core body and often loosens the glue or causes blistering of the face veneers. Some builders who are forced to place built-up stock in a building where excessive moisture exists, try to overcome this trouble by cutting grooves in the back of the solid body or side that gives against the wall, thus hoping to force swelling to expend itself in the back. While this overcomes the trouble to some degree, it is far from being an absolute

into the building, seal the side next to the wall or moisture exposure, with a good coat of asphaltum paint. This will prevent the moisture from being absorbed into the wood and avoid much trouble in this regard. Indeed, it would seem that it would pay every builder to first seal or paint all edges and backs of veneered work before the same leaves the shop. This will cause a little increase in cost in the first place, but in the end will be found to be a profitable investment. One piece of specially constructed veneered work saved from being spoiled by moisture would often more than pay for a month's extra expense incurred in finishing up all veneer work in this manner.

The Wooden Garage

THE next time a man tells you that he can buy a garage from a mail order house and have it put together, all for less money than you can afford to furnish the materials and build one for, tell him to wait a minute. Then take out your pencil and show him where he's wrong.

Call his attention to the fact that the advertisement which he read probably didn't mention a floor, nor any foundation for the walls. Also remind him that freight charges often prove a source of surprise and that somebody has to pay for hauling the material from the station. Again there's nails, and paint, and hardware, etc., etc., etc. Then name your price complete! Tell him to think it over and that you'll call around tomorrow and make arrangements to start work.

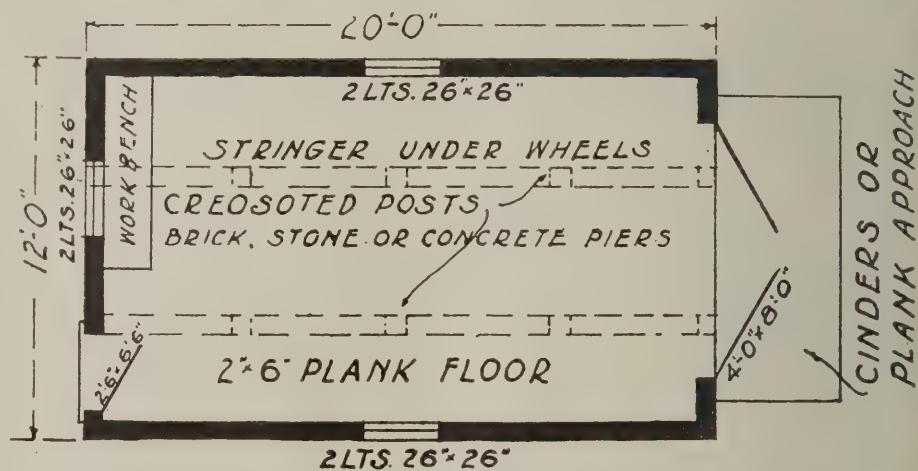
To do the thing up brown you and your local builders' supply man will have to get your heads together beforehand. Work up drawings for various sizes and types of small garages, take them to the material men and explain what you are doing. If they are wide awake they will readily grasp at the opportunity to further their own interests and at the same time help you. Get complete lists of material and prices from them, figure your own costs, and you'll be ready to argue the point with any man who mentions a mail order garage. Most of the mail order garages are of the portable or knock-down type, so you'll have to include one or two of those in your estimates. In some cases it is advisable to place your garage proposition before the public by means of newspaper or other advertising, and don't forget the fact that if you show your local people that you can compete in garages, they will also realize that you can do so in houses and other buildings as well.

For ease of erection and low first cost, wood is a highly desirable material for a small garage. The accompanying illustrations show various types and should prove of value in working up individual designs.

Figure 1 shows a portable or knock-down type. This type is in considerable demand among car owners who live in rented houses and desire a garage that may be easily moved if the need arises. For ease in handling such, a garage should be made in say, eight pieces; four for the sides, two for the roof and two for the floor. It can, of course, be further simplified by omitting the floor altogether if the location is well drained. Portable garages are usually roofed

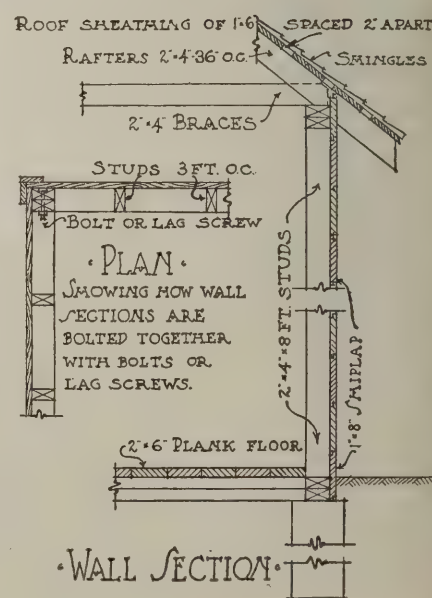


Figure 1—By working with local materialmen a good business in portable garages may often be built up



with ready roofing and the sections are secured by means of lag screws. The studding and rafters may be spaced at 3-foot centers, as shown by the detail. The doors shown in the photograph are somewhat more expensive than a garage of this type usually warrants. An ordinary board and batten door would do as well. To take down a garage of this type it is only necessary to remove the collar boards and the lag screws, it is then ready for removal. If the demand seems to justify, it is a good scheme to work up several of them in the shop at odd times and have them ready to put up on short notice.

The use of wood as a material for garage construction, however, is not confined to the portable garage. Figure 2 illustrates a small garage of the permanent type which also includes a pergola entrance. Little touches such as this,



add immensely to the appearance of a small garage, and may be turned out at slight expense by the builder who owns a well equipped shop. Note in the plan that special garage door hardware is indicated, so that the doors are hung on a track and may be slid around flush with the side wall, thus being out of the way and allowing a clear opening.

Figure 3 shows a two-car garage of excellent construction and attractive appearance. Two-car garages are becoming popular even among people who own but one car, as the unused portion may usually be rented, and two or three years' rental will pay for the entire building. Owners of adjoining property often combine two garages under one roof, with the dividing partition on the lot line. This scheme reduces the individual cost and usually makes a better appearance than would two small, separate garages set close together.

Figure 4 shows a small garage in which stucco is used for the exterior wall finish. This makes an inexpensive and durable finish. Wire lath may be nailed directly to the studding and the interior sheathed to make a warm wall. The stucco may be carried up under the eaves to form the soffit.

Figure 5 shows a single-car garage that is somewhat wider than is usual. A garage is seldom made too large, and in locations where the length is limited by conditions it is well to build the garage wide enough to provide room for placing the work bench and other equipment along the side wall. A garage without a work bench is like a home without a fireside.

In building a wooden floor for a garage the flooring should be of 2 by 6 lumber, surfaced on the top and edges. To prevent oil and grease drippings from soaking into the floor it should be painted with cement enamel. To afford fire protection the exposed woodwork may be painted with a fire resistive paint. The foundation posts should be set at about 4 or 5-foot centers, and there should be two rows of them down the middle of the garage to carry the stringers which support the floor. The stringers should be made of two 2 by 6 and spaced so that they come under the wheels of the car. If wooden posts are used for the foundations they should be creosoted to make them more durable. The approach may be made of gravel or cinders, graded up to form an easy slope.

Good door hardware is essential. A door that rags, or sticks, or is in the way, will go far toward lowering a builder's reputation. Garage door hardware to suit any condition is now made by reliable manufacturers.

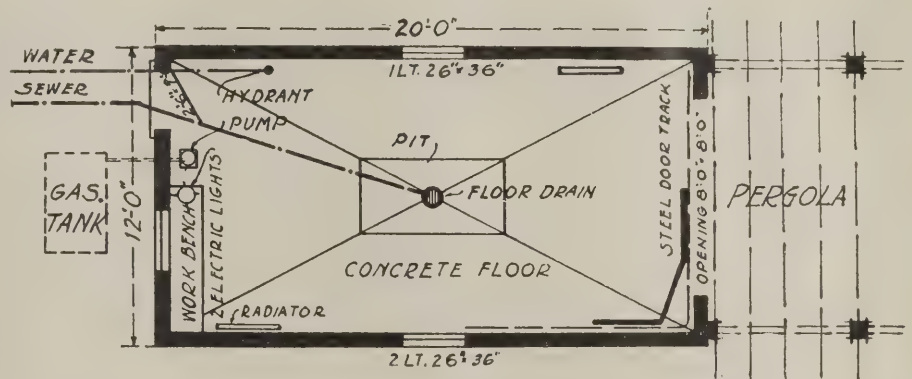
The garage should be warm and light, especially in cold climates. As an aid

to this, heavy building paper should be placed under the siding. The interior may either be sheathed or covered with wall board. Wall board is also useful for ceiling.

A common mistake is to place the windows too high. Single sash windows set near the ceiling do not give much



Figure 2—A good woodworking machine soon pays for itself in turning out work like this



light under the car where it is often needed.

One electric outlet is sufficient for a small garage, but it should be placed over the work bench and have a two-way socket.

Individual garage heaters are now made for use with gas as fuel. They are compact and economical and offer insurance against frozen radiators.

Builders entering the garage field should obtain all the information possible on garage specialties, such as hardware, heaters, gasoline tanks and pumps, turntables, and so forth. Most manufacturers will mail descriptive literature on request. There is no reason for any builder not being up to the minute on information of this kind, and there is no telling how soon he may need it.

The Secret of Nail Driving

In the first place, there is really no secret about driving a nail. The only thing to do, is to be sure you hit it on the head every time. And if you do, the nail is driven.

And yet, simple as the operation is,

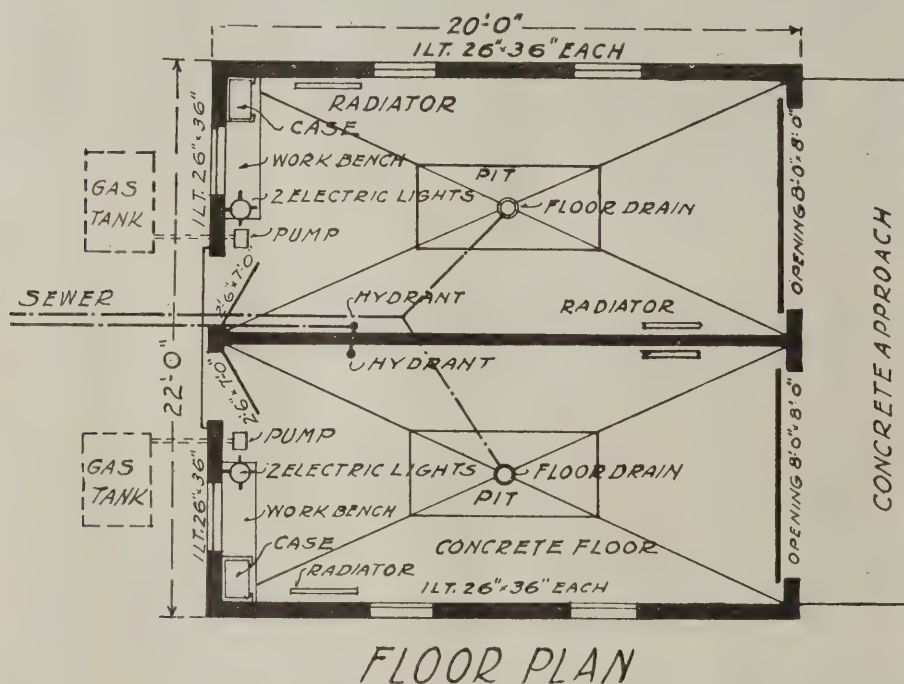
there is probably not one person in ten who can drive a nail straight, or who don't miss it about half the time at the first attempt.

The way to drive a nail is to keep your eye absolutely on the head. It is impossible to watch the hammer and the nail at the same time, so the hand does what the eye tells the brain to think. And if the eye keeps saying: "On the head—on the head—on the head—" then the nail is going to go in straight.

Nail-driving is one of the finest illustrations of the philosophy of success. Center your eye, your heart and your brain on the thing you desire to achieve, and if you concentrate enough and muster faith sufficient, you cannot help but succeed. Hit the nail on the head.



Figure 3—Two-car garages don't cost a great deal more than single ones, and the extra space may usually be rented at a profit

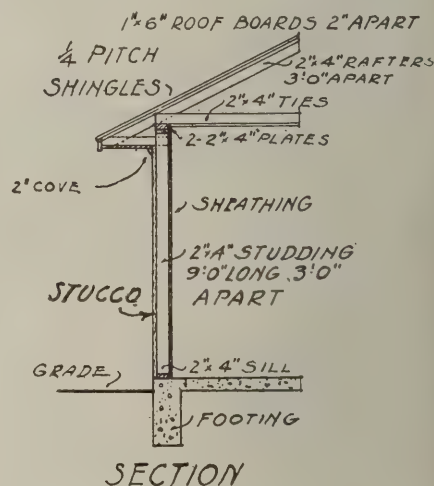


of wood about $\frac{3}{8}$ of an inch by 3 inches by 4 inches. That will enable you to grasp the sandpaper and block firmly.

In sandpapering a straight surface, always use a block; for small inside corners, like fillets of mouldings, use a sharp-cornered block.

It is important that the fineness of the sandpaper should be such as is adapted to the work in hand. It is graded by numbers, beginning with No. 00, and ranging to No. 3. The finest, 00, is used chiefly to rub down shellac or varnish between coats; Nos. 0 and $\frac{1}{2}$ may be used upon mahogany and other close-grained fancy woods, but No. 1 is fine enough for ordinary purposes. No. $1\frac{1}{2}$ is the grade most commonly used. Nos. 2, $2\frac{1}{2}$ and 3 are for use on floors and outside painted work.

In sandpapering either broad or curved surfaces that are to be stained, or finished in the natural color, take care to make the strokes of the sandpaper parallel with the grain. If different pieces of wood join one another at an angle, as, for example, in panel work, sandpaper the pieces in order,



round the panel. Do not allow the sandpaper to drag across the grain of any other piece while you are working on one. Smooth, scrape and sandpaper as many as possible of the pieces of work before you put them together; otherwise you will not be able to sandpaper the corners as you should.

The most frequent abuse of sandpaper consists in depending upon it to remedy the defects caused by a dull, poorly adjusted smoothing plane or a dull scraper. The wood should be smoothed with a sharp, correctly adjusted plane, and scraped with a well-sharpened scraper, until there is a perfect surface in which neither cross-grained places nor plane cuts are visible. Sandpaper should not be expected to do the work of the cutting tools, or to do more than make a uniform surface upon which the stain and finish can be laid.

Take care not to let the sandpaper

To a carpenter, nail-driving is such second nature, that about two swings of his hammer places an ordinary nail in its nest. But, you see, a carpenter's success depends upon his ability to hit the nail on the head. If he kept knocking them sidewise or missing them, his buildings wouldn't go up.

No matter how simple the task at hand, do it efficiently—do it better than it has ever been done before—and you will be surprised at the rapidity with which you cut down the length of time necessary to do things.

Center your eye, your heart, your head, on the thing you want to see done,—and you will do it. Drive the nail with your eye.

The Use of Sandpaper

Sandpaper is a necessity in putting a fine finish on furniture, and yet few nonprofessional woodworkers realize that skill and judgment are required in its use. Sandpaper should be used only to give the finishing touches, never until all of the work with the cutting tools has been finished. Otherwise the fine particles of sand forced into the grain of the wood will quickly destroy the keen edge of any tool that may afterward be used.

Sandpaper should be torn in halves the short way of the paper; one of the pieces may then be doubled, and folded over one side and two edges of a block

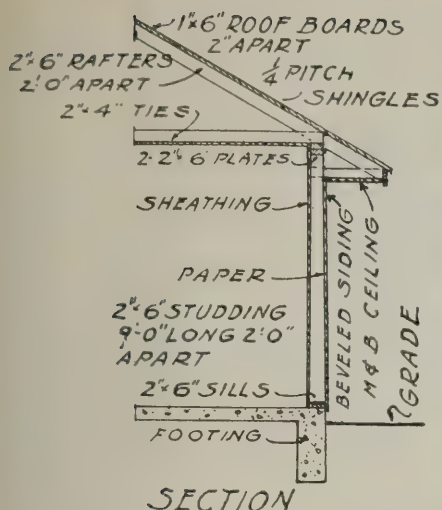


Figure 4—Stucco on wire lath makes a serviceable garage that earns friends for the builder



Figure 5—Building a small garage often paves the way for a larger job in the future. Thoughtful builders always consider such points

formed by adjoining surfaces will be somewhat rough; touch it lightly with the sandpaper, only enough to make the corner smooth, not enough to destroy its shape.

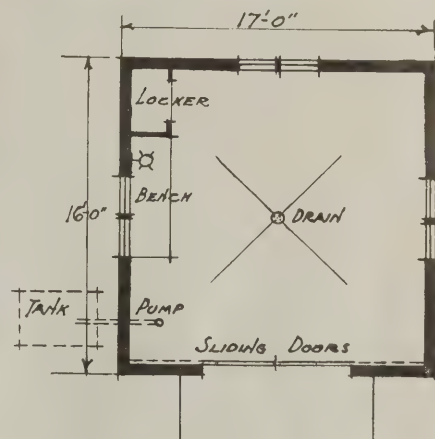
In sandpapering such woods as mahogany, butternut and sycamore, you will be likely to rub up the grain or cause fuzzy places, unless you allow the sandpaper to cut in but one direction of the stroke, and lift clear of the wood in the other direction.

Include a Place for the Auxiliary Heater in Your Plans

Conveniences and labor-savers must be leading features in profit-making houses and apartments. In planning a house the

wisdom of providing for the most desirable place for the auxiliary gas-heater should not be lost sight of, as it too frequently is. The United States Bureau of Mines, in Technical Paper 242, asks: "Why should not the housewife be allowed to share the benefits of modern improvements and inventions? Instead of allowing her to perspire around the coal stove that her grandmother used, why not provide her with a modern gas fire for cooking and for heating water for cleaning and washing, thus making her work lighter and her life more pleasant?"

In its report, the Bureau of Mines says that gas is particularly well adapted for water heaters and for bath-room heating and that when housewives use it for cooking they never want to go back to the dirty coal or wood stove.



"When gas is used for cooking," continues the bulletin, "the fire is always ready and the heat can be controlled with a nicety that can not be obtained with any other fuel. With the ordinary coal or wood stoves practically the whole stove must be heated before anything can be cooked on it, whereas with the gas fire only a small flame is burned and where the heat is needed the rest of the stove remains cool. When any particular cooking process is done, the fire can be turned off and no fuel is wasted.

"Such is not the case with a coal fire. The fire must be left burning until it burns out. Oftentimes the fire must be kept going between the cooking of two meals. Thus the efficiency of the gas fire is very much higher than the coal fire. But aside from the efficiency of gas, the comfort of the housewife demands consideration. She also wants to have her work made lighter and more pleasant."

STUDYING what you read in NATIONAL BUILDER may save you many a long day's work. When you have "no time to read" or study you may lose a lot of time in thinking without getting anywhere.

Building Store Fronts

By F. H. Sweet

Remodeling Store Fronts Is a Profitable Specialty—The Suggestions in This Article Show the Retailer's Viewpoint as it Affects the Builder

THERE is a big opportunity in every community in remodeling store fronts. Retailers have long ago passed that stage where they cannot recognize the value of modern fronts. The market is big, retailers are more prosperous than ever before, and modern retailing makes good displays a necessity. This condition exists not alone in the large cities, but right down the line, even to the general stores in the rural districts.

The subject of show window design is not so closely connected with retailing that the average building contractor cannot grasp it. The development of store fronts during the past 10 to 15 years has been so universal and so enthusiastically taken up that he who runs may read—we need only to look at and analyze them. Herein are set down a few facts about store fronts, not altogether from the standpoint of the builder and not entirely from the retailers' viewpoint, but from the retailers' viewpoint as it interests the builder.

It seems quite unnecessary to say that the idea of a store front, or show windows, is to display a particular line of merchandise to the best advantage, but if you were to make an investigation of what has been done by retailers (and contractors) you would appreciate the reason for calling attention to the fact. To verify the above, it is suggested that you note the show windows on both sides of the street of any block of stores in your city or town. You will likely find that at least 80 per cent of them are of the same identical type insofar as plan is concerned. Those fronts probably cost all the way from \$300 to \$2,500, though the \$300 windows are just as successful as the \$2,500 ones, from the standpoint of adaptability. Practically the only difference lies in the amount of money spent for art glass, panel work, etc.

You will find displayed in those show windows such various and unlike objects as cigars, furniture, auto accessories, hardware, pianos, bottled goods—practically every line of merchandising sold at retail. Doesn't it seem strange that a furniture dealer should use a show window planned like the one used down the street for the display of jewelry? Anyway, you will find that many show windows (including a number of modern

ones), are not adapted to the merchandise displayed in them. It is therefore recommended that when a builder is called upon to design and build a new front he should be competent to speak with authority on the subject.

To make a show window distinctive it is not necessary to adopt freakish designs. Figure 2 is popular, and with the proper proportions it is very successful. It lends itself to the display

of small articles such as shoes, hats, jewelry, phonograph records, 5 and 10-cent goods, drugs, etc. With this style of window the window trimmer can catch the eye of the passer-by and encourage him to enter the lobby of the front in order to look at the other articles displayed. The vestibule, or entrance, is large and inviting—it permits a number of people to pass into and out of the store without crowding. Such a vesti-



A well proportioned combination of brickwork, terra cotta and plate glass will bring an out of date front right up to the minute

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bule offers shelter during rainy and cold weather, and for that reason appeals to the retailer whose store is near a street car stop.

A show window of Figure 2 style costs

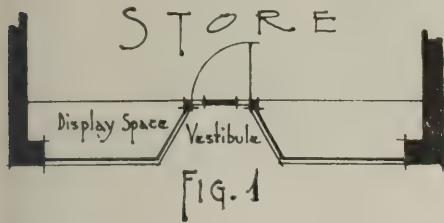


Fig. 1—Probably the most popular type of plan for show window arrangement. This does not mean, however, that it should be used without studying the requirements

comparatively little more than the one shown in Figure 1. The plates of glass are of narrow widths, and 84 inches in height is practical for most show windows. The bulkhead varies, of course, with the nature of the merchandise to be displayed, but usually between 12 inches and 24 inches. The bulkhead of a jewelry store window should be no less than 22 inches high, preferably 24 to 26 inches. For the display of clothing and haberdashery the bulkhead should be between 12 and 18 inches.

Wherever it is possible, use tile prism in the transom and run it straight across the front, as shown in Figure 5. The chief objections to the treatment of transom glass as shown in Figure 4 are that the windows are difficult to trim and are not pleasing to the eye—it has a rambling appearance.

It is advisable in many cases to build an island or outside show case, as shown in Figure 5. These precautions, how-

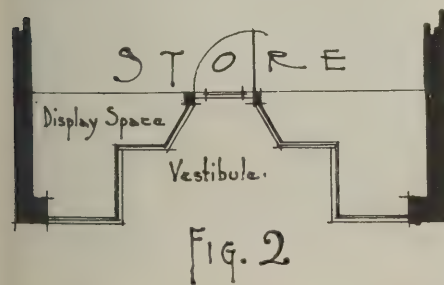


Fig. 2—This type offers a larger vestibule than does Figure 1. It is also somewhat more expensive. It is well suited to the display of small articles

ever, should be kept in mind when designing an entrance of this character: Distance "A" should never be less than 4 feet; "B" should not be less than 4 feet 6 inches, and "C" not less than 5 feet. The reason is obvious; the successful entrance makes it easy for people to enter and leave the store. The depth of the island show case, shown at "D,"

varies with the merchandise displayed in it. Even as narrow as 18 inches makes a fine case to show specials. When used for the display of shoes, etc., its depth should be about 24 to 36 inches.

Three feet six inches seems to be the universally adopted single store door size. Some have put in 3-foot doors, but they are not quite satisfactory. Many have gone the other way and installed doors as wide as 4 feet 6 inches, which takes, so one dealer said, "two men and a boy to swing." Most contractors favor doors 2¼ inches thick and of compound construction. Double doors are practical for some stores, but most retailers who have adopted them say they should be double acting. When double doors are used they can be made narrower than 3 feet 6 inches, and therefore not so thick. Seldom should a store door (except in very large stores) be over 7 feet to 7 feet 6 inches high.

Mosaic tiling is, of course, most popular for the vestibule floors of modern

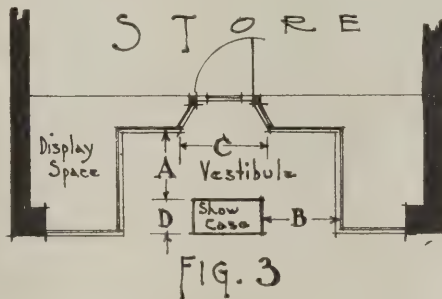


Fig. 3—Sometimes it is desirable to make the entrance large enough to contain an island showcase. In such cases, care should be used to avoid cramped passageways

store entrances. In practically every town there are tile setters who can 'do such a job in very short order. Provision for grouting must be made and the floor joists should be chamfered. Ordinary concrete flooring can be satisfactorily used if it is necessary to trim the cost wherever possible. This may be colored and jointed if desired.

Much could be said about the interior panels or backs of modern show windows, but it is felt that the kind used in each case depends upon the expense that is permitted. Many of the country's most attractive fronts, however, have inexpensive panels—panels made up of pine and composition board. The trade papers which are published for retailers are full of suggestions for window backs and panels. Work this part out with the retailer for whom you are building the front. The same can be said about window lighting. There are manufacturers of reflectors who will gladly tell you how to light the windows to get the best effect.

Many of the points brought out here ordinarily do not interest the contractor who puts in show windows, but the more a man knows about his clients' problems the larger will be the success and the

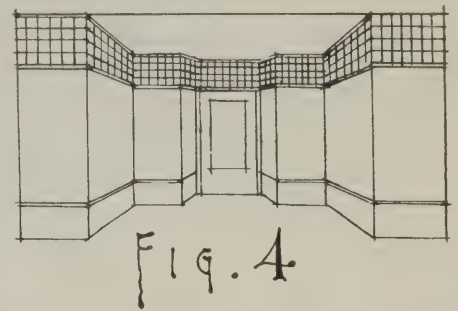


Fig. 4—Carrying prism glass back like this makes a "choppy" appearance and spoils the entire effect

greater will be the profit, for each of them. One of the surest ways to get business is to go after it. Study up on show windows, learn about the various styles, then make up a list of some of the retailers of your city who need new ones, and talk to them. Explain to

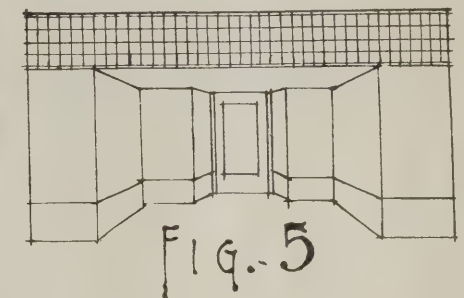


Fig. 5—Prism glass should be carried straight across the front with a low ceiling formed over the vestibule

them that now is a splendid time to remodel; that you can do the job immediately; that you get the materials promptly, and that you will not interfere with their business (most retailers say that while the men are busy building the front, people are more anxious to get in than ever before. Some say that remodeling in itself boosted their business.)

You can make a clean profit on every store front you remodel. Why not go after it—hundreds of other contractors are doing it.

Chicago Building Activity in 1919

In spite of a long drawn out building trades strike, 6,531 building permits, involving \$102,756,950, were issued in Chicago in 1919. The amount of frontage involved was 207,354 feet, which is equivalent to building up both sides of a street twenty miles in length, not deducting anything for cross streets.

A Community Hall

A SUBSCRIBER asks for suggestions for a community hall for a small town. The size of the building to be 40 by 100 feet. The site is in a park.

The accompanying drawings show a building which could probably be adapted to suit the conditions. Such accessories as separate club rooms for men and for women and for boys and girls, billiard room, bowling alleys, swimming pools, coat rooms and other features found in the more expensive community buildings have been omitted, although they, too, might be arranged for in the basement.

The entrance is through a lobby into the community hall, which seats about 400 people. The hall is equipped with a stage and dressing rooms. A picture machine booth could be built against the rear wall near the ceiling. Emergency exits are provided at the stage end and in the middle of the side walls. The floor should be flat and the chairs should be of the folding type and removable, so that the floor could be used for dancing. The space under the stage could be used for storing extra chairs. Ventilation for this hall could be obtained by rows of pivoted windows in the side walls near the ceiling. The ceiling might follow the slope of the rafters up to the collar beams and then run flat on this portion.

The lobby ceiling is only eight feet high, thus making it possible to provide a second story over the front portion. The second floor is reached by means of a stair located in a stair hall opening off of the lobby. A men's toilet opens off the stair hall.

The second story contains a large room that may be used for a committee room, as a reading and writing room, as a club room, or as a combination of these. A row of shelves along the blank wall would provide space for about 1000 books.

It is assumed that the community hall will be often used for public dinners; for this reason a kitchen is provided on the second floor. The kitchen is equipped with a large range, work table, sink and pantry. It is connected to the serving room on the first floor by means of a dumb waiter. In the kitchen, the dumb waiter is set in the middle of the floor and has doors on each side so that the service may be rapid and without confusion. The kitchen is also convenient to the committee room so that it could be used for the preparation of club dinners, teas and so forth.

The serving room contains a sink and large work table. A long refrigerator

could be built under this table for keeping salads and ices. A women's toilet opens off the serving room.

In connection with the giving of public dinners it is well to note that the tables may be formed of long planks laid on wooden trestles. The trestles may have hinged legs on one side so that they may be folded flat, thus taking up but little storage space. The space under the stage can be used for the storage of the tables.

Under the main stair is a stair leading to the basement. It is assumed that only the portion under the front part of the building is to be excavated for the basement. This will contain the heating plant and fuel room. It would be advisable to have the heating equipment so arranged that the community hall could be cut off from the remainder of the building. This would permit the economical heating of the front part of the building without wasting heat for the hall when the latter is not in use. If desired, it would be possible to provide for the men's toilet in the basement using the one opening from the stair hall for women. Then the toilet opening from the serving room could be omitted. This change would allow the installation of two dumb waiters instead of one, which might prove to be an advantage.

Three exterior designs are shown, one for cement, one for brick and one frame. The cement one could be built of solid concrete, or of stucco on hollow tile or on wood. Ornamental tile inserts in bright colors, and a red tile roof over the open porch, together with trellises and flower boxes, would go far toward relieving an appearance of plainness. The flat roof should be covered with tar and gravel or prepared roofing.

The brick design could be built of solid brick or of brick veneer on hollow tile or on wood frame. A cement base course runs as high as the first story window sills. This design, as well as the cement one, shows a second story balcony or porch which would prove of value for the use of public speakers addressing open air meetings. By enlarging it slightly it could be used for band concerts in the park.

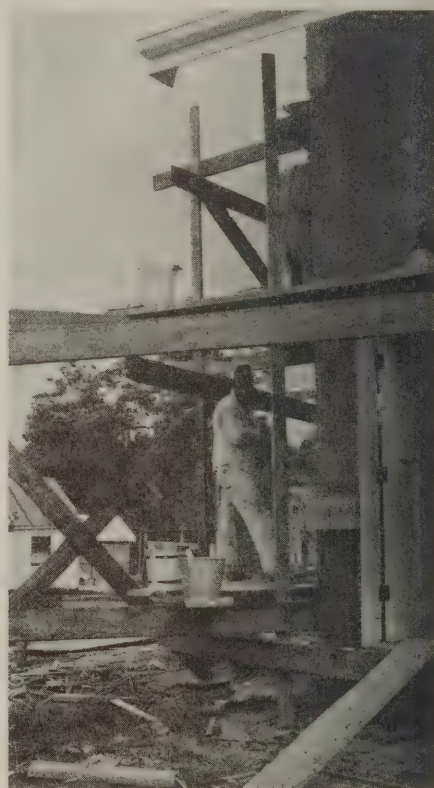
The frame design should be built with wide clapboards or shingles finished white. This design and the one for brick show pitched roofs. These could be covered with wood, asphalt, asbestos or slate shingles. The shingles for the frame building should be somewhat subdued in color, raw reds, greens, etc., would not prove attractive for this design.

These thumb nail sketches are offered merely as suggestions. They show the diversity of the designs that may be evolved from a single plan. It will be noted that in one or two instances there are slight

discrepancies between the plan and the exterior designs. These differences are minor ones and may be adjusted without ill effects.

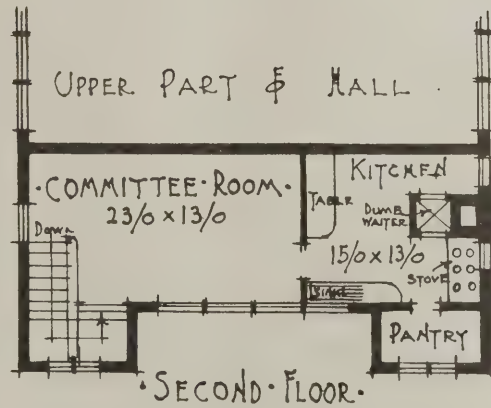
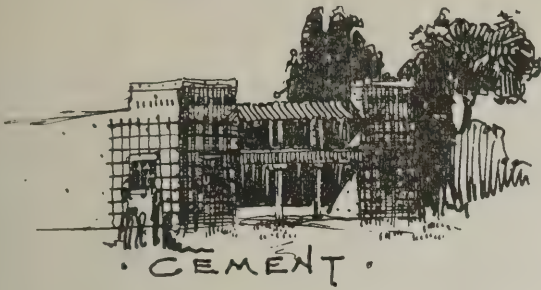
Contributory Negligence

Efforts to determine the responsibility for breakage or other damage to materials which have been placed in position is responsible for frequent arguments among sub-contractors. Windows are broken, plaster is damaged, woodwork is marred, and no one will shoulder the blame. Sometimes, however, the contractor who executed the work in question is solely to blame, although it is often difficult to make him see it in that light.



Note the light globe at the right

The accompanying photograph illustrates a case along these lines. The electrical contractor was in a hurry to clean up the job and has placed the light globe in position on the bracket over the door. His speed is commendable, but if the globe is accidentally shattered by a workman on the scaffold, or is broken when the scaffold is wrecked, the electrician will have no cause for complaint. Contributory negligence is an old principle of law that holds good in disputes on the job, as well as in the courts.



JIM T POMEROY, ARCH'T.,
CHICAGO

A Community Hall

Cobblestone Details

COBBLE-STONE has long been a more or less favored material for details in localities where loose stone is found. That its proper use offers a certain attractiveness is not to be denied,

Stones with excessive projections make a wall look unstable. They have a sort of "perched" or "balanced" appearance. Freaks and stunts are all right in the circuit, but few of us would care to look at

usually be found to be honeycombed with cracks and loose joints after a few years, or even months.

The same reasoning applies to cobblestones that are too large. Large stones



Plate 1



Plate 2

Plate 1—Rough, broken stones of small size make a good appearance. Note the generous size of the piers and the ornamental chimney coping. Plate 2—The cobble work is well "bunched," but the stones are too large and would be improved if more mortar had been used in the joints. Note the softening effect of the vines

but the fact arises that in many cases the effect is overdone. Stones that are too large, those that have excessive projections and studied efforts to conceal the mortar joints are among the common faults. Any building material should express stability if nothing else. Of course, we always realize that cobblestones are held together by mortar, but our practical natures want to see some of it. The mere fact that we know it is purposely concealed, doesn't satisfy us. It looks tricky!

them every day. Here again our practical side asserts itself, and although the projecting stones may be pitched to the outside to shed water, we have a feeling that rain may run back to the joint, with the attendant danger of a damp wall and the possibility of destroying the mortar. When stones have excessive projections combined with hidden mortar joints, the wall looks as though it might be tumbled down by a well-directed push. The worst part of it is that such construction is not durable and will

are also usually unattractive because they don't seem to suit the size of the other details. They are "out of scale" and the deep shadows which they throw make them appear harsh and crude and not in keeping with a home feeling.

Slender piers and tall chimneys of cobblestone should also be avoided, they are difficult to build and are seldom pleasing in appearance.

Cobblestone should be used for details and not as a principal material. That is, an entire house built of cobble-



Plate 3



Plate 4

Plate 3—A good piece of jointing, but the absence of copings is a structural fault. The terrace wall contains flower boxes. Plate 4—This one is overdone. The chimney appears "stringy" and the large cobbled wall surface is monotonous



Plate 5



Plate 6

Plate 5—An effective treatment, using very small, rounded stones. A little more mortar would improve the appearance.

Plate 6—This one looks well, even though the details are a bit "scattered" and mortar is scarce

stone is apt to have an overdone appearance. Such details as porch rails, attached chimneys, terrace walls and porch piers (if the latter are quite large, say over two-feet square) are well suited to this material. Cobble-stone details should be "bunched" to form one group. A chimney here, a rail there, and a piece of foundation somewhere else, never look well. The details look scattered and "fussy."

True cobble-stone is of course, a weathered stone that has been rounded and smoothed by the elements, but cobble-stone effects are also obtained with any roughly broken stone that is smaller than that usually used in rubble-work. In this article both types are called cobble-stone.

Cobble-stone may be used in connection with frame construction by attaching it to the wood work with metal ties, as in brick veneered work. The ties should be closely spaced, say 18 or 20 inches apart both ways. In such construction the sheathing is sometimes placed on the inside surface of the stud-ding so that the larger stones may extend between the studs, thus avoiding the trimming and fitting of stones. Furring is nailed to the sheathing to allow for the interior lath and plaster.

Probably the most frequent form of cobble-stone construction is that in which concrete forms the core, with cobbles used as a facing. The concrete and cobbles should be carried up together so that the best bond may be obtained.

Copings should be provided for all cobble-stone walls and so forth, that have tops exposed to the weather. This warning may sound unnecessary, but the fact remains that carelessness in this regard is responsible for many cracked and damp walls. Much care should be used in pitching the stones to the front so that moisture will be readily carried away from the joint. Of course, under the best conditions, a certain amount of

rainwater will follow the rounded surface of cobbles and be carried to the joint below, but properly sloped stones will at least prevent it from standing against the joints.

The most general criticism of cobble-stone work has been directed against the stinginess of the mortar joints. Of course well-made mortar joints are expensive, but not prohibitively so, and to obtain a pleasing result the mortar

should be used lavishly. In the best work the exposed mortar covers more wall surface than do the cobbles. On account of its rapid setting qualities and resistance to dampness cement mortar is favored for cobble-stone work, but good quality lime mortar has long given excellent satisfaction in this type of construction. Colored mortars are seldom attractive, but pure white mortar is often effective.

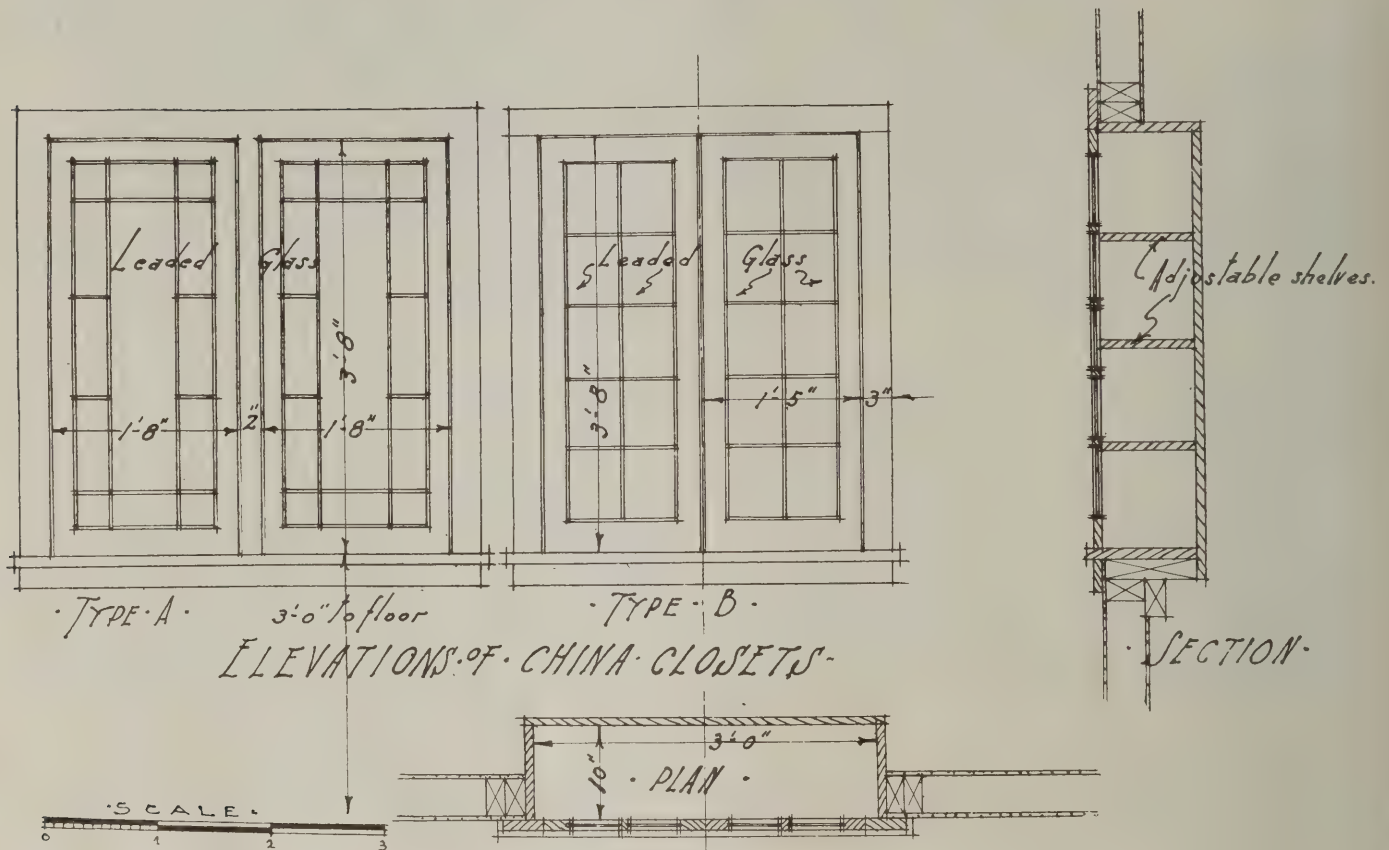
Preserving Sod



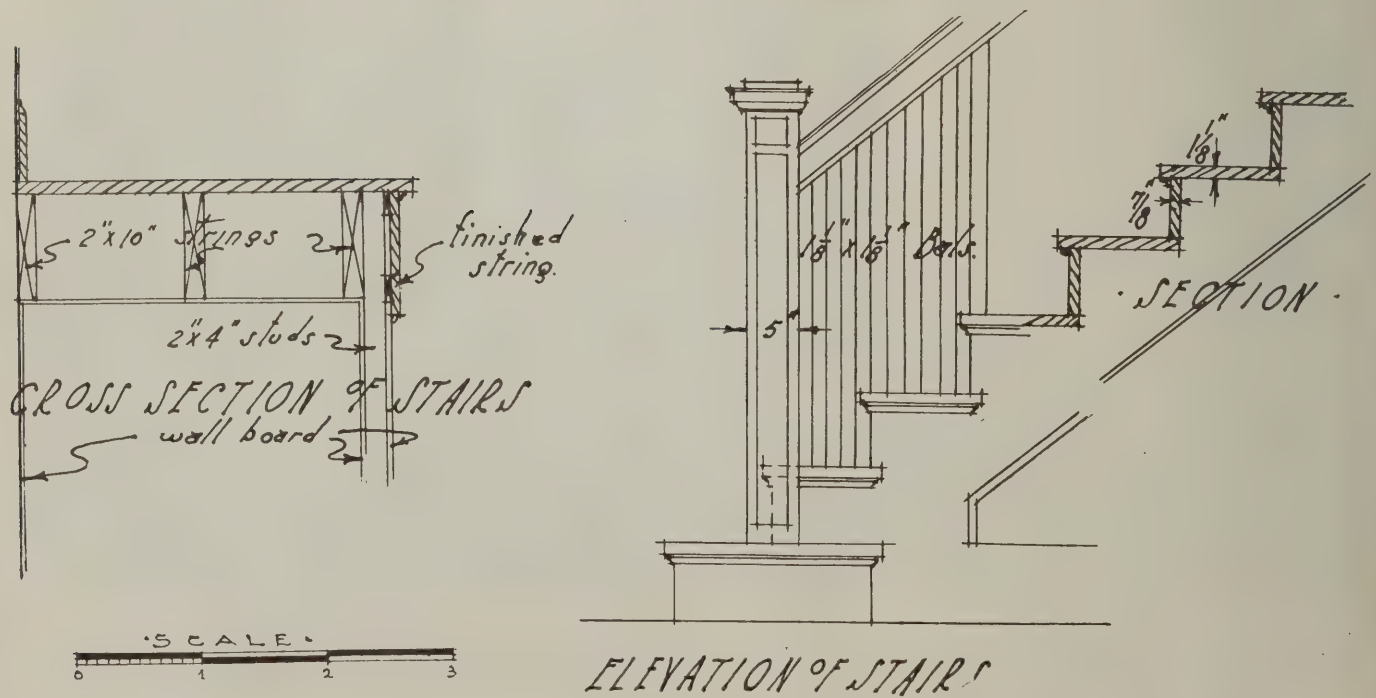
A building site is often covered with a good growth of grass which the owner wishes to preserve. In such cases the sod should be removed from where the building is to stand and for about ten additional feet all around. It should be cut in strips about two or three feet wide and as long as possible. It should then be formed into rolls and stored in a damp place and kept moist if necessary.

The top soil should also be removed to a depth of about ten inches and piled in a convenient place. After the completion of the work around the building, the top soil should be replaced and rolled and moistened, then the healthiest pieces of sod are put down and rolled. This work should not be done during extremely heated portions of the day. The sod on terrace slopes should be well pinned in place with wooden pins.

Details of China Closet



Stairway Details



Concrete Walks and Drives

IN ALMOST every community there is a chance for a live builder to build up a profitable sideline by laying concrete walks and drives. Not considering street walks, almost any yard requires at least a hundred lineal feet of walk for the sake of convenience and appearance. Yards which contain a garage usually require an auto drive in addition, and almost any farm should have several hundred lineal feet of concrete walks and drives. In fact, a farm which is not al-

and the top of the fill should extend at least a foot beyond the edges of the walk. The filling should be composed of good granular material and should be free from clay, muck and other unstable materials. When the concrete is to be laid on old cinder or gravel paths, the old material should be loosened and spread evenly to receive the new work.

In former years the materials and workmanship of concrete walks were often slighted, as it was felt that hap-

cement is required to make such material safe and durable for use in concrete. For these reasons bank-run materials should be worked, if required, and should always be screened before using. The water used for mixing should be reasonably clean, and free from oil or strong alkalies.

Forms

Two-inch thick lumber is usually used for forms. One-inch stuff is also used, but it is too thin to resist springing



What can be done with a 30-foot lot

ready improved with outside concrete work offers a veritable mine of possibilities along this line, as these days a farm is not considered up-to-date unless it is improved with concrete feeding floors, and with pavement for the barnyard and around watering troughs and other sources of mudholes.

If possible a concrete walk should be laid on well drained ground, otherwise it will be necessary to put down a layer of gravel or cinders to form a sub-base, and in some cases tile drains should be provided.

To insure a neat job the walk should be staked out with lines and grade stakes. A building level will be found useful for this part of the work. All soft spots should be excavated and tamped solid with hard material. When it is necessary to form a fill above the surrounding grade the earth filling should be well tamped in six-inch layers

hazard methods were as good as any for such work. The natural result was that many of the walks failed within a few years after being laid instead of giving first-class service for a lifetime, or longer, as a good concrete walk should.

The cement should be fresh, or "live," be of a well known brand, and free from hard lumps or foreign matter. The sand should be clean and well graded from fine to large particles. The coarse aggregates should be composed of clean, durable crushed rock or pebbles, and should be uniformly graded in size. It may be taken as an almost invariable rule that bank-run sand and gravel is not suitable for concrete work of any character. Material of this character usually contains a large percentage of loam, and the proportion of sand to gravel is usually much greater than is desirable. In other words, an excess of

when the concrete is tamped and the use of thin forms often results in an ugly irregular edge on the walk. Its use is poor economy anyway, as it is good for only one or two terms while thicker stuff may be used on job after job. The forms should be set true to the line with their upper edges set level with the finished top of the walk. Stakes should be set close enough together to prevent springing of forms and should be driven into the ground until they are stiff and unyielding. The thinner the form lumber the closer the stakes must be set to insure a neat job. For curved walks it will be necessary to use $\frac{1}{2}$ -inch boards, sprung to fit the stakes, or for sharp curves sheet metal should be used.

The concrete should be divided into blocks by means of cross-forms or cut apart by means of a separating tool and straight edge. If cross-forms are used they may be made of $\frac{1}{2}$ -inch lumber, or

of metal, secured to stakes placed on one side, and should be the full depth and width of the walk and placed at right angles to the side-forms. In this method alternate blocks are poured and allowed to become sufficiently hard to retain their shape, when the cross-forms are removed and the remainder of the blocks are poured, the first blocks acting as

temperature cracks. Large blocks may be reinforced with wire mesh or with $\frac{1}{4}$ -inch rods placed 20 inches apart both ways. No block should be longer than $1\frac{1}{2}$ times its width and when not reinforced should not exceed six feet in any dimension.

Expansion joints for walks and drives should be made about every 50 feet.

to insure complete separation of the blocks.

Walks in business districts; blocks more than six feet square; drives and pavements over which hauling is done, and points where walks cross drives, should have a total thickness of not less than six inches. Walks in residence districts, feeding floors and other paving



Plate 1



Plate 2

Plate 1—A good mixer saves time, money and worry on small jobs as well as large ones. Plate 2—Steel reinforcement should be imbedded in large blocks to prevent cracks from shrinkage and temperature changes

cross-forms for the fresh concrete. A separating tool is finally run in each joint to insure complete separation. Where the separating tool alone is used to form the blocks a suitable length of walk is poured continuously and divided into blocks by forcing the separating tool through from side to side.

Wooden forms should be wetted and

They should extend entirely through the slab from side to side and should be about $\frac{1}{2}$ -inch wide. After the concrete has hardened they are packed with oakum and asphalt, or with other durable, weatherproof compounds. Expansion joints should also be provided where sidewalks abut curbing, buildings and so forth.

not used for vehicles should have a total thickness of not less than four inches. In residence districts the edges of walks may be reduced to three inches in thickness.

Measuring and Mixing

All measurements of ingredients should be by volume, and a measuring



Plate 3



Plate 4

Plate 3—Curb cast as a unit with a driveway. The side-form is made of one-inch lumber. Two-inch stuff would be stiffer and require fewer stakes to prevent springing. Plate 4—Striking off the wearing coat of a two-course drive preparatory to floating the surface

metal forms oiled or given a coat of soft soap or whitewash before concrete is placed against them. This insures them against sticking.

Construction

No block division should contain more than 24 square feet of surface unless it is reinforced against shrinkage and

The tool used for separating the blocks should be about six inches wide and $\frac{1}{4}$ -inch thick. The joint should be cut entirely through the concrete and filled with dry sand before the top coat is spread. After finishing the top coat it is also cut through to the sand joint; a groover is run in the groove, and finally a trowel is drawn through the groove

box should be used to insure accuracy.

To insure excellence and economy a machine mixer should be used. If, however, it is necessary to mix by hand, the cement and sand should be mixed dry until of uniform color, then the water is added, using a spray nozzle; then the drenched pebbles and all mixed thoroughly. Concrete or cement mortar

must never be remixed either wholly or in part after it has begun to set.

Placing

The concrete should be handled rapidly after mixing and not more than 45 minutes should elapse between the mixing of the concrete and the finishing of the wearing course. The placing of sections should be continuous and individual blocks should be completed to the required width and depth in one operation. The sub-base or filling should be well drenched just before concrete is placed.

Two-Course Work

There are two general methods of laying walks and pavements. These are known as two-course work and as one-course work. In two-course work the concrete base is first poured and then the wearing course is added. In one-course work the wearing course is formed from the base, both being poured in one operation. The latter is easier to construct and is usually preferred for paving barnyards and feeding floors and for unimportant walks around outbuildings.

Two-course walks may be laid with a 1:2½:5 or a 1:3:6 mix of cement, sand and pebbles for the base, and a 1:1 or a 1:2 mix of cement and sand for the wearing course. The pebbles in the concrete base should not exceed one inch in size. The concrete should be of a consistency that will flush readily under the tamper, but not thin enough to allow separation of the ingredients. The forms should be filled and struck off and tamped below the top of the forms to receive the wearing course. The wearing course mortar should be from ¾ to 1 inch thick and should be placed before the concrete base has set. The mortar should be of the deepest possible working consistency. The wearing course should be brought flush with the top of the forms, using a sawing motion of the strike board and then finished smooth with a wood float. A steel trowel should not be used, as it produces a slippery surface and there is a tendency to over-trowel, bringing an excess of fine sand and cement to the surface and thus impairing the durability of the wearing coat. Two special tools are required to make a neat job on walks; a groover to finish the joint between blocks and an edger to round off the edges of the walk.

One-Course Work

In general, all of the foregoing applies to one-course work, but there are slight differences in placing and in proportions.

Concrete for one-course work should be richer than that used for two-course work. A 1:2:3 or a 1:2:4 mix is gener-

ally used. The largest pebbles should not exceed ¾-inch in size.

After the forms have been filled, tamped and leveled off with a strike board the surface should again be tamped with a special tamper having a gridded face that will force the pebbles entirely below the surface. The surface is now struck off and floated as in two-course work.

Protection

Workmen should not walk over, nor should barrows be run on freshly laid concrete, either before or after finishing.

A 2-inch layer of moist sand should be spread on the finished surface as soon as it has hardened sufficiently to withstand the pressure of the thumb. This covering should be kept moist for a week or 10 days when it may be removed and the walk put to use. Drives should not receive heavy traffic for a month after laying. Tarpaulins should be provided for protection against pitting by raindrops. After 12 hours the surface is usually safe against such damage.

Concrete should not be laid on a frozen sub-base nor should it be placed during freezing weather unless proper provision is made to heat the aggregates and water, and to protect the concrete against freezing.

In General

Paving and feeding floors have the same general characteristics as walks and drives. In fact, they may be constructed as a series of walks laid side by side. It is not advisable to make any of the blocks larger than six feet square. It is well to provide a gutter around the edges of feeding floors and barnyard paving so that the valuable fertilizing liquids may be led to the manure pit cistern through a tile drain. Feeding floors for hogs should have a curb extending 3 inches above the platform to prevent waste of feed, and should have an apron extending a foot below grade to prevent hogs from rooting underneath.

Each job should be marked by the builder giving his name and the date. This may be done by stamping or by inlaying a metal plate flush with the surface. Stamped letters should be about 1 inch high and ¼ inch deep.

Walks should have a pitch of about ¼ inch per foot from side to side or may be "crowned" to pitch both ways from the center. Care should be used in removing side forms to prevent damage to the concrete, and they should be left in place for a week or 10 days. After forms are removed the earth should be graded flush with the top of the walk on the high side and to within about 1½ inches of the top on the low side.

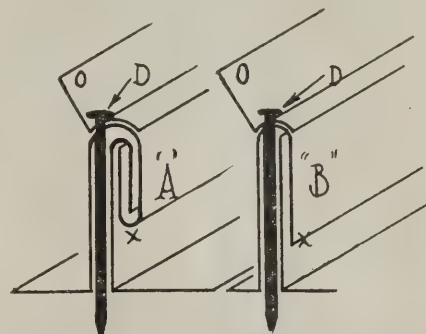
The combination of brick and ornamental tile with the cement surface of yard walks

offers unlimited possibilities in the way of interesting patterns and treatments. In some cases concrete is used merely as a base to receive brickwork. The wearing surface mortar is sometimes colored to improve the appearance and pure white cement and sand are used for the same purpose. If color is used it should be a mineral pigment, mixed with the sand and cement while dry, and should not exceed 5 per cent of the weight of cement. Extreme care in measuring and mixing is required to obtain an even color throughout.

Repairing Dislocated Standing Seams

By L. S. B.

Nail heads appearing upon the surface of a metal roof are an indication of carelessness and should be avoided. Even when covered over with solder they are dangerous, as the "giving" of the metal soon loosens the solder from the nail, and the head will shortly break through the solder, causing a leak. Constant vibration of the metal works the hole larger—a worse leak.



"A" indicates double fold and "B" single fold, standing seam method of roofing

With this statement in mind the question arises, how can a standing seam be repaired when it has been drawn away up out of place, by reason of careless nailing, and the use of too few cleats when the roof was laid? The answer is illustrated by the accompanying sketch.

In order to get the seam back down to its proper position and incur no danger in nailing, of leakage, an awl is used to punch a hole into the apex of the seam, as at "D." Continue the awl down between the flanges of the seam, and note that it does not come out between the fold and the flange at "X," because if not noticed, the point would then likely be driven through the body of the metal roofing.

Having driven the awl down to the wood sheathing a channel and route will have been prepared for an 8-penny nail, which is first passed through the thin, narrow strip of sheet lead, "O." After the nail has been driven into the sheeting, with the standing seam firmly resting thereon, the lead may be forced back to cap the head of the nail

Frames for Concrete Walls

WE ARE all more or less familiar with the difficulty of obtaining weathertight joints around window and door frames. This difficulty is perhaps greater with concrete than any other material. With an aim to overcome this fault, and at the same time simplify the work, the frames are usually set up and the concrete poured around them, the frames forming a part of the foundation.

The objection to this method is that the backs of the frames are in direct contact with the wet concrete and at first have a tendency to swell. Later, when the concrete dries out, the frames shrink excessively, and large open-joints develop between the frame and the concrete. In some cases the backs of the frames have been oiled to repel the moisture but even this precaution has not proven entirely satisfactory. Grouting does not seem to remedy matters much. Caulking, however, will prove effective, but proper caulking is seldom done, if at all, excepting on expensive work.

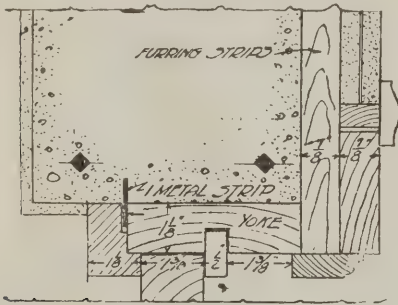


Plate 1—A section through the head of a window in a 6-inch wall. Note the metal strip projecting into the concrete lintel

Therefore, it has remained for Milton Dana Morrill, the architect and specialist on concrete house construction, to develop a new type of frame for use in connection with concrete work. Mr. Morrill states that this type of frame has been used in a large number of buildings, and that it has proven highly efficient and economical. In fact, he states that taken as a whole, these frames cost less than ordinary ones. They may be of standard sizes, and brought to the job knocked down, or they may be built entirely in the mill or on the job.

Referring to the accompanying drawings, the essential novelty of these frames is found to consist of the combination of sheet metal and wood, and also in the method of constructing the sills. The drawings show 6-inch concrete walls, but the application of the frames to thicker walls is readily apparent. Also, with perhaps slight modifications, this type of frame might be adapted for walls

of brick, hollow tile, stone, or concrete blocks.

The section through the window head shows a metal strip tacked onto the yoke and extending up into the reinforced concrete lintel, thus forming a wind stop at this point.

The section through the jamb, how-

upon this feature, it is suggested that the side which forms the outside lining of the metal weight box might be extended, drip fashion, so that it projects into the concrete beyond the back lining. This provision would certainly insure a weather-tight joint between the concrete and the weight box.

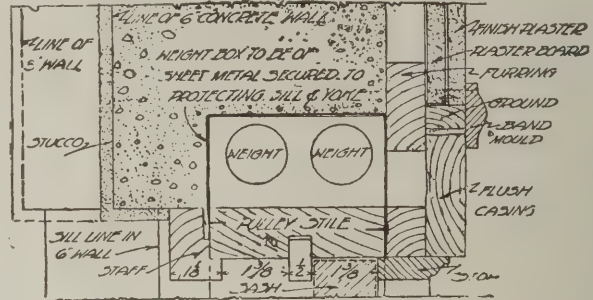


Plate 2—Section through jamb of window showing the metal weight-box. Note the small amount of wood used throughout this frame

ever, shows the greatest departure from usual practice in building frames. This section shows a detail for a double-hung window frame, in which the weight box is made of sheet metal. Thus, there is no direct contact between wood and concrete and the danger of a wide open joint at the back is reduced to the minimum. Of course, some shrinkage oc-

In the past, some difficulty has been experienced in making weather-proof joints between wooden sills and concrete walls. It is said that this difficulty is greater with concrete than with brick, as the latter material is more porous and readily absorbs any water that may be driven under the wood sill and thus prevents moisture from penetrating to the

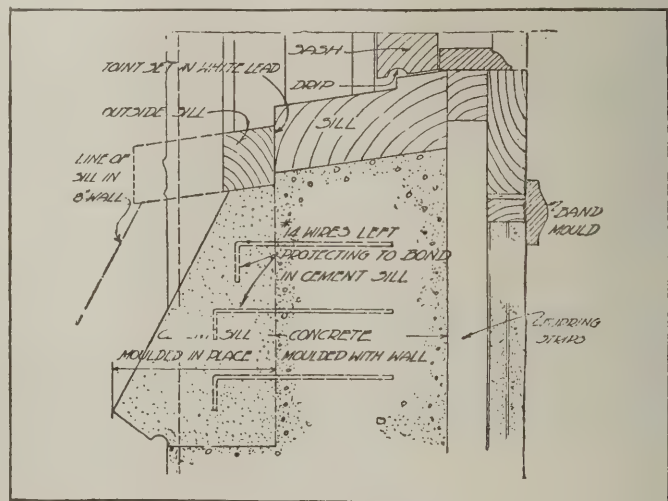


Plate 3—Section through concrete sill showing the application of wood and concrete sub-sills. Note the absence of a stool and apron

curs in concrete while it is hardening, but the bulk of this shrinkage occurs before the concrete has become hard and is largely overcome by the natural settlement of the material. In any event, by using metal weight boxes, the shrinkage is confined to the concrete alone and is probably of no consequence. For those, however, who wish to improve

interior wall surface. Metal water-bars will overcome this fault providing that they are properly applied, but for some unknown reason the average workman will almost always slight this work and unless watched carefully will often omit the water-bars entirely. Therefore, the sill shown in the detail seems to offer some advantages over the customary

ones. This detail might be simplified, however, by omitting the concrete sub-sill entirely; running the concrete wall up solid to the bottom of the wooden sub-sill, and allowing the latter to project beyond the face of the wall. This projection should be say about an inch, and the underside of the wooden sub-sill should be grooved to form a drip.

In moulding the concrete walls around these frames it is necessary to provide a temporary reveal strip to build the frame out to the full thickness of the wall. The reveal strips should be made of durable material—1¼-inch cypress has given good results,—so that they

boxes, thus affording an attachment for the tops and bottoms of the weight boxes. The sides of the weight boxes are tacked to the pulley stiles.

Note in the detail of the sill that the wooden sub-sill is made to cover the joint between the main sill and the wall; also note that wires are left projecting from the concrete wall to provide for bonding when the concrete sill is placed. The joint between the wooden sub-sill and the main sill should be set with white lead and a possible improvement would be to form a tongue and groove or rebated joint at this point. This would do away with the straight vertical

use of materials and offers very little dust-catching surfaces.

If plaster board were used on the walls even the grounds under the band moulds might be omitted. The casings could be given a coat of stain and placed in position and the plaster could be laid up to them. If care were used in following the plasterers, immediately cleaning off their smears and giving the casings another coat of stain, this method would probably prove practicable. In any case the band moulds are, of course, applied last.

The method of making weathertight frames for doors and casements is sim-

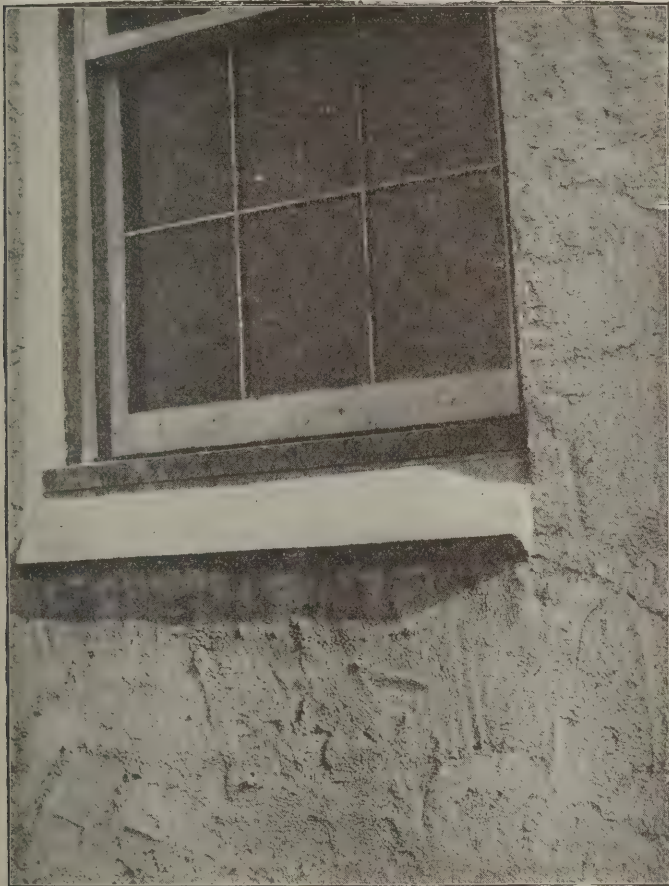


Plate 4—The appearance of the completed sill. The wall stucco is finished with a rough texture surface

may be used several times. The reveal strips are tacked to the edges of the frame and may be extended below the wooden sill to form a recess for the concrete sill. When the concrete has hardened they are removed and replaced by the staff bead and the stucco is brought around and finished against the staff. The staff bead also forms the outside sash stop.

It will be noted that the metal weight box forms a channel section which is quite stiff. This stiffness is increased by carrying the yoke and the sill the full width of the frame, including the weight

joint which might cause trouble if it should open up.

Another interesting feature of these frames is the use of flush trim for the interior. That is, the face of the finishing lumber is flush with the face of the plaster. A small band mould covers the joint between the trim and the plaster. The base boards and the door casings are also flush with the plaster and the band mould runs continuously along the base and around the doors. Note in the detail of the sill that the usual stool is omitted. This, together with other features, makes this very economical in the

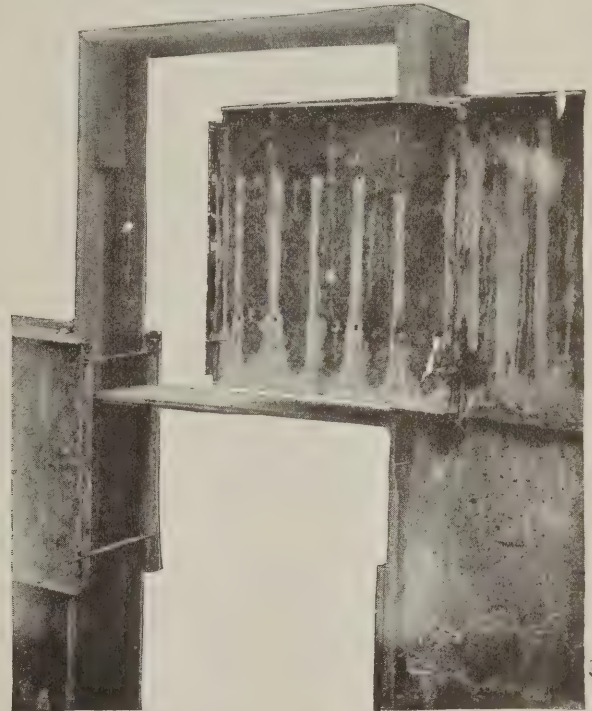


Plate 5—Moulding a door frame in place with steel forms. The windows are built-in in much the same manner

ilar to that shown in the detail of the double-hung window head. That is a strip of metal is tacked to the outside of the frame and allowed to project into the concrete.

These details, in common with all new structural details, must bear the test of time before they are generally adopted. It is felt, however, that their principle is sound, and their adoption should go far toward preventing open joints between walls and frames.

KEEP MOVING

The architect and builder's head must keep his hands and the hands of those he employs busy. It is up to him to get his name and his work into the minds of his fellow citizens. He must not only mix but seek every avenue of publicity—and that is quite a study in itself.

Roof Framing

No Man is Always to Blame for What He Does Not Know About His Trade—He is to Blame for What He Will Not Learn

EDITOR'S NOTE—This is the first of a series of articles on modern roof framing which will appear in future issues of National Builder. In compiling these articles the editors have drawn freely from matter which has appeared from time to time in National Builder, thus the articles are based on the contributions of a number of the leading writers on this subject. In fact, the only changes in the original text have been made with an aim to coordinate and condense the views of the various writers, thus simplifying the subject and offering a composite expression of the ideas of such writers as I. P. Hicks, John Upton, A. A. Stafford, J. Grant Robinson, James Barry, Dwight L. Stoddard, A. L. Higgins and J. E. Truitt.

Even though builders and architects do not care to take up this matter in detail it will be well to preserve the articles for future reference, as it is well proven that one of the surest means of gaining the respect of the "man on the job" is the ability to solve his practical problems for him.

THE STEEL SQUARE

The square is the practical base of all framing of buildings. With it any bevel, angle, pitch or cut may be readily obtained, and it is safe and accurate when correctly used.

Some of the simplest and most practical methods of using the steel square to obtain the lengths, cuts and bevels for all kinds of roof framing will be shown in these pages.

The rules given apply to all roofs and represent roof framing in a nutshell.

Always take the side of the square that is marked in 12ths of an inch, then every inch on the square represents a foot on the rafter and every 12th of an inch will represent an inch. If the numbers are too large, cut them all in the middle, then double the reading on the rule. By reducing rise and run equally, nearly any length can be easily obtained.

For instance: a building 40 feet wide with a half pitch roof would have a run of 20 feet and a rise of 20 feet, which is 20x20 inches, too great to measure across corner of square. Reduce by one-half, 10x10 inches. Hypotenuse reads on rule 14 9-16". Now double this back 28 18-64". Twenty-eight inches equals 28 feet; 18/64 equals 3 3/8 inches. The length of rafter will be 28' 3 3/8".

When you have a fraction of an inch in

measuring across the corner of square, be very careful to read it out right, for measuring 1" equals 1', and getting down into small fractions of an inch, it is very easy to make a mistake in length.

A scale of one inch equaling one foot means that every 32nd represents three-eighths of an inch.

Be very particular with the scale and use a pencil sharpened to a fine point. When a 12th of an inch on the square represents an inch on the rafter, it is easy to get more than an inch off with a pencil that has a point on it like a crow bar.

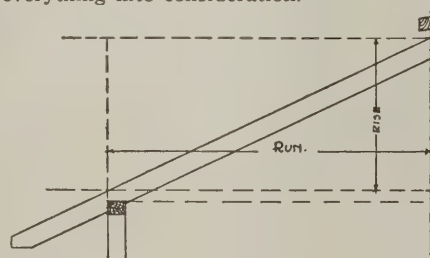
It is always best to use the blade of the square for bottom cuts and the tongue for top cuts. By so doing you are not so likely to get the cuts mixed up in your mind.

In raising the rafters, the common rafters should be spaced so that three common rafters, one on each side of the building and one on the end in the center, will all meet at the top, then the hips should be cut in. To insure good work, the plates should be made as perfect as possible.

The laying out of a roof should be carefully done, no matter if it be a thirty-foot hip or a porch rafter.

Always look out for what extra must come off at top or bottom to suit your job.

In measuring to get rise and run as well as length of any rafter, especially rafters that have to go up under a window sill or other accurate place, be sure to take everything into consideration.



Accurate measuring depends on allowances

In the sketch, note the measuring up of the heel; note the allowance for the sheathing and shingles on top of the rafters.

CUTS FOR RAFTERS

A roof is said to be a "quarter pitch" when the rise of the rafter is $\frac{1}{4}$ the width of the building; a half or square pitch, when the rise is $\frac{1}{2}$ the width, etc. The Figures 6 and 12 (or any other proportionate numbers) will give the cuts for a quarter pitch; 8 and 12 for a third pitch; 12 and 12 for a half pitch; from which it will be observed that the rise per foot of

the several pitches are, for a quarter pitch 6 inches, a third pitch 8 inches, a half pitch 12 inches. Other pitches are often used, as 3, 5 or 7 inches rise per foot. To get the cuts for those, use 3 and 12, 5 and 12, 7 and 12, or whatever it may be.

The rise and run cut on rise gives top or plumb cut, while run and rise cut on run gives bottom or level cuts.

To "lay out" a common rafter for, say, a quarter pitch roof, suppose we begin at the foot, placing the Figures 6 and 12 on the outside edge of the square even with the edge of the scantling, and mark the long bevel from 12, the run. This gives the "heel" cut which sets on the plate. To get the "plumb" cut for the outside edge of the plate, draw a line square from the heel, leaving at least one-half the width of the rafter solid over the plate.

At the top of the rafter also use 6 and 12 on the edge of the square, but cut on 6, the rise. This gives the plumb cut.

To get the plumb and heel or level cuts for a hip, use the same figures for the rise as you do for the common rafters of like pitch, but instead of taking 12 inches for the run, take 17, providing it is a square run, this number being the diagonal of a square, the side being 12. Therefore, for a quarter pitch roof, 6 and 17 will be the bevel for the level and plumb cuts. For any other pitch, use whatever the rise may be for a common rafter, but always take 17 for the run.

Valley rafters are obtained on the same principles as hips of corresponding rise and run, the top being mitered from the center each way to fit the ridge or other rafters.

Suppose you have a rectangular plan, say, 16 by 24 feet, and want one or more hips run to the center. Halve each of the adjoining sides, and we have 8 feet and 12, respectively, for runs. Let the total rise of the rafter be, say, 6 feet.

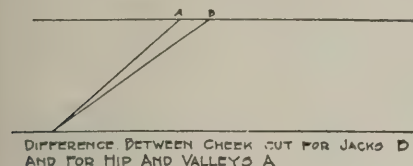
Now to get the hips, measure the distance from 8 to 12 across the corner of a square and it gives 14 1/2, then 6 and 14 1/2 on the square will give the cuts.

As to side cut of hip or valley, that is taken from themselves, not from the common rafter, as they have a less rise to the foot than common rafter. The side cuts of hip and valley rafters are simply run and length of the particular rafter you wish to cut. Cut on length.

Perhaps you have seen men try to get cheek cuts for hip and valley rafters by using run and length of common rafter, and while this is pretty nearly right, it is not quite. There is not very much differ-

ence, they all being, even for roofs as steep as 18-inch run to the foot, between 45 and 29 degrees.

Jack rafters cut the same as common ones at the foot and the down cut is the same as for common.



Where the most of us are apt to get bothered is in the side or cheek cuts of jacks to fit against hip, or of hips or valley rafters to fit against ridge, and the trouble is that it is so simple that we are not willing to do it easily, but try to make a hard problem of it.

Let us suppose that the work is all laid down flat. Then the side cuts would all be miters or at an angle of 45 degrees. In such a case the length and run would be equal and if used on the square would give a miter cut. Raise the rafter up to any desired pitch and what do we get? The side of the hip is still perpendicular but a square miter on the jack will not fit against it. But if you use figures for length and run, and cut on length, you see you are changing the cut to agree with the rise of the roof. The more rise, the more length and the more difference in the cut.

The ratio between length and run is the same for all jacks and common rafters in the same roof, so simply use length and run of common rafter. Cut on length. For square pitch use 12 and 17, cut on 17.

This will cut all jacks.

It is asked, "Where did you get that noise, length and run of common rafter for side cut of jacks to fit hip or valley?" Where did anyone get the idea of 17" and 12" for side cut of jacks to fit 12" pitch? If it will work on 12" pitch, it will work on any pitch of a common roof. Jack rafters should be got out in pairs, sawed true to the bevels and numbered, the pair next the corner being No. 1. If the preceding instructions are strictly adhered to, no difficulty need be anticipated as to their not being right.

Remember on all side cuts to allow for thickness of carrying timber, except a deck that is generally figured to side only.

Let us take, for example, a building having a pyramidal roof. But there are no common rafters in this roof unless we should put up one from the middle of the four sides, before the hips are put up. If so, the first pair should be full length and the other pair shorter by half the thickness of the first pair. Then the hips would need to be shortened one and five-twelfths inches for each inch in the half thickness of the main rafters.

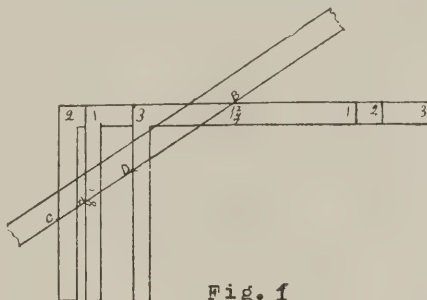
If the hips were put up first, the long rafters, if they were put in the middle of the plate, would be figured as common

rafters, shortened one and five-twelfths inches for each inch in half the thickness of the hips.

LENGTH OF RAFTERS

This system is applicable to any pitch and any width, and odd inches will never bother the ambitious boy or man who will take a few minutes of their time to get this new idea into their heads so that they will thoroughly understand it. It is easy, it is accurate, learn it and be up to the minute with the best methods of doing your work. If you thoroughly learn this system your mistakes will be few and far between.

Referring to Figure 1, take any straight piece of a board, say a 2x4 about 3 feet



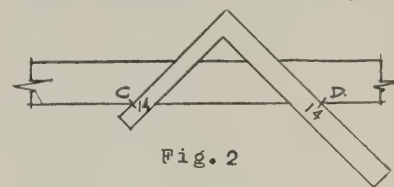
long for a straight edge and lay your square on corresponding to the pitch of roof you want to frame. In this case we have laid the square on the edge at 12 inches on the blade and 8 inches on the tongue which represents what is commonly known as a third pitch roof. The blade gives the bottom cut and the tongue the top cut of the common rafter.

Now the length. The numbers 8 and 12 represent the pitch of roof, this is shown by the position of the square as shown by 1, 1. Now if the building is 24 feet wide, the distance from A to B on the straight edge will be the length of the rafter. Now suppose the building is 28 feet wide, just slide the square forward on the straight edge, keeping the same pitch, till the number 14 on the square comes to point B on the straight edge. This brings the square in the position as shown by 2, 2, and then the distance on the straight edge from C to B is the length of rafter. Now suppose the building is only 14 feet wide, then slide the square backward on the straight edge until the number 7 on the square comes to point B on the straight edge, always keeping the same pitch, the square will then be in the position as shown by 3, 3 and the distance from D to B on the straight edge will be the length of rafter. Also the number on the tongue will give the total rise.

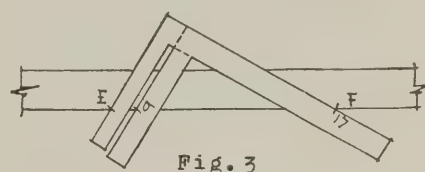
Remember the net length of common rafter will be the total length less one-half the thickness of the ridge. Remember that all there is to get the length of rafters is to measure across the total rise and total run. This gives the length of all rafters for a shed, roof, gable, hip, uneven pitch, ogee, valley, jack or any other kind of a rafter.

The cuts will always remain the same as the pitch of roof indicated by the first application of the square.

To find the length of a hip or a valley rafter, take half the width of the building on both the blade and tongue of the square and place the square on the straight edge,

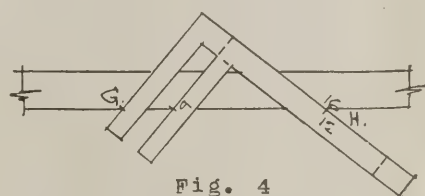


as shown by Figure 2, and note the distance from C to D. This represents the run of the rafter. Now place the square on the straight edge with 17 on the blade and 9 on



the tongue, as shown by Figure 3. This represents the pitch of the rafter. Now slide the square forward on the straight edge, keeping the same pitch, till the figures on the square represent the distance from C to D in Figure 2, then this distance as represented by E F in Figure 3 will be the length of the rafter. On account of having to corner the hips to fit in at the top they have to be cut about 1½ inches shorter than the actual scale measurement. This is because the ridge and the common rafters take up some of the space where the hips join.

Next, to find the length of a jack rafter. For example, we will take a 16-inch space. First lay the square on the straight edge 9



and 12, as shown in Figure 4. Make a mark on the straight edge at H and slide the square forward, keeping the same pitch, till the figure 16 comes to the point at H, then mark on the straight edge on the tongue side of the square, as at G, then the length on the straight edge from G to H will represent the difference in the lengths of jacks spaced on 16-inch centers.

Any other spacing can be obtained in the same manner by sliding the square forward or backward as the case may require. If you want a 20-inch space, slide the blade of the square up to the 20-inch mark; if you want a 24-inch space, slide the square up to the 24 inches; if you want anything less than 16 inches, slide the square backwards till it represents the space you want, and the result will always be correct. Take this difference in the length of jacks from

the common rafter, this will give the length of the longest jack; then take this difference from each successive jack down to the last, then if there is an odd space, which there frequently is, it does not matter if the last space comes out a little long or a little short on the spacing, on account of its being next to the corner and on the shortest length of rafter. It is better to have an odd space here than on the long rafters.

Remember the true length is not on side of jack, it is in the center; $1\frac{1}{2}$ inches should be taken off the first jack rafter on account of the thickness of the hip rafter. This would have to be taken off of only the first long jack, then the regular difference in length will make all others come right.

To further illustrate this system we will take a 24-ft. cottage, $\frac{1}{3}$ pitch hip

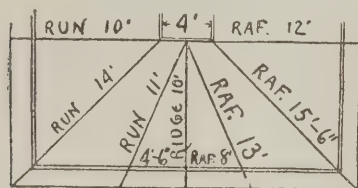


Fig. 5

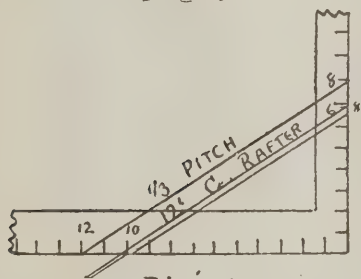


Fig. 6

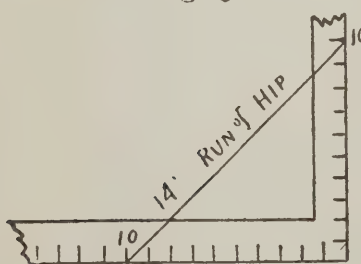


Fig. 7

roof, 4-ft. deck and gable in front, see Figure 5. As it is only the principle involved, for convenience in illustrating we will use even feet as much as possible, and not give accurate measurements as to inches although in framing they should always be made. One-third pitch roof rises 8 in. to the foot. As this 24-ft. house has a 4-ft. deck, the run of common rafter would be 10 ft. As the rise is 6 ft. 8 in., and run 10 ft., the length of common rafter is 12 ft., see Figure 6.

As the run of the hip is the diagonal

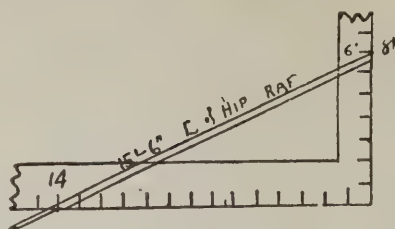


Fig. 8

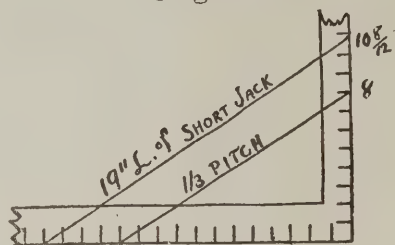


Fig. 9

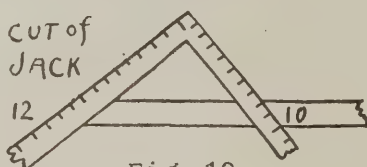


Fig. 10

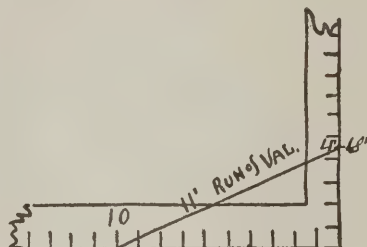


Fig. 11

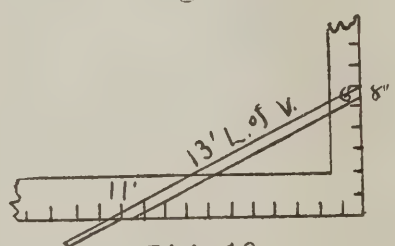


Fig. 12

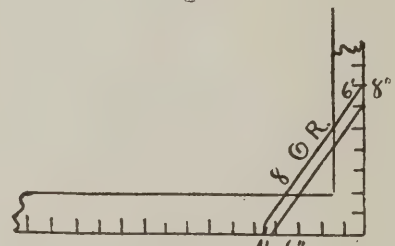


Fig. 13



Fig. 14

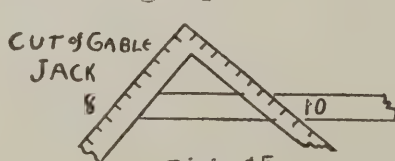


Fig. 15

of 10 ft. or 14 ft. (Figure 7) and the rise is 6 ft. 8 in., run 14 ft., length of hip 15 ft. 6 in. (Figure 8). If the jacks are to be 16 in. apart, measure across your square at 16 in. at $\frac{1}{3}$ pitch and you have 19 in. (Figure 9), length of short jack; twice that length is length of second ones, and so on, or divide the common rafter into the number of jacks required and get your lengths from common rafter. As the length of common rafter is 12 ft. and run 10 ft., place the square on 12 and 10, cut on 12 for bevel of jack rafter (Figure 10).

Now as the front gable is to show, divide the roof into three equal parts, allowing for projections; set the foot of valley 4 ft. 6 in. from center of building, and as it runs back 10 ft. to deck, the run of valleys is 11 ft. (Figure 11). As the rise is 6 ft. 8 in., run 11 ft. length of valley rafter, 13 ft. (Figure 12). As the rise of front gable is 6 ft. 8 in. and run 4 ft. 6 in.; length of gable rafter 8 ft. (Figure 13). As the length of common rafter on main roof is 12 ft., and run of gable is 4 ft. 6 in., place the square on length and run, cut on length and it gives side cut of main jack to fit valley (Figure 14). As the gable rafter is 8 ft. and run of main 10 ft., length and run cut on length give side cut of gable jack (Figure 15).

(To be continued)

UNIFORM NATIONAL SAFETY STANDARDS

The National Safety Council, 168 N. Michigan Avenue, Chicago, announces that the formulation of uniform national safety standards will begin in a few weeks. The first subjects taken up will be those on which rules are now being formulated or revised by state or other authorities. At a meeting called at Washington, D. C., in December by the Bureau of Standards, those in attendance voted to approve the plan of formulating safety standards under the auspices of the American Engineering Standards committee. This committee was organized a couple of years ago by the following engineering societies and government departments: American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, War Department, Navy Department, Department of Commerce. Each of these organizations has three representatives on the American Engineering Standards committee. As a result of the conference the constitution has been revised with the thought of admitting to membership the National Safety Council, the National Fire Protection Association and similar national organizations.

Questions and Answers

This "Questions and Answers" department is for the use of National Builder readers to exchange views and experiences. Write your name and address plainly. These need not be published. If you do not want your name to appear, say so, but send your name and address anyway, so that we may know who you are and perhaps be able to send you some information you may be in a hurry for.

GOVERNMENT TESTS AND A CONTRACTOR'S TESTS WITH CUT NAILS AND WIRE NAILS

J. M. Jensen, Arnold's Park, Ia., writes: I have just read the article on page 42 of December NATIONAL BUILDER on "Cut Nails vs. Wire Nails." Contrary to the U. S. test there described, I have always found wire nails had the most holding power. It stands to reason they should. The wire nail is forced into the wood, while the cut nail cuts its way. Now a man doesn't have to take the Government test for that part of it. Where a man gets the best test is in wrecking a building that has been built and nailed with the old-time cut nails. You can save the lumber to a board. But try and wreck one that is built with our wire nail of today and I will promise you a lot of kindling wood. I built two houses for a man in Nebraska on

twenty-two years. The reason we used the cut nails was because some man told the owner that the railroad company had made a test of the cut nail and found that it had a higher holding power. So we made a test and our test proved that the wire nail had most holding power. Let us hear from somebody that has had a try at testing this in one way or the other.

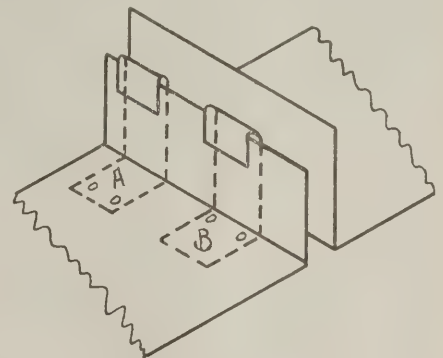
KEEPING RECORDS OF MEN AND COSTS

A. J. C., a western builder's foreman, who does not want his name used, sends a copy of his weekly time sheet, which, with the names changed, is here shown. A. J. C. says his methods enable him to tell why some jobs run over the estimate and some run under the estimate, and promises some comparisons later. In the column "Classifications," in the time sheet, letters and figures are used to indicate the ability of the workman, thus Al. e. g., indicates that the man is a good mechanic; can trust him any place; takes interest in his work; turns out good work and enough of it. E. g.—Good on certain kinds of work, siding, cornice, finish, etc., but not to be trusted with work outside of a certain kind. N. g.—As a rule some man who has used a hammer and saw on a bridge gang working out poll tax, and when he gets on a job thinks he is still working

this sheet, and then I have a correct report at the end of the week. Adding up the column under total time leaving off the 48 hours overhead, makes 440. Also add up the time on each job and it makes 440. The boss makes up his payroll from this, and the bookkeeper charges up each job with the total time, say Commercial, 46½ hours, rate \$1.00 equals \$46.50; 12 hours at 70c, \$8.40, etc. So every week the boss knows just where every cent of his payroll goes and what it goes for."

PROPER NAILING OF METAL ROOFING CLEATS

When the cleats are nailed in any old way, as illustrated at "A," in the accompanying sketch, the seam will often



Dotted lines indicate cleats in place ready for seam to be formed. "A" shows wrong and "B" correct nailing

Time Sheet, Week Ending December 26, 1919

		Commer-							Total
Class		Rate	cial	Brown	Green	Smith	Jones	Kerr	
Foreman—A. J. C.	Overhead	1.12½	8	8	8	8	8	8	48
Griffin	Millman	1.00						88888	40
Maguire	Millman	1.00						88888	40
Lalor, P. T.	Finisher; Cornice	1.00	84	4888					40
Cross, J. L.	Finisher; e. g.; Cor.	1.00	4888						28
Fillmore, Geo.	Finisher; Cor.; e. g.	1.00	4	888					28
Pilker, F.	Outside; Fast; Rough	1.00				88888			40
Parker, T. J.	Outside; Good; Slow	1.00				88884	4		40
North, C.	Outside; Good Leader;								
	Willing	1.00				88848	4		40
Tillman, Frank	Outside; N. G.; Slow	1.00				8888			32
Barton, L. M.	Good any place; Al.								
	works alone	1.00	2½		886½	1½5½			32
Gilson, Geo.	Finisher; Al. e. g.	1.00			8886½	1½8			40
Updike, Frank	Finisher; Al. e. g.	1.00			8886½	1½8			40
Total time each job			46½	52	83½	170	8	80	440
Laborers									
Lapere, X.	Good	.70	312	2		3224	2722	422	40
Dalby, Will	Excellent	.70	2121		6	4324	4322	121	40
									80'

one of which the shingles were nailed on with cut nails. This roof had to be re-nailed and patched in places. The shingles on the other building were nailed on with galvanized wire nails. These shingles are lying pretty fair after

out poll tax. He doesn't last any longer than A. J. C. can get someone else, or gets caught up with the work.

A. J. C. says: "I have six jobs going and about enough men to handle two jobs right. Every evening I post up

draw up from the lath and sheeting by expansion and contraction. In fact, in many instances, assisted by a high wind, the tin has been drawn off the roof entirely, which is all wrong, and could have been avoided by proper applica-

tion and ordinary care in the first place.

Cleats should be placed not more than 18 inches apart instead of double that

good man can make more money doing it than he can by dodging it, and granting that some of it is more or less disagree-

that may be made in jobbing work, there are many builders who have found it so profitable that they have given up their



Plate 1

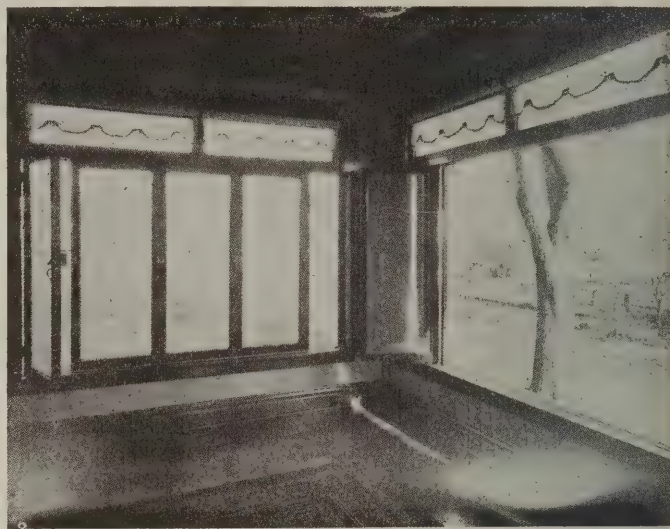


Plate 2

Plate No. 1—The possibilities for turning attics into useful rooms are unlimited. Wall board is highly useful for this purpose. Plate 2—Making porches livable the year around is the practical way. These casements have special hardware which allows them all to be bunched at one end, thus leaving the opening entirely clear

distance, as they are usually spaced.

Particular care should be given to seeing that the cleats are nailed close up, in the corner, as shown at "B." There is enough "give" in the formation of the standing seam to take care of expansion, and with the cleat nailed close up, directly in the corner, the pull is straight and will not give, otherwise the seam pulling up will bend and spread, causing the body of the sheet to buckle into various shapes. Thus, ultimately, creating leaks oftentimes hard to locate, not to mention the horrible rattle and noise of a loose metal roof flapping.

ODD JOBS

At this season of the year many builders begin to get restless. In many cases their work has been hold up during the winter, and they are anxious to get back on the job.

The odd jobs as a means to this end are often overlooked, and in fact some builders deliberately turn them down. These men say that jobbing work is disagreeable and that there's no money in it. Now in many cases they have never tackled an odd job, but are merely repeating the words of some grouch who can never see any good in anything that differs from his regular work.

Of coures, jobbing work doesn't offer many "get rich quick" possibilities, but a

able, it isn't half as hard on a man's temper as it is for him to lie around doing nothing.

The chief value of jobbing work, however, is its advertising worth. It offers an opening wedge to a new client's confidence and often means a nice fat piece of regular work at some later time. If a builder does a satisfactory piece of jobbing work for a man he may rest assured that he will gain by it later.

A good woodworking machine is almost essential in doing jobbing work, and the up-to-date man will obtain the local agency for a number of building specialties so that he can turn out first-class work in a hurry and at a fair profit.

To return to the subject of the money

regular building work entirely and devote all of their time to jobbing.

KEEPING A LINE ON PRICES

There is a much simpler method of comparing prices on supplies than digging down into a pile of invoices every time it is necessary to make such a comparison.

An index card system is used by Frank W. Taylor & Son, Philadelphia, Pa., for this purpose. An ordinary index card 6 inches wide and 4 inches deep is ruled off into eight columns, at the head of which are printed: *Date of Invoice. Bought From. Quantity. List. Per. Discount. Net Cost. Remarks.*

On the top left-hand corner is printed the word *Article*. On the same line, and in the center at the top is printed *Size or Number*. In this way each article is given a separate card, which is filed in a small case alphabetically.

When purchases are made, the data is placed on the card under the respective heading.

By this method it can be seen at a glance on the card the variation in prices of any article. For instance, one card is used for galvanized sheets. The date of purchase, quantity, price, etc., are entered on this particular card. When quotations are offered it takes but a moment's time to look at the card in the file and make the comparison.—*Warm Air Heating & Sheet Metal Journal*.



Plate 3—Built-in cabinet work is useful and ornamental. An old-fashioned room may be modernized at slight expense

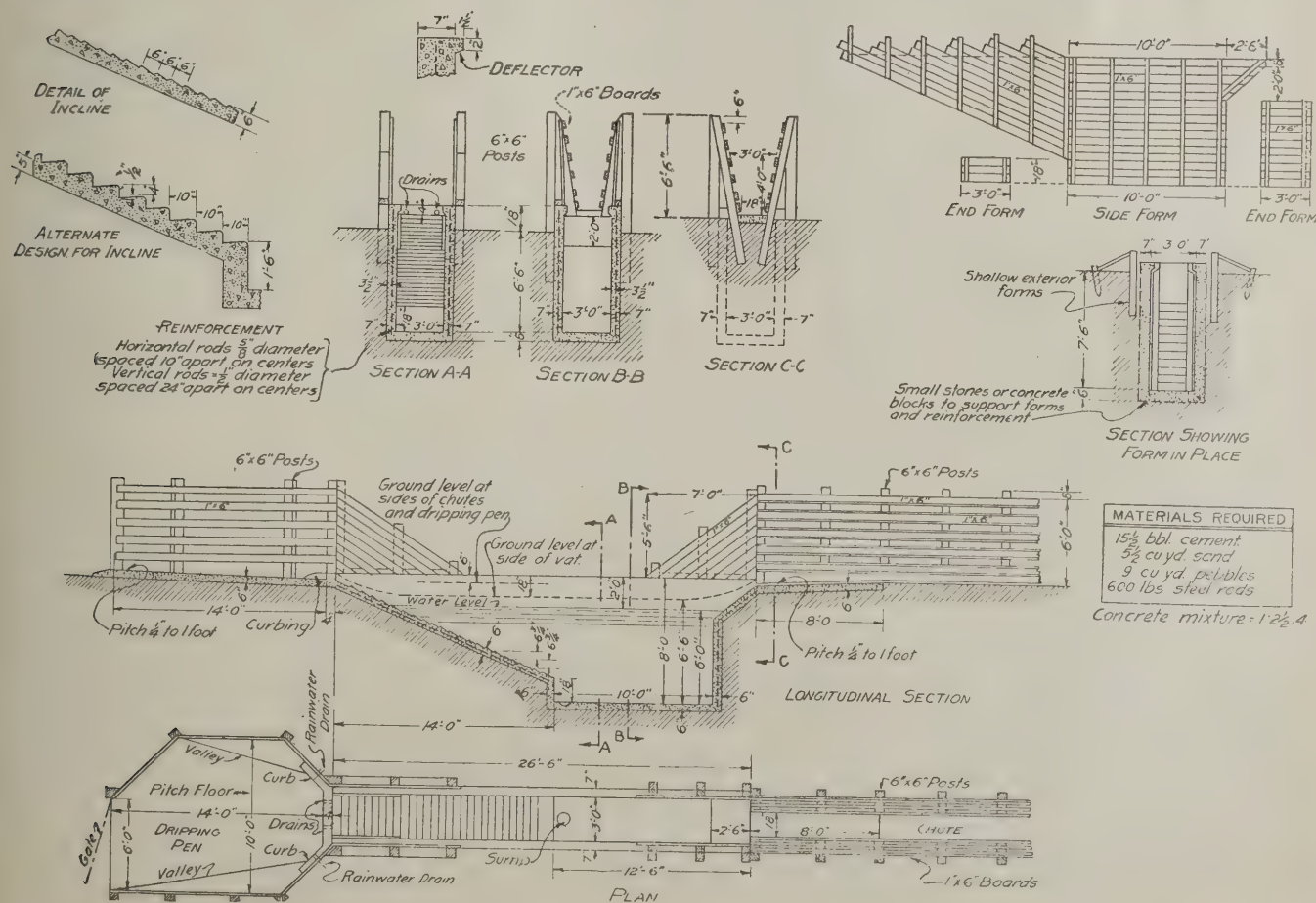
Visitors on the Job

Many builders purposely cultivate an air of hostility toward visitors while work is under construction. They take the position that visitors are in the way and distract the workmen, and that a new building is a dangerous place for idlers. This is all very well for commercial buildings and especially for those in large cities, but with respect to dwellings there is a growing tendency among builders to welcome visitors during construction. This does not mean that a reception committee is kept on the job, but the men, and especially the foremen are instructed to answer questions intelligently and to bear a civil attitude toward visitors. Builders who have adopted this plan report that they have landed considerable new work by these methods.

The accompanying photograph shows a large signboard that is being used on a job for the purpose of attracting visitors. In this case the owner as well as the builder are after the benefits.



Plan and Details for Concrete Cattle-Dipping Vat



Publications and Announcements

Removing the Stairway Barrier is the title of a leaflet illustrating and describing the Sedgwick Hand Power Invalid Elevator, issued by the Sedgwick Machine Works, 150 West Fifteenth street, New York.

F. E. Myers & Bro. Calendar exhibits on one sheet in connection with a large calendar the full line of farm operating equipment manufactured by the concern at Ashland, Ohio.

Nelson Valves is the title of a handsomely illustrated and well-bound catalogue and price list of bronze, iron and steel valves, gate, globe, check and non-return valves manufactured by the Nelson Valve Co., Chestnut Hill, Philadelphia, Pa.

Structural Slate—Commercial Gradings and Standard Finishes—The first of a series of structural service and data sheets compiled by the Structural Service Bureau in co-operation with the slate industry and D. Knickerbocker Boyd, architectural advisor and structural standardist. The Structural Slate Company, Pen Argyl, Philadelphia, Pa.

Something New in Hand - Power Dumbwaiters—For Indoor and Outdoor Service—An illustrated descriptive catalogue issued by the Standard Electric & Elevator Co., Inc., 118 E. Pratt street, Baltimore, Md.

Lane Bros. Company Hardware Specialties—An illustrated descriptive catalogue and price list of builders' hardware, issued by the above-named company, Poughkeepsie, N. Y.

Effect of Vibration, Jigging and Pressure on Fresh Concrete—By Duff A. Abrams, professor in charge of Structural Materials Research Laboratory, Lewis Institute, Chicago.

What Those Who Know Say—Illustrated leaflet with indorsements of chemical toilets by boards of health. Issued by Coates Sanitary Manufacturing Co., Grand Rapids, Mich.

Simonds Guide for Millmen—No. 1, vol. xii, of house organ of the Simonds Manufacturing Co., Fitchburg, Mass., manufacturers of saws, files, knives and edge-holding tools for cutting purposes.

Fuller Brick Cleaner—Illustrated leaflet historical and descriptive of a device for cleaning brick. Issued by N. T. Fuller, Spring and First streets, New Bedford, Mass.

American Walnut—A handsomely-designed and illustrated brochure, giving the history and uses of American walnut. Issued by the American Walnut Manu-

facturers' Association, 115 Broadway, New York.

Anchor Concrete Block Machine—A handsomely printed catalogue illustrative and descriptive of buildings, mechanisms and materials used in connection with the block manufacturing machines manufactured by the Anchor Concrete Stone Co., Inc., Rock Rapids, Iowa.

Weather Vanes—Catalogue of the Friedley-Voshardt Company, 733 South Halsted street, Chicago.

Dampproofing Walls Above and Below Grade—Catalogue with illustrations, details and diagrams issued by the Hydrex Felt and Engineering Co., 120 Liberty street, New York.

Concrete Mixers—Catalogue showing mixers for every purpose, issued by the Jaeger Machine Company, Columbus, Ohio.

Frigidair—Domestic Mechanical Refrigeration—Illustrated and descriptive catalogue issued by the Frigidair Corporation, 725 Scotten avenue, Detroit, Mich.

Architectural Sheet Metal Ornaments, Statues, Etc.—Catalogue, 188 pages, Friedley-Voshardt Company, 733 South Halsted street, Chicago.

Thatch Roofs—A handsome brochure printed in monotone and colors illustrative of various types of houses roofed in a thatched effect with stained shingles. Issued by the Creo-Dipt Company, Inc., North Tonawanda, N. Y.

"Creo-Dipt" Stained Shingle Homes—A portfolio of 50 photographic reproductions of homes of various types roofed with stained shingles. Creo-Dipt Company, Inc., North Tonawanda, N. Y.

Progress in Windows—An historical and descriptive illustrated brochure on windows and window construction. Issued by the Whitney Window Corporation, Minneapolis, Minn.

Micaspar—How to Use It—An illustrated descriptive circular about micaspar as a facing aggregate. Issued by the Crown Point Spar Co., Crown Point, N. Y.

Monolog is the title of an illustrated and descriptive catalogue of the Sharp Rotary Ash Receiver Company, Inc., Binghamton, N. Y. The variety of ways in which the disagreeable work of ash removal is effected and reduced to the minimum is interestingly described.

Portal Wall Beds—A catalogue of elevations and interiors and floor plans of apartment houses, bungalows and other residences in which wall beds have been

installed. Details of wall-bed construction, dimensions and door details are shown. Distributed by W. L. Van Dame Co., 58 E. Washington St., Chicago.

Garden Craft—A sumptuous catalogue, 10 by 13½ inches, elaborately illustrating garden furniture, porch furniture, sun room furniture, breakfast room furniture, arbors, pergolas, gateways, trellises, fences, oil filling stations, and special pieces. Price \$1.00. Issued by the Mathews Manufacturing Company, Lakewood, Cleveland, Ohio.

A Better Mixer at Half the Price—Leaflet descriptive and illustrative of the Interstate Mixer. Issued by the Interstate Equipment Company, South Bend, Ind.

Russell Sewage Disposal System—Descriptive and testimonial leaflet of the system of the Russell Sewage Disposal Co., Burlington, Iowa.

Expanded Metal Construction—January issue, No. 1, Vol. 9, of house organ of the North Western Expanded Metal Co., 37 West Van Buren Street, Chicago, Ill. Shows exteriors and interiors of a variety of buildings in which expanded metal has been used, with illustrations and details of methods of application.

Whale Bone Wall Ties—Descriptive and illustrative folder of galvanized metal wall ties for solid and veneered walls, and metal plugs for brick, cement and tile construction. Allegheny Steel Band Co., Pittsburgh, Pa., north side.

E. C. Atkins & Company, Inc., Saws and Tools—This is a comprehensive catalogue and price list of saws and tools with tables and other useful data; copiously illustrated, with full explanatory text. A complete telegraph code, numerical code, and cross index makes this work of 264 pages a model of its kind. In design, illustration, printing and binding "Atkins No. 18" is in every way commendable.

Look at Pozzo Before You Build—An historical and descriptive circular of a building material designed to take the place of wood or brick at less cost. Issued by the American Pozzolana Co., Pennway Building, Indianapolis, Ind.

Journal of the American Society of Heating and Ventilating Engineers for January—No. 1, vol. 26—Contains official reports of research bureau, including investigations of direct radiation; air conditioning of school buildings; the magazine feed boiler; and a report on heating a 17-room house by gas. Issued by the Society, 29 West 39th Street, New York.

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NATIONAL BUILDER

Volume 63

Chicago, March, 1920

Number 3

The Situation

THE high pressure demand for materials creating what is termed a "seller's market," forcing prices up to very high levels has been a problem difficult to overcome. Material producers have been quick to discern that a boom of this character must have a greater reaction and lead to such a loss of confidence that the building industry in spite of the heavy demand for buildings would fall into such a state of hesitation that construction work would be immeasurably slowed down. They therefore urged upon their customers not to stock up on material but to buy only as their needs demanded. Dealers, however, have realized the advantage of ordering far enough in advance of requirements and their action of course has its reward for such foresight. Nevertheless this represents the condition of business generally out of control where everyone is fighting for his own hand.

Some relief has been experienced in that many large contracts have been withdrawn and from strikes which have held up building and thus eased the buying market. Against this condition notable in the East is the shortage of cars and the discrimination against building material in railroad transportation. It stands at the bottom of the preferred list. A revision of this list is expected at this time of writing, when the railroads are restored to private ownership, if the Esch Bill is passed, one of the provisions of which is that rates shall not be increased for six months.

That there will be an unprecedented building season this year is generally predicted, but this will be out of the necessity for building overcoming the various handicaps of high prices of material, inadequate transportation and high freight rates, high wages, and difficulty of obtaining adequate loans.

The opinion of authorities, manufacturers and dealers, is that the top of high prices has been reached, although a few slight advances are noted in lime, plaster, metal lath, wall board, fire brick and face brick.

Dow building reports and Tomkins trade review predict better conditions and a hopeful outlook—the main cloud on the building horizon being the inadequacy of transportation and the railroad and labor problem in general.

Predictions are, however, as varied as the number of predictors. Local experiences and conditions vary in different sections and these naturally influence judgments. That a few instances of extravagance should be taken as indicative of a general trend is natural, but it is not conclusive of general extravagance in any particular direction—such as the case of a man who paid \$19,500 for a six-room house as a present to his daughter, but which a banker, who examined the property, said was not worth a loan of more than \$4,500. There is extravagance all along the line.

See Reports on Meetings of National Conference on Concrete House Construction, and Associated General Contractors of America, pages 53 and 55, respectively, in this issue.

Business associations in Southwestern towns are publishing announcements it is said, to the effect that nothing but open-shop deals will be made this year. This is a consequence of the increase in union wages in the building industries in some crafts mounting as high as \$12.00 a day. A similar movement is reported from St. Louis.

This movement, originating in Dallas, Texas, developing into the Open Shop Associations of Texas, Oklahoma, Louisiana, and other southwestern states, has been further advanced by a meeting held in Dallas, Texas, on February 13 and 14, at which a declaration of principles and a constitution and by-laws were adopted. The declaration of principles announces: "It is not the purpose

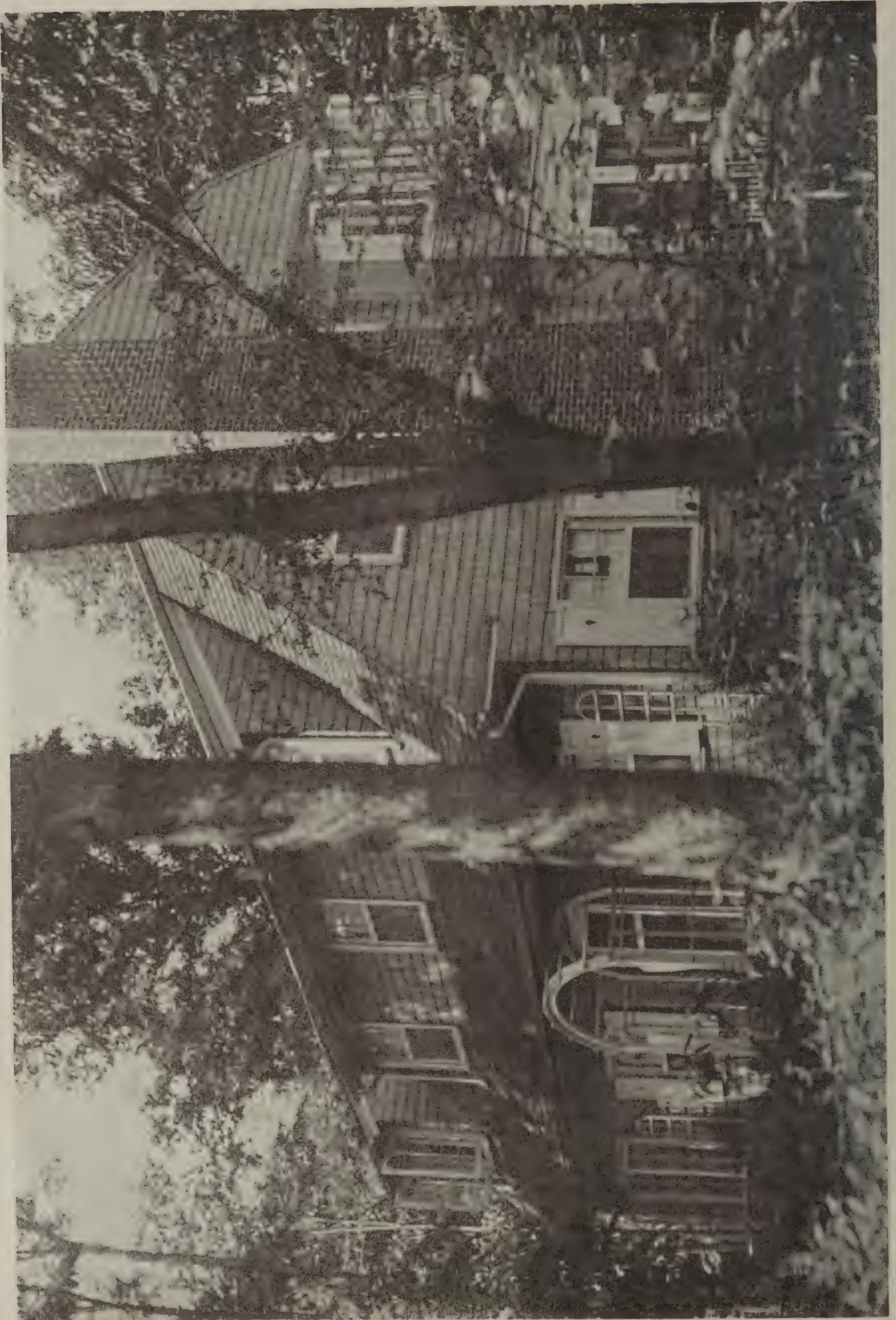
of this association to combat organized labor, as such, or to prevent the formation of labor unions, but rather to protect personal liberty and property rights by seeing that nonunion workers have an equal chance with workers who belong to unions."

The resistance to increases in wages is tackling the problem from the top, while the resistance to increase of living costs is tackling the problem from the bottom. The needs and extravagances of the hour force the workmen individually to regard what is left out of their pay as a small reward comparatively and as the job of their representatives is to get more money and a shorter workday if possible, the "vicious circle" tends to widen rather than decrease.

The building industries being mostly seasonal, profit sharing principles are difficult if not impossible to apply, and bonuses are rather indicative of an ability to pay more, depending on how the bonus principle is applied.

The Building Trades Employers' Association of Philadelphia and vicinity is meeting the labor problem by advertising in the daily press that as increased production will reduce the high cost of building, the support is solicited of the public, builders, sub-contractors, and all workmen, union or nonunion, to agree to the establishment from May 1 to October 31, 1920, of a working day of nine hours instead of eight hours, with a corresponding increase in pay.

That wages shall be readjusted in time to more reasonable levels is inevitable. The higher they go in any one trade the greater the inducement for men to enter upon that trade, and the law of supply and demand becomes effective however it may be regulated against. But that wages shall ever reach the low levels of pre-war times cannot be expected. The standards of living which society, in its own protection compels, must necessarily keep the cost of labor on a higher level than before the war. The social conscience, whether awakened by sympathy or policy, is awake, and so far as unions are concerned, the steady movement is toward reliance on the one big union—the United States—as the protector of collective and individual rights and liberties.



A Dutch Colonial House—Chas. E. White, Jr., Architect

See descriptive article and complete plans and details in following pages

A Dutch Colonial House

FOR small houses the Dutch Colonial type may probably be depended on to maintain its popularity for many years. Unlike some of the other types, which are popular today, but may be obsolete tomorrow, the Dutch Colonial has both sentimental and practical reasons which will likely maintain it in public favor for years to come.

The factor of the lasting qualities of the type or style of a building is one not to be ignored. We are all familiar with the stock criticism of so many buildings in which they are called out of date. This applies in some cases to buildings that were built only a few years ago and is largely responsible for the difficulty which is usually encountered in making a profitable sale if the house is thrown on the market. An architect or builder should consider not only the immediate satisfaction of a client, but should also make every attempt to keep him satisfied. Wherever possible, the client's ideas should be led away from the freakish and flashy styles and notions of the moment. It should be explained to him that no man knows how long he may desire to keep a house in his possession and that it is safe and more satisfactory to build in a conservative style that is simple and has been proved by time, than it is to adopt a style that has no reason for its use other than its novelty.

The sentimental foundation of the Dutch Colonial type is undoubtedly secure. It is distinctively American and for that reason alone its continued popularity is probably assured. To the characteristic gambrel roof is due its practical value, as this type of roof does away with waste roof space and permits the entire house to be utilized for living purposes.

One of the first things to be considered is the size of the house. A very large house cannot be made to look well if the Dutch Colonial type of design is used. The type is well adapted to houses of the size of the one which accompanies this article, but for houses which are much larger than this some other type is more appropriate.

This house was designed by Charles E. White, Jr., architect, for Mrs. P. F. Hurlbut of Wilmette, Illinois. It contains seven large rooms, a living porch and a sleeping porch.

The exterior is a somewhat free handling of the Dutch Colonial type and shows the possibilities for adjusting the type to fit almost any condition of plan arrangement. The entrance is simple and quaint and in harmony with the house.

The walls are of shingles stained a silver-gray tone to give a weathered effect. The walls are relieved of any plainness by the white shutters, trellises and flower boxes and by the red brick chimney at the end.

The basement is constructed with concrete block walls, including the partitions. The laundry contains two laundry tubs,

The Plans of
this Dutch
Colonial
House are
shown in re-
duced scale
in the follow-
ing pages,
photograph-
ed directly
from original
drawings

a gas water heater and a toilet. Note that the laundry tubs are set out in the floor instead of against a wall. This makes a convenient arrangement that is appreciated by the housekeeper. The ice box drain is led across the ceiling and drips into a tub and is thus protected against sewer gas. An electric drop cord connection is provided near the tubs for a washing machine. The cold room for the storage of vegetables, canned goods and so forth, is ventilated by means of a metal duct leading from an area and is provided with a register face so that the temperature may be somewhat regulated. The boiler-room is large and well lighted and the fuel-room will hold about twenty tons of coal.

On the first floor the entrance vestibule is provided with a convenient coat closet and a seat with a hinged top that may be used for rubbers. The living-room and the main hall are combined in such a manner that the latter becomes an

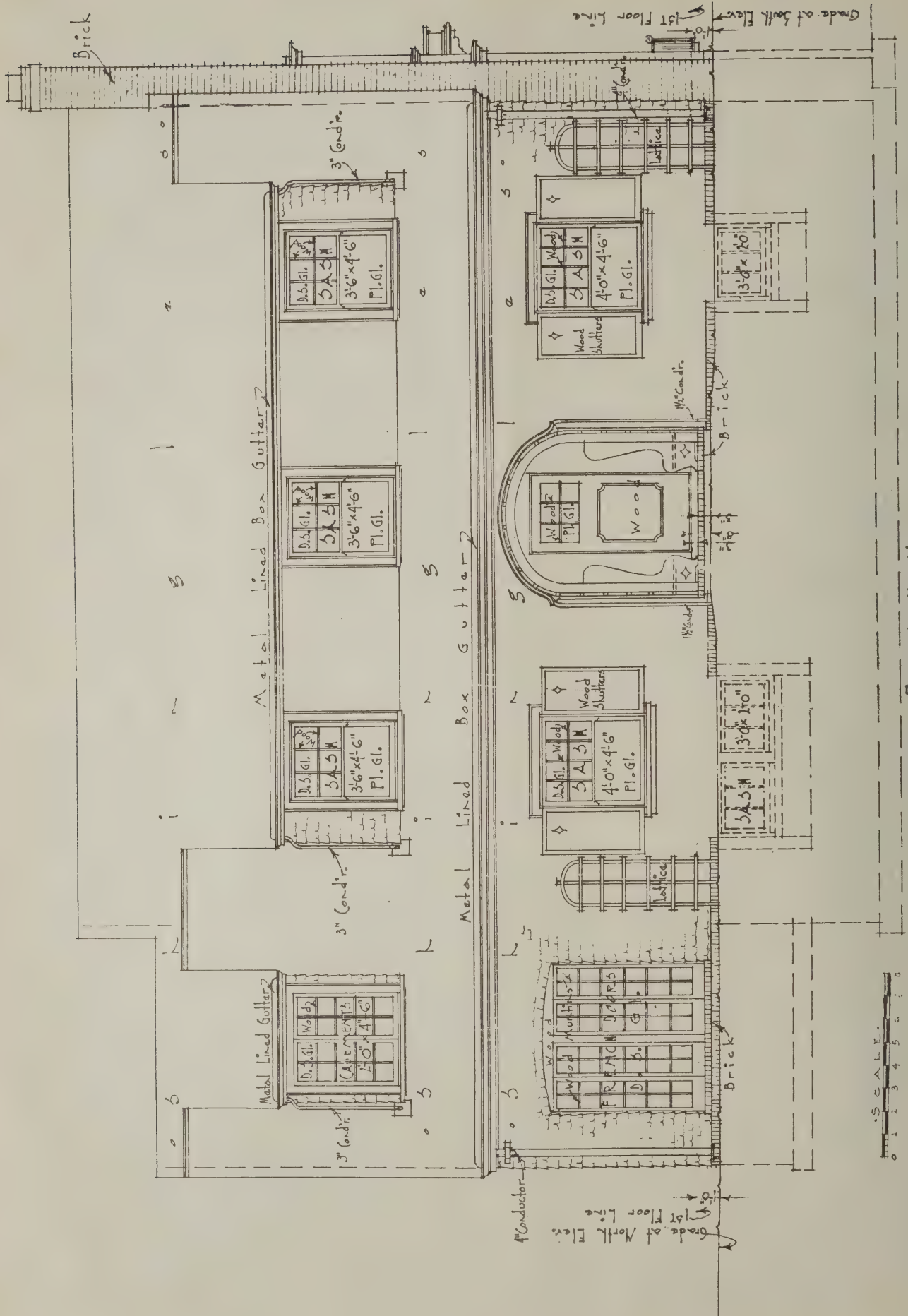
alcove. The main stair was changed during construction from the type indicated on the drawings to one more colonial in character, with turned balusters and a wreathed hand rail at the bottom. The effect of the stair from the living-room is very pleasing. The mantel is colonial with red brick hearth and facing. There is a small recess on one side of the living-room which opens by means of French doors onto a small wrought iron balcony. The radiators at each end of the living-room are partly concealed under built-in seats and at one end the seat is flanked by bookcases.

The dining-room opens into the staircase alcove and into the living porch by means of French doors. The living porch is surrounded by French doors and is also used as a breakfast-room.

The kitchen has two outside doors, one leading to the entry and the other to a small enclosed porch. The kitchen contains a small broom closet and the cabinets across one end are of enameled steel. The passage leads to the basement stair and also to the dining-room. It contains the refrigerator, which is iced from the entry, and also has a built-in cabinet over the refrigerator. The planning of this portion of the house is very unusual and will repay close study.

The second floor hall contains a linen closet and also a broom closet. The latter is a practical convenience that saves many trips up and down stairs. The bathroom is tiled and also contains a linen closet, which is used for towels, and so forth. The main bedroom contains an additional lavatory. In each of these bedrooms built-in wardrobes are provided instead of closets. The double doors of a wardrobe make the contents more accessible than is the case with ordinary closets. Each wardrobe has a shoe rack at the bottom and two shelves above. The radiators for these rooms are set in the corners where the roof slopes down beside the dormers, thus utilizing this low space. French doors lead from one of the bedrooms onto the sleeping porch. The sleeping porch is equipped with casement windows and is large enough to contain three single beds. The balcony over the kitchen porch is floored with tin over which a loose floor made of slats is laid for protection. It has a wrought iron railing and makes a convenient place for shaking rugs, airing bedding and the like.

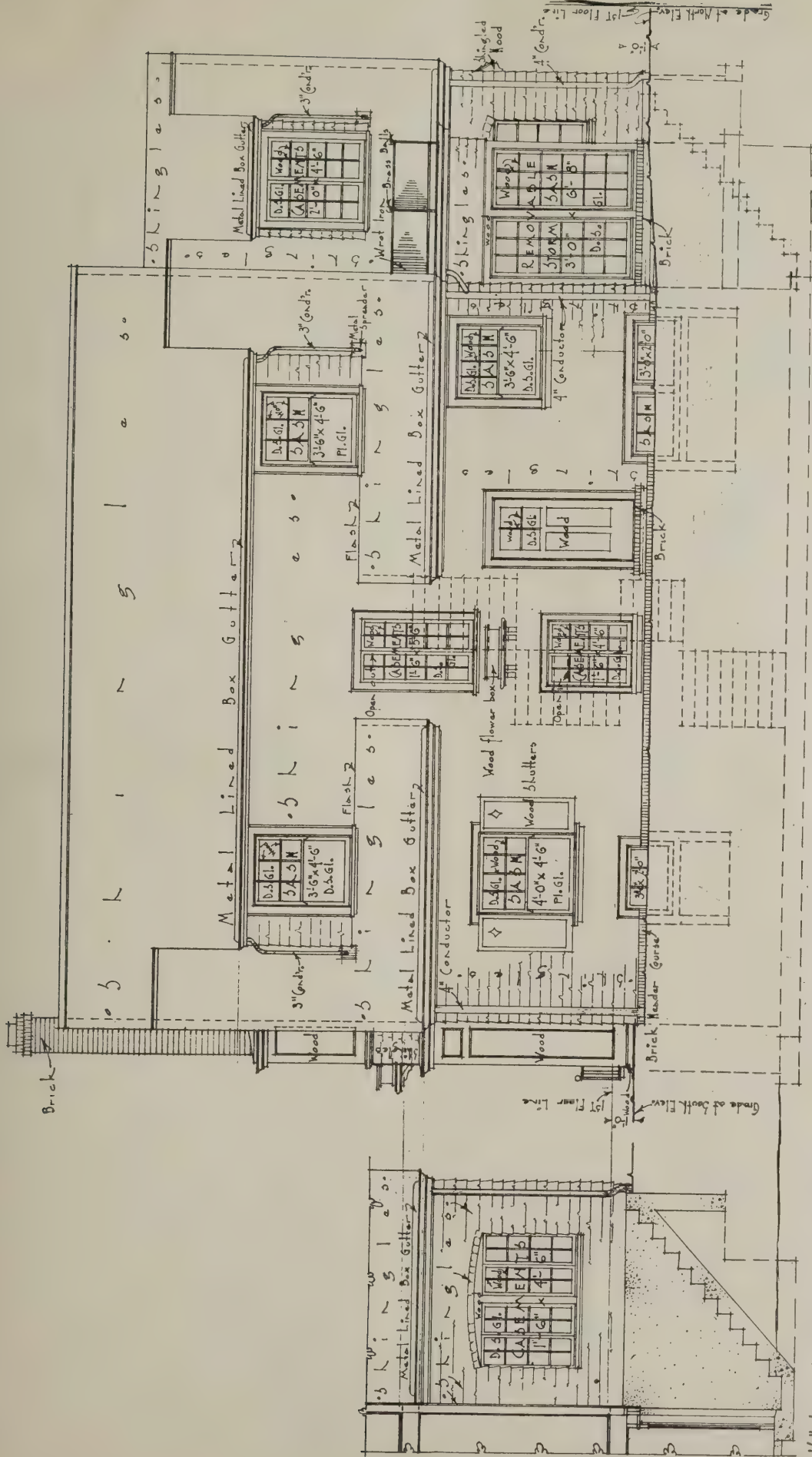
The house is thoroughly modern in every respect and has hardwood floors and trim, a steam heating plant, vacuum cleaner equipment and all practical conveniences of this nature.



FRONT ELEVATION

DUTCH COLONIAL HOUSE—See descriptive article, page 15

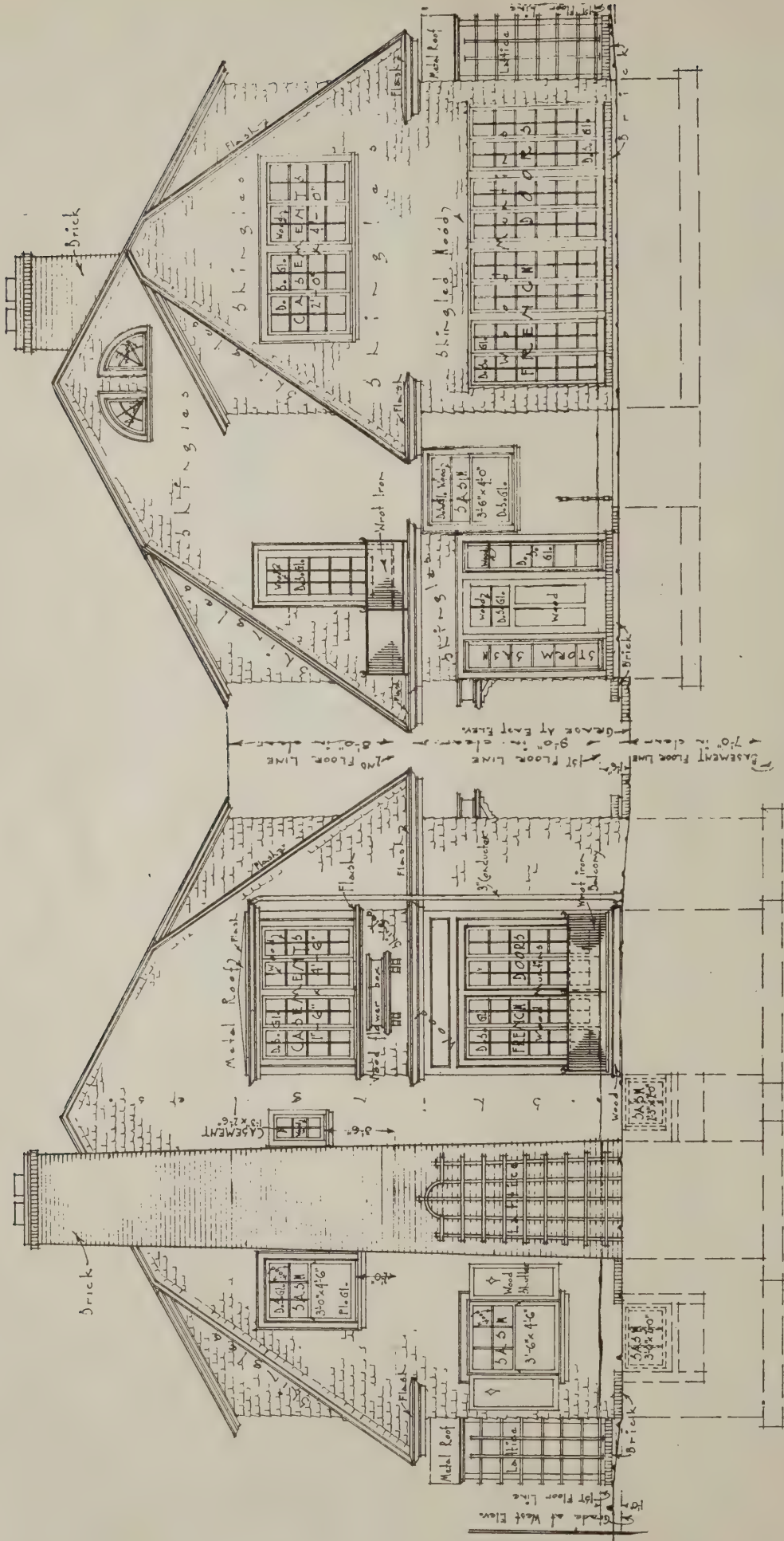




WEST-ELEVATION

DUTCH COLONIAL HOUSE

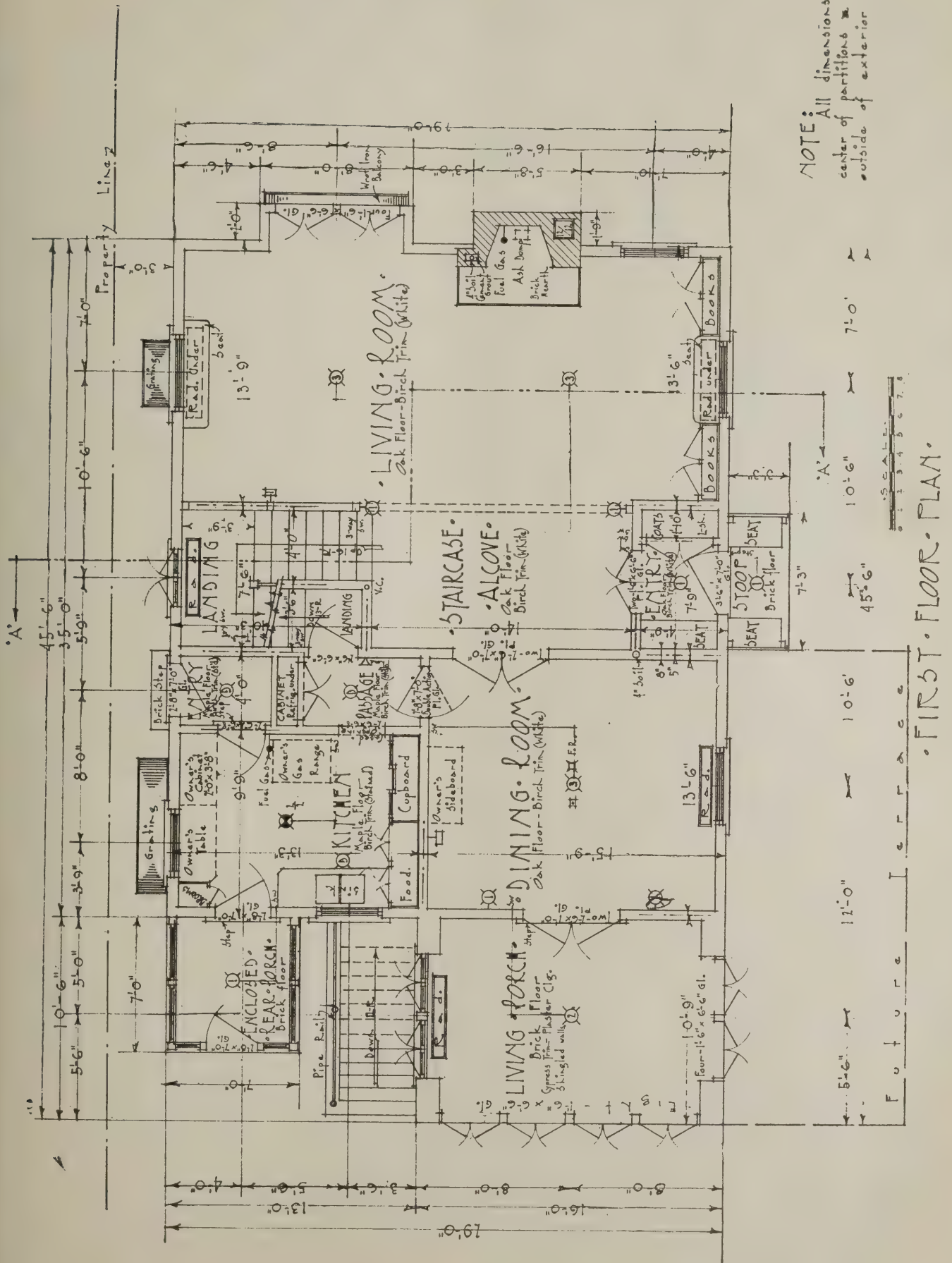
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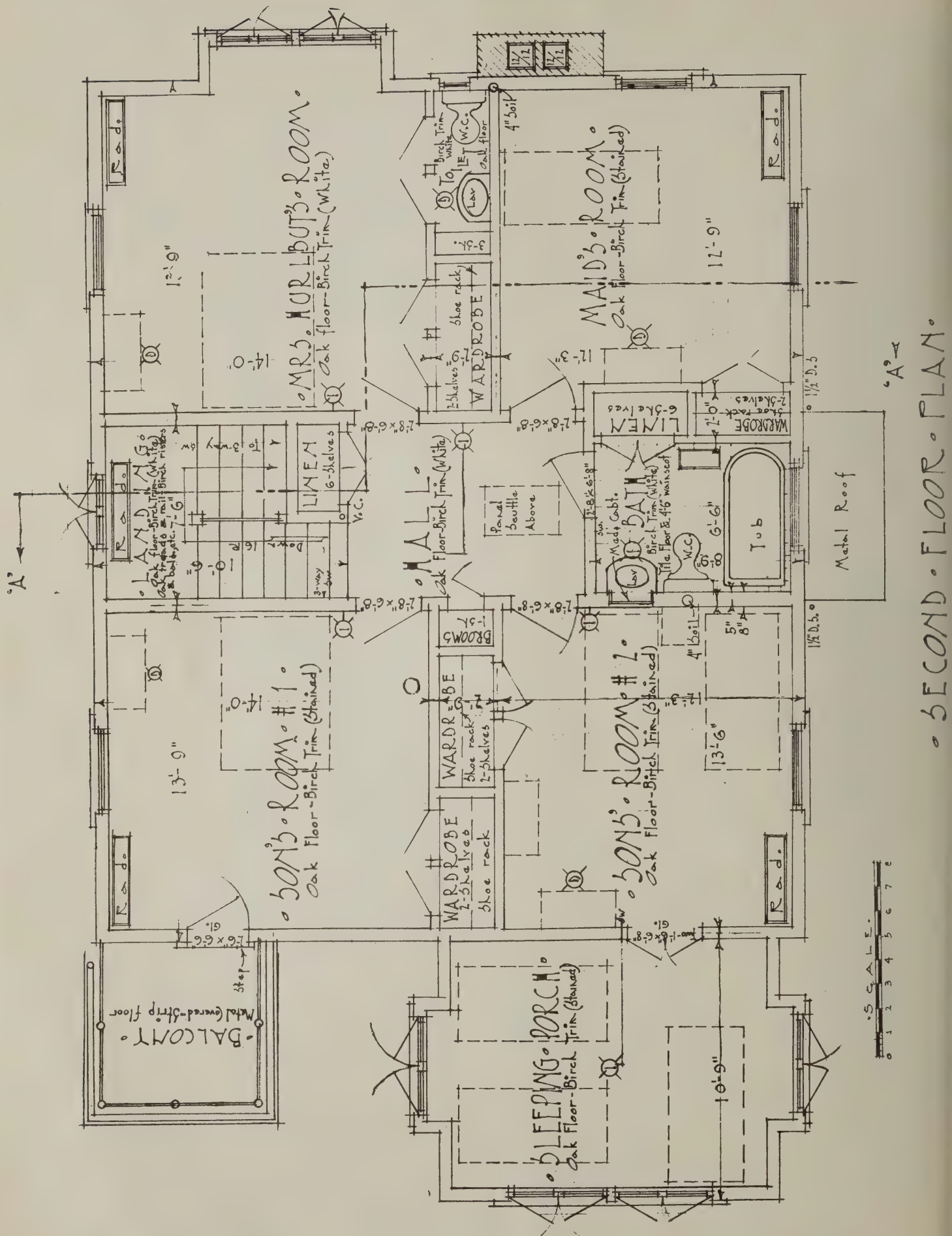


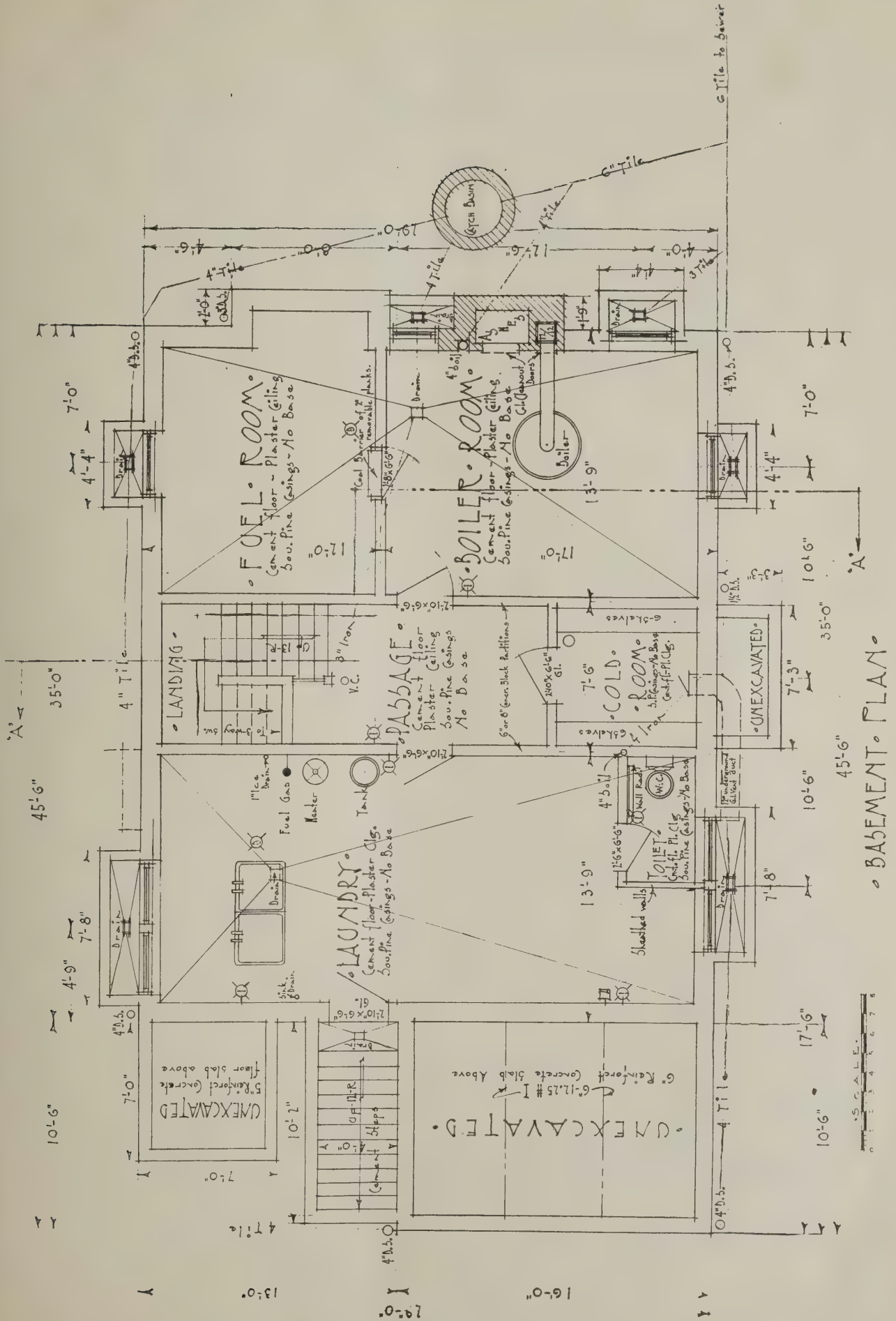
-NORTH-ELEVATION-

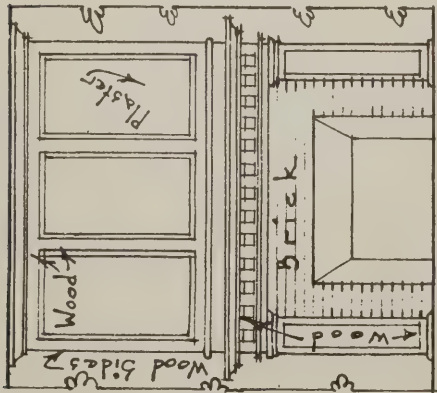
DUTCH COLONIAL HOUSE

-SOUTH-ELEVATION-





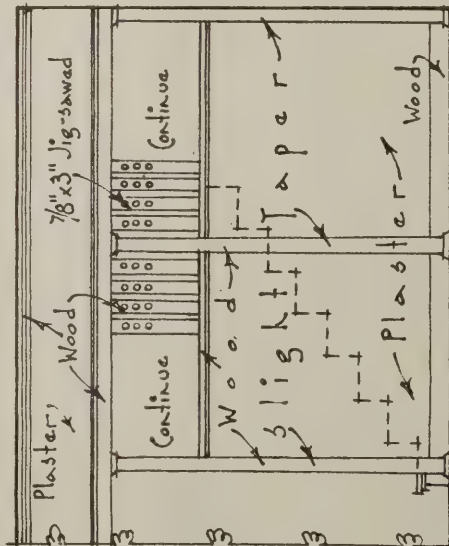




• ELEVATION • OF • FIREPLACE •



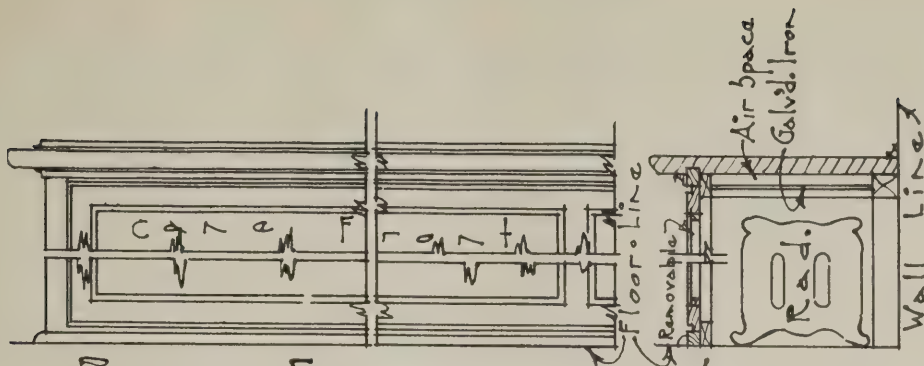
• WEST • ELEVATION •



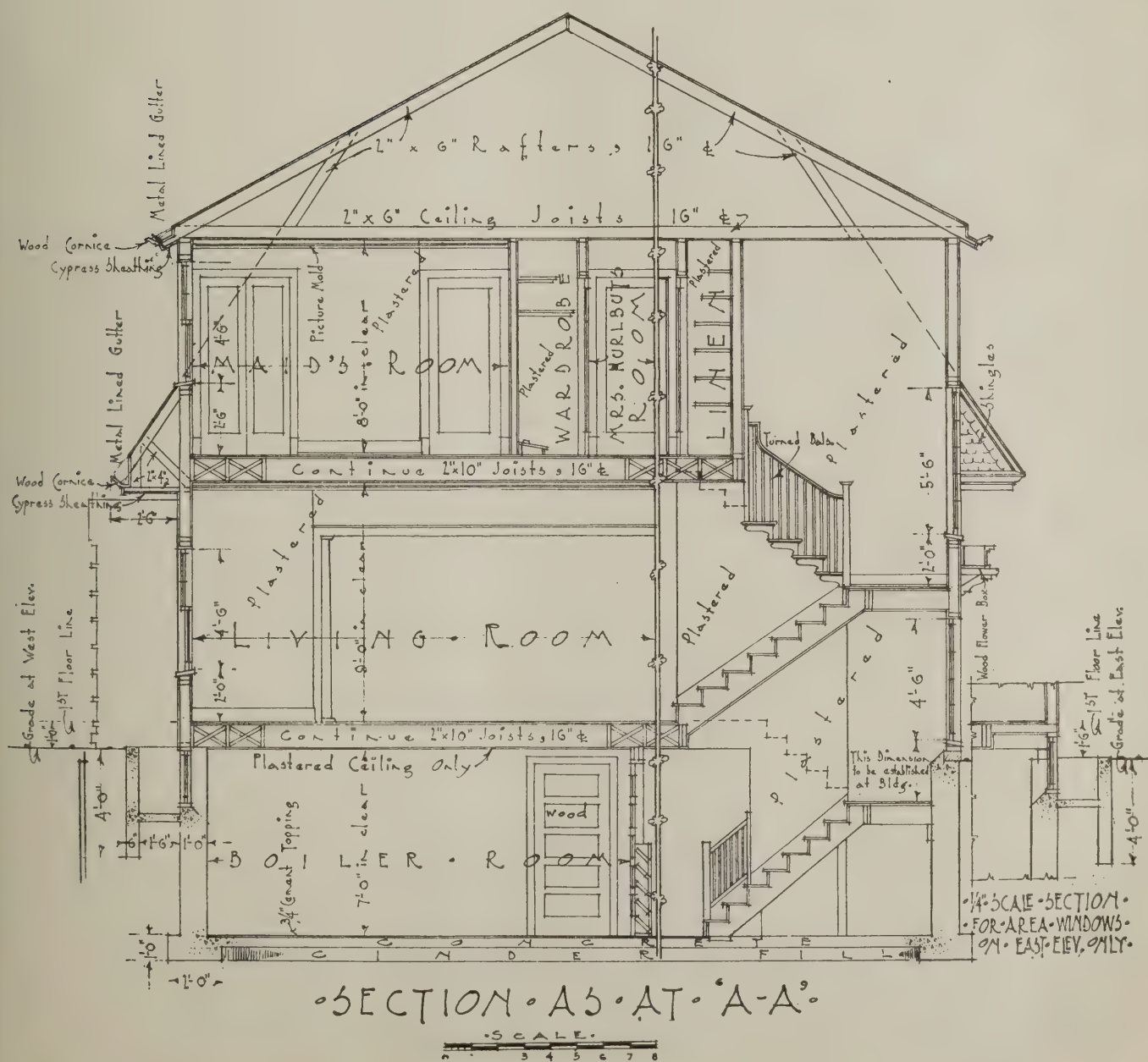
• FRAGMENT • OF • NORTH • ELEVATION •
• SHOWING • STAIR • ENCLOSURE •
• 1/4" • SCALE • DETAIL • OF •



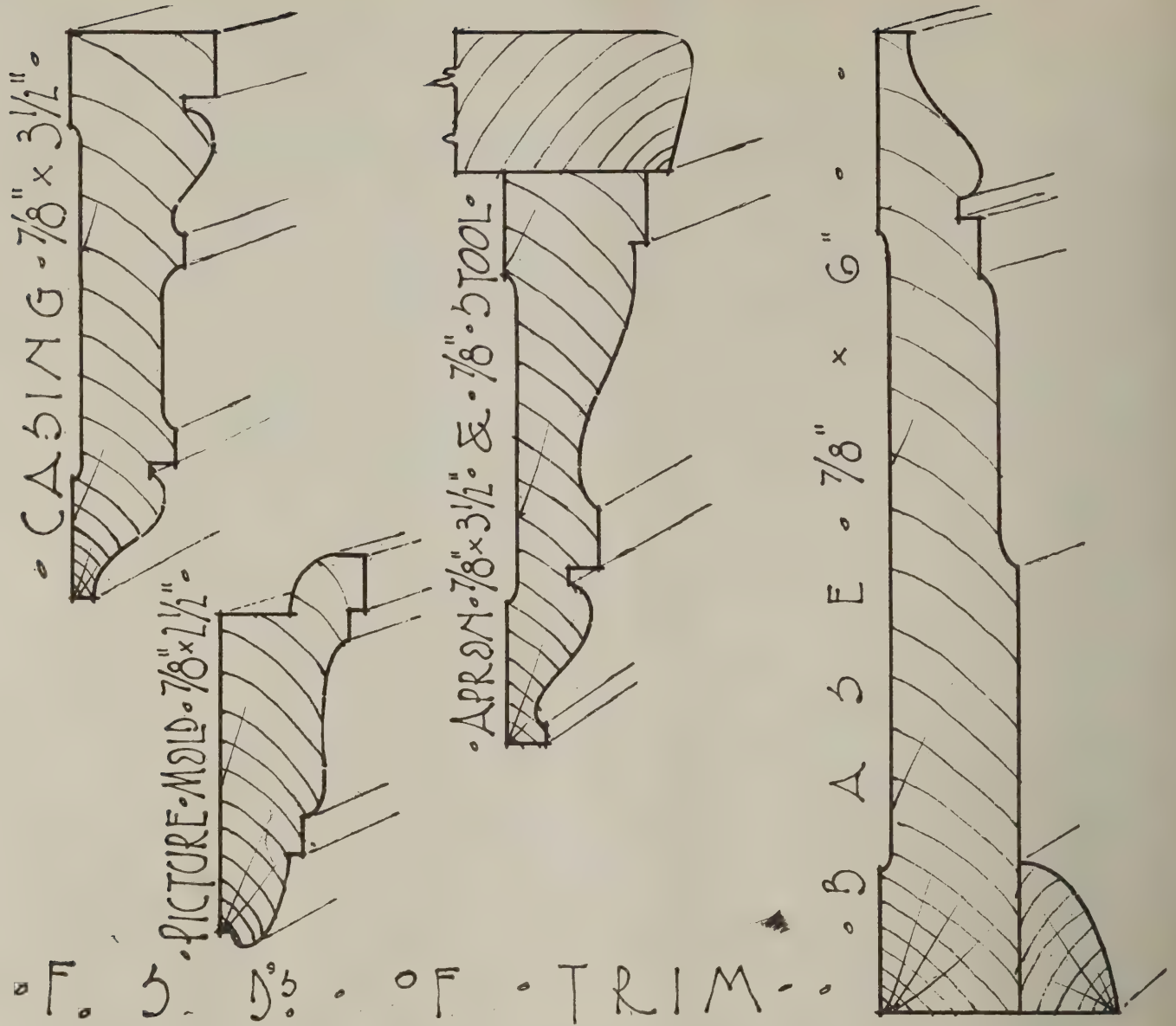
• EAST • ELEVATION •
• OF • LIVING • ROOM •



- PART - ELEVATION - SECTION
- $\frac{3}{4}$ " SCALE - DETAILS - OF - SEATS -
- IN - LIVING - ROOM -



• 1/4" SCALE - SECTION •
• FOR AREA WINDOWS •
• ON - EAST ELEV. ONLY •



Interior trim of Dutch Colonial house. See description, page 15

Buttresses

The accompanying photograph shows what may be expected when walls carrying long-span trusses are not buttressed.

The building is used as an armory and, to leave a clear space for a drill floor, the roof is supported on trusses. The walls are built of brick and are quite high, the ceiling being some 16 or 18 feet above the floor. Considerable outside surface is exposed to wind pressure and snow loading and the photograph shows the bowed-in wall which is probably a result of one or both of these loadings. The wall on the opposite side is bowed out to a corresponding degree. If the walls had been properly built with substantial buttresses under the ends of the trusses, no trouble would have occurred and some man's reputation would not have been damaged.

Generally speaking, a wall of this character for a building having a ceiling height of not more than 18 feet, should be not less than 12 inches thick and should be stiffened



by buttresses placed not more than 16 or 18 feet apart. The buttresses should be placed under the ends of the trusses or other load bearing members, and for a wall of this kind the buttresses should be at least two feet broad on the face and should project at least 8 inches from the wall. This projection may be divided on the outside and inside faces if desired. That is, 4 inches inside and 4 inches outside. The curtain walls should be bonded or otherwise tied to the buttresses.

Creosote Your Shingle Roofs

Squirrels are protected by the Kansas state law. They found the new pine shingles just placed on the roof of the home of Mrs. J. W. Trowbridge, 811 Tauromee Ave., Kansas City, Kan., appetizing and, increasing in numbers, threatened to eat the roof off. The police and municipal authorities were powerless to help, the state law tied their hands.

Roof and Wall Tiling

By John Y. Dunlop

THE chief characteristic of the bungalow which illustrates this article is its picturesque roof and walls which are covered with weather tile. In this design the base of the walls and the chimneys are formed of concrete blocks, while the wall framework is of wood covered with shingle-tiles, which are laid in much the same way as wood shingles or slate.

The roof tiles, which are of the Italian

In some cases the height of the concrete block wall is two courses, while at those parts on which the tiling is used the number of block courses is five. In the section of the middle part of the wall the sill piece on which the studding is set is shown anchored through the molded course and to the top course of the concrete block wall.

The framework is sheathed and covered over with waterproof paper and on

ets projecting from the gables. The lengths of these brackets are four spaces, that is, they extend into the roof from the large board for a distance of about 5 feet and are notched to the under side of the rafters. The large board in this case is molded on the lower edge and also has cover molding nailed on the face at the top edge to cover the ends of the roof strips which carry the tile.



A bungalow with Italian tiles on the roof, ornamental shingle tiles on the walls, and a concrete block foundation

pattern, depend for their weather tightness upon the interlocking device at the joint and have what might be termed single laps.

The heating of the bungalow is by open fires and that is the reason for so many chimney stacks penetrating the roof.

The foundations are cement concrete, made thick enough so that a ledge or projection is left on the inside after the concrete block base is laid. The wallplate which receives the floor joists is laid on this projection.

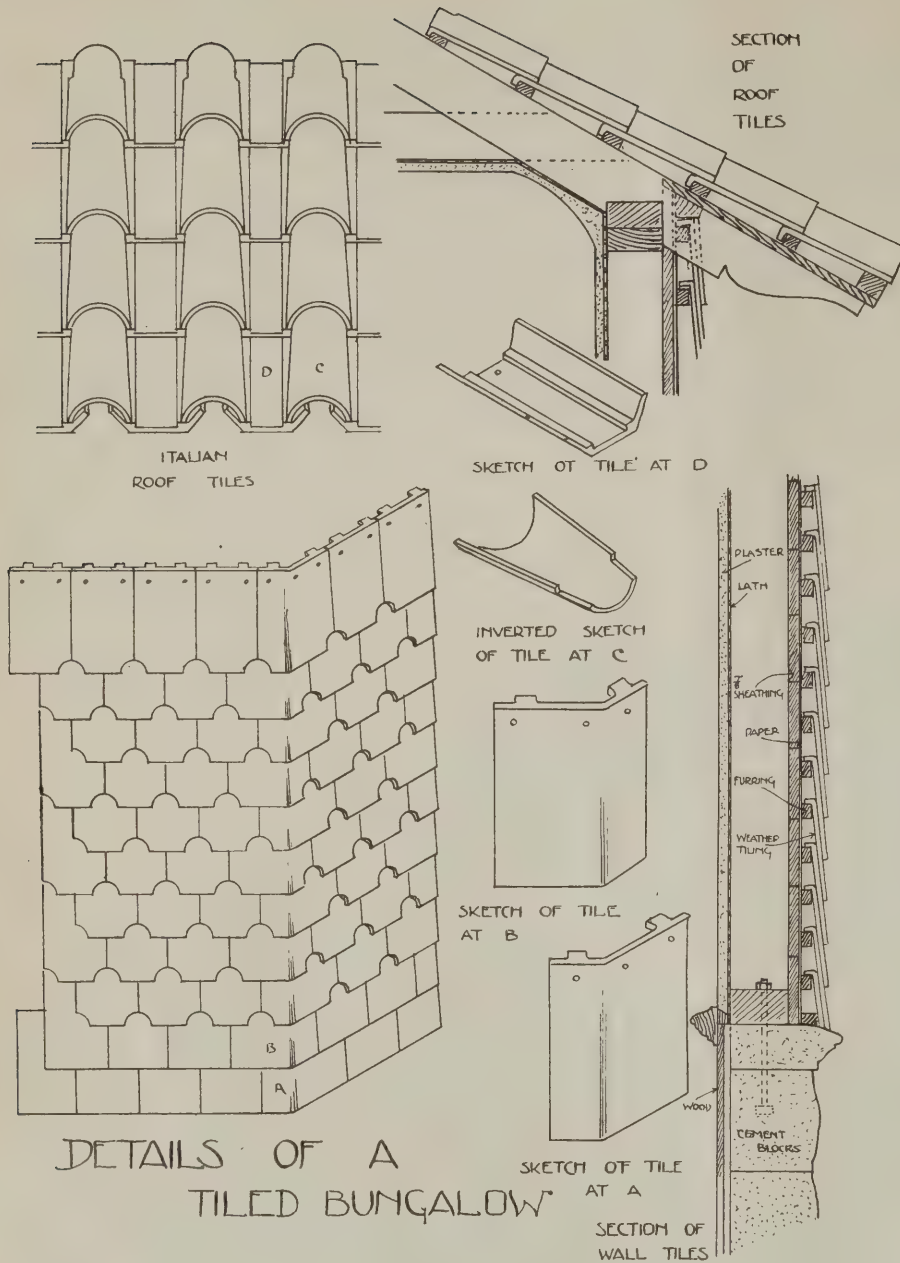
top of this paper the furring pieces are nailed at 4-inch centers. This method is carried up to the wallplate.

The roof strips are spaced to suit the length of the special tile. As the cornice is open, the rafter ends are sawed to a pattern and are also sawed in on the top edge to allow $\frac{5}{8}$ -inch sheathing to be laid where the underside of the roof is exposed. At the valley and around the chimney stacks, 6-inch boards are laid to form bearings for the flashings at those points.

The large boards are carried on brack-

Internally the wood framing is lathed and plastered, while the dado part is capped with a wooden dado rail at the joint of the two materials.

The tiling of the wall must be hung so that the wind and rain cannot pass directly through any joints. To obtain this weathertightness the tiles must be hung to break joint in the alternate courses. Also, in any course above the two lowest ones, the tail of the tile must overlap the head of the second course below. This over lapping is clearly shown in the section of the wall tiles



and is called the lap to which the tiles are laid. For steep roofs and walls for ordinary work the lap is often no more than two inches, but for good work and exposed situations the lap could be increased to advantage.

Wall tiles are often hung by the lugs, which are molded on the upper edge, but unless they are of a very small size they should be formed with two holes for nailing near the top edges. Tiles are either laid on roof or wall strips or on sheathing, but the best results can be had by using strips. In cases where the roof is an open one such as in a garage or small hall, the roof is often boarded over for the sake of the interior appearance, and in that class of work the strips would be nailed on the top of the boarding.

A better plan for stripping than that shown in the section is to nail vertical

wood strips on the sheathing, one over each stud, and nail the horizontal strips on top of these. The space thus formed between the sheathing and the tiles keep the house warmer and the vertical strips allow moisture to readily run off, thus helping to preserve the sheathing from decay.

The tiler proceeds by nailing a large beveled strip under the lower edge of the first course of tile. This strip is necessary to give the tiles that slight pitch from the vertical which is required to allow them to bed close to each other throughout their length. If this lower piece is omitted, the tails of each tile will stand clear of the tile below and the wind and rain may penetrate the wall covering.

The wall tiles of the first course must be shorter than the other tile by the amount of the gauge to which the tiles

are laid. The gauge of tiling, as that of shingles or slate, is the length of the tile exposed to the weather in each course.

All tiles on a wall should be further secured with nails, which may be two inches long and may be of copper, zinc or composition (a mixture of copper, zinc and tin). Ordinary nails should not be used, as they soon rust. Copper nails are the best, but are almost prohibitive now on account of the cost. Composition nails are becoming very popular.

In the drawing, special tiles for the external angles are shown in sketches A and B. These tiles are the same length as the others, but are full breadth on the face and only one-half tile broad on the return. The corner tile on the next course should be one-half tile on the face and a full tile on the return.

The tiles on the roof of this bungalow are one of the great variety of roofing tiles which are in the market. In England the principal roof tile in use is the shingle tile, which is laid in exactly the same way as the weathering tiling just described. Next to these in popularity is the Spanish tile, with its troughs and covers made in one piece, forming the characteristic S-shape roof tile which is so common. In Italian roof tiles, the trough and cover are different in shape. The trough is somewhat pan-like, while the cover is almost semi-circular in section, as shown in the drawing.

In covering a roof such as is shown with those special tiles, there are three points which require special attention, viz., the junction of the cover tiles with the ridge; the junction of the tile with the chimneys, and the intersection at the valleys.

It has already been noted that a 6-inch board is laid on each side of the valley to receive the sheet metal. These boards should have one-half inch tapered fillets nailed on them, 4 inches from the center of the valley. The sheet metal is dressed over these fillets, and the end of each course of tile projects one-half inch over them. The projecting ends of the tile should be cut parallel to the line of the valley.

At the junction with the chimneys the flashing is applied in much the same manner as for shingles or slate. First a sheet metal apron is put on the front of the chimney, the top being turned up at least 3 inches above the roof line and fitted into a groove cut in the cement work. This joint should be wedged and pointed. At each side of the chimney is the raking flashing which should be counterflashed. The flat portion of the raking flashing on the roof should be dressed over a piece of tilting fillet which is placed on the roof on each side of the chimney. The saddle or cricket is formed in usual manner, and the outer edge of the flashing should be dressed

over a tilting fillet which is continued around from the side of the chimney.

Each piece of tile should be carefully fitted around the flashing. The top of the course of tile which passes in front of the chimney is laid under the apron. At the sides of the chimney, the ends of each course are cut parallel to the

sides of the chimney and allowed to project over the tilting fillet one-half of an inch. A similar arrangement is made with the first course which passes behind the chimney. Thus, after the roof has been tiled we have this narrow margin of flashing around the junction of the tile-covered surface and the chimney.

At the ridge piece a circular section ridge tile is suitable and each of the cover tiles are scribed onto the curved surface.

After all of the tiles have been fitted the ridge tile should be bedded and the junction of the cover tiles with the ridge should be well pointed.

Churches Without Steeples

ONE of the noticeable features of modern church design is the absence of the steeple. It has not been long since a church building was not considered completed until a steeple or long, tapering spire capped the belfry. The steeple was held to have a certain religious significance, in that it pointed toward heaven and thus expressed the constant direction of the thoughts of true believers. Also, from the fact that the church steeple usually overtopped every other building

some building ordinances have gone so far as to absolutely prohibit the erection of steeples or tall spires on churches or other buildings.

This may seem a rather extreme stand to take, especially in view of the fact that properly installed lightning conductors—or lightning rods as they are also called—will almost, if not entirely, overcome this danger. The Washington Monument is a case in point; this 555-foot shaft has been struck repeatedly by light-

unnecessary to dispense with steeples because of the danger of lightning. There are, however, other objections to steeples in that they are usually difficult and expensive to build and their upkeep is quite an item. These objections have forced steeples into the background.

The accompanying photographs illustrate two recently built churches without steeples. In Figure 1 the suggestion of the steeple is retained by the use of two spires at each side of the front. These,



Plate 1



Plate 2

Plate 1—A Cleveland, Ohio, church building of brick with terra cotta trimmings with a parish house finished with stucco and half-timber work. Plate 2—A Harrisburg, Pennsylvania, church building built of split stone with cut stone trimmings

in the community, it expressed the domination of spiritual affairs.

Aside from religious considerations, steeples added certain picturesque qualities to the churches and rendered them highly distinctive.

Several factors, however, have combined to render steeples almost obsolete. Chief among these, perhaps, is the fact that they offer such convenient targets for lightning. The most of us can readily recall any number of instances in which steeples have been struck by lightning. In most cases this meant more or less expenditure of time and money in repairing the damage, and in other cases resulted in the destruction of the church itself, sometimes accompanied by loss of life. On account of these dangers, however, but owing to its excellent system of lightning conductors no apparent

damage has resulted. Some years ago the country was infested with agents selling lightning conductors. These agents were in many cases entirely unscrupulous and untrained men whose only concern was to "get the money." This practice resulted in the lightning conductor industry coming into disrepute, which was difficult to overcome. However, it is now possible to obtain high-grade lightning conductors, or rods, which if properly installed will give efficient protection. There is nothing extremely difficult to understand about lightning rod installation, and any builder who obtains the local agency for a first-class manufacturer will receive full information regarding the proper installation of the equipment.

Considering the efficiency of lightning conductors of high quality, it is really

however, are too small to be dignified by being called steeples. In Figure 2 the steeple has been entirely eliminated and not even a belfry has been retained.

Buildings Suited to Our Needs

Commenting on the adaptation of classic architecture to modern uses, Mr. W. D. Cromarty, in a paper read before the Royal Architectural Institute of Canada, stated: "I can remember a post office in the United States and an interview with a man in the street regarding it. He said, 'It's Greek, ain't it?' I admitted that we might call it that. 'Well,' he asked, 'did the gol-darn Greek have to drag himself up a hundred steps every time he wanted to buy a two-cent stamp?'"

Small House Design

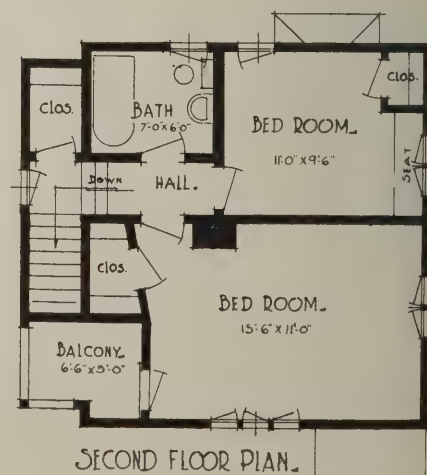
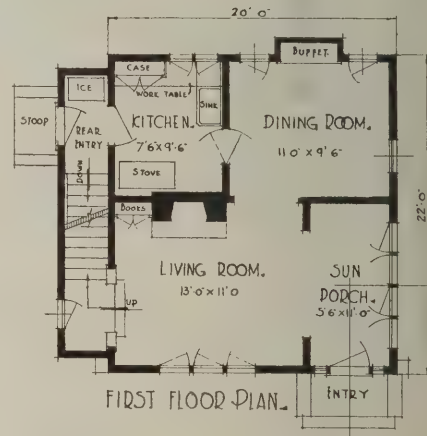
By Eugene R. Shulz, Architect

WE are too ready to believe that the principle of the "ready-made" article, which has been applied with efficiency to numberless things we need, can with equal success be applied to our homes. One has only to look about in any typical community to realize the futility of the method. When a man builds the house that is to be his home, it should be as much an expression of himself as is possible. He builds it usually with the intention of having it for the rest of his life.

Wholesome beauty, practicability, and stability. These are the elements which should be given first consideration by all who contemplate building. To a great many people there is, unfortunately, an idea of greater cost associated with any building well designed and planned over one that is not. Wholesome beauty and practicability does not mean grandeur and expense, but it does mean that the house be so planned and designed that it will adequately meet the needs and individuality of the family which is to occupy it.

That there is a shortage of homes is quite obvious; and with the high cost of materials and labor to combat, the home-builder is confronted with a serious problem. We must continue to build in spite of this added burden, but

through a process of elimination our homes must be planned so as to elude all unnecessary expenses and yet retain the comforts and conveniences which every home should have. Labor and



materials must be reduced to a minimum and skillfully handled. The answer is The Small House.

In the design of a house there are two problems involved: the arrangement of the rooms or the plan, and the treatment of the exterior, or the elevations. The plan is the first to be considered; it is in general the more important. Here the various needs of the owner are provided for; the exact number and size of rooms, location of stairs, bath, chimney, etc. With a well-studied plan, the elevations naturally take a pleasing form, providing the problem is intelligently handled.

The keynote of the small house should be simplicity, both in plan and design. Emphasis should be given to the rooms that are lived in, making them as large as possible and reducing to a minimum space used for halls, stairs and passages. This space allowed in a large house is unnecessary in the small one. The plan should be so arranged that in a compact and restricted area access can be given to all the various parts of the house, as entrance, living room, kitchen and second story while maintaining the privacy of each and avoiding making a thoroughfare of any. The flexibility of a small house is much increased by throwing the living rooms together as far as possible. No matter how small the family, there are many times, when, for social purposes it is necessary to have a large room. This arrangement does not interfere with the proper fulfilling of the separate functions of living and dining room. The economy of throwing the space of the two together is obvious. The necessity of separating guests from the confusion of elaborate service does not exist in the small house. Such separations as might occasionally be needed can be easily effected by the use of a screen. Small rooms, each capable of being cut off from the other, is an arrangement no longer necessary.

In a small house where one does one's own work, added steps, inconvenience in getting at implements and materials and waste of space should be avoided. A small kitchen properly arranged with cupboards on the walls is not only an economy in the building but a most desirable arrangement for the housekeeper.

In the exterior of the small house the chief requirement for a good architectural effect is simplicity. This, as a rule, is difficult to appreciate by many. Good architecture is not a matter of expense; it depends entirely upon the exercise of good taste and the selection of appropriate materials.

To have a house that is good in design and plan requires the services of one trained in this line of work. True, this means an actual expenditure of money for plans, but the amount saved

through a good set of plans will be far in excess of the price paid for the drawings. It is well to remember this: It is not what you pay for architectural service that is the real consideration, but what you get. Because upon your plans depends entirely the proper or improper expenditure of your entire building funds.

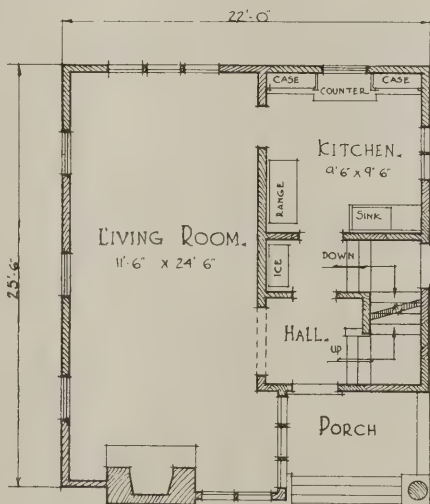
your own individual and personal ideas into a bright, original and cheerful home.

Houses Number 1 and 2 are adaptations from the same plan. The arrangement shows the successful results brought about by skillful planning. Though only 20x22 ft. in its main dimensions, this limited area provides more house than is ordinarily obtained

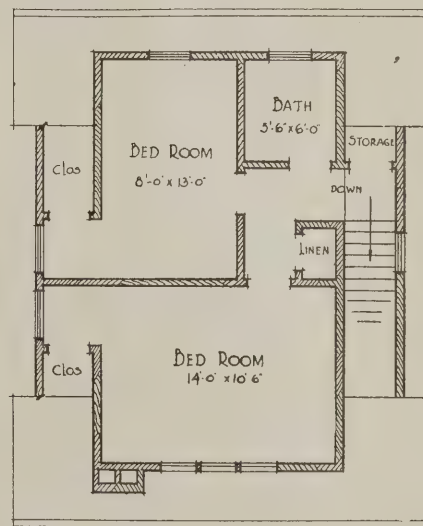


EUGENE R. SCHULZ
DESIGNER

HOUSE No. 3



FIRST FLOOR PLAN



SECOND FLOOR PLAN

One may have his own notions about law, nevertheless one would not jeopardize his interests by acting without the advice of a competent lawyer. One may have his own notions about the treatment of illness, but it is only the foolhardy who refuse the skill of a physician. And so one may have his own ideas about the plan of a home, but he makes a serious and lasting mistake if he does not employ the skill of a designer. The trained designer will work

in a larger house. The exteriors, as illustrated, are good examples of unaffected design. The proportions are good and the general treatment pleasing. In House No. 3 only the necessary accommodations are provided for.

These houses can be built in the materials suggested or the construction can be varied. Most house plans are fairly flexible in the matter of minor changes and these can be made without affecting the general appearance of the houses.

Porches

By A. Benton Greene

(All rights reserved)

THE porch is a universal feature of and an essential adjunct to a country house. In most cases it is placed at the front of the house, and because of this conspicuous position it should receive more than ordinary consideration. The architect should study it from an aesthetic as well as a utilitarian point of view. Too often the designer just "sticks" the porch on, giving no thought to harmony in the unity of the design. A porch should form an integral part of the design of a building. The color scheme that is adopted for the body of the house should obtain also for the porch. Similarly with details and materials. To take a case in point. Where a brick porch is used in a stucco covered building, that part of the foundation wall which is above grade, as well as the sills and lintels of windows, and perhaps the chimney, may also appropriately be finished with the same material; so that when your eye strikes the brickwork of the porch, it will be carried along the foundation wall and upward to the sills, lintels and chimneys, thus tying the whole into one homogeneous mass.

The artistic massing of a porch, although important, is subordinate to its construction. However, when a porch is said to be beautiful, it is predicated upon the assumption that it is substantially and properly built, for beauty and utility must always go hand in hand. We shall therefore in this article devote the greater part of it to a consideration of the more important points and the most common structural features of a porch.

In the first place there is the framing of the floor. In a wood porch the joists (A) should be set parallel to the house, so that the floor boards may be laid at right angles to it. The joists are supported on girders, one end of which rests on the foundation wall and the other on a brick or other masonry pier (B). Not infrequently wood posts are used instead of masonry piers, but they are not so desirable as the latter.

As before stated, the flooring of the porch is laid at right angles to the wall of the house. This is done so as to allow the floor to pitch outward from the wall of the house, one-eighth of an inch to the foot being a most satisfactory inclination. Fir, white pine and cypress, 1½ in. x 4 in., are the most common woods used for porch floors. In laying them care should be taken to run all the joints in white lead and to drive the tongues well in place.

The edge of the flooring, on all exposed sides, is rounded off to form a nosing (C) and a cove moulding (D) is placed under-

neath. Under the nosing and completely enclosing the porch joists is placed a ¾-in. casing, about 6 in. wide (E). C, D and E together form the water-table, so called because it helps to shed the water away from the foundation walls of the house. The space between the brick piers is fitted with a frame of ¾-in. pine board, 4 in. wide. In this frame is set either a wood panel (F), or lattice work. The latter is built up of ¼-in. x 1½-in. strips set 1½ in. apart, or, if a better job is desired, of ¾-in. x 2½-in. strips halved together, with spaces 2½ in. square.

The treads of the front steps are usually made 1½ in. thick and should be built of slats (three are sufficient), with ¼-in. or ⅜-in. spaces between them, to allow for drainage. The treads are almost invariably finished with rounded nosing and a cove under. Risers ⅞ in. thick are sufficiently strong for ordinary purposes.

The columns may be solid, but if they are more than 6 in. in diameter it is best to build them up, to prevent checking or cracking. The caps and bases are made from separate pieces of wood and may be made as elaborate or as simple as one wishes. The half post or pilaster (G) is placed against the wall to give a finished appearance to the columnar design of the porch. It is finished with cap and base, exactly the same as the full column in front. It is exceedingly good practice, in order to prevent rot, to thoroughly soak the ends of all porch posts or columns with white lead.

The railing between the columns consists of an upper rail, a lower rail and a series of balusters. The upper rail (H) is moulded and ramped and is here shown wide enough to act as a shelf for a flower pot or as a seat. Ordinarily, rails less than 4 in. x 4 in. are stuck from one piece; when larger, they are built up. The lower rail (J) has one small feature that is especially interesting. It is the small projecting piece of wood (K) at the rear. This piece has a double function. It not only insures perfect alignment of the balusters, but also acts as a water table. In order to facilitate sweeping, the bottom rail should be kept 2 in. from the floor, supported at intervals of four or five feet by small wooden blocks which prevent the rail from sagging. The balusters, which partly fill the void between the upper and lower rail, may be made square, but those which are rectangular in section present a better appearance. For ordinary buildings the dimensions shown in the accompanying drawing (L) will do. If a neat and less expensive railing is desired the balusters may be made ⅞ in. x

1¼ in. or ⅞ in. x 1½ in. set any convenient distance apart.

The balustrade around the roof of the porch is built the same as the lower balustrade, except that the lower part of the pedestals is thoroughly flashed. The outer ends of the 2-in. x 6-in. porch rafters rest on a 4-in. x 6-in. girder, which in turn is supported by 2-in. x 4-in. upright studding. The 2-in. x 4-in. shoe (M) acts not only as a plate to these studding, but also provides a nailing surface for the finishing timbers of the lower part of the cornice, both interior and exterior. The cornice shows a box cornice, which is formed as follows: A series of lookouts is nailed to the ends of the rafters. The silhouette of these lookouts or brackets is made to approximate the outline of the surrounding mouldings. The upper part is then cut out to form the gutter. The lookouts are gradually made wider as they approach the high point of the gutter, thus obtaining a uniform pitch to the leader outlet. The lookouts are then covered with sheathing and the surface lined with tin, copper or other suitable metal.

Getting Down Clay in Winter

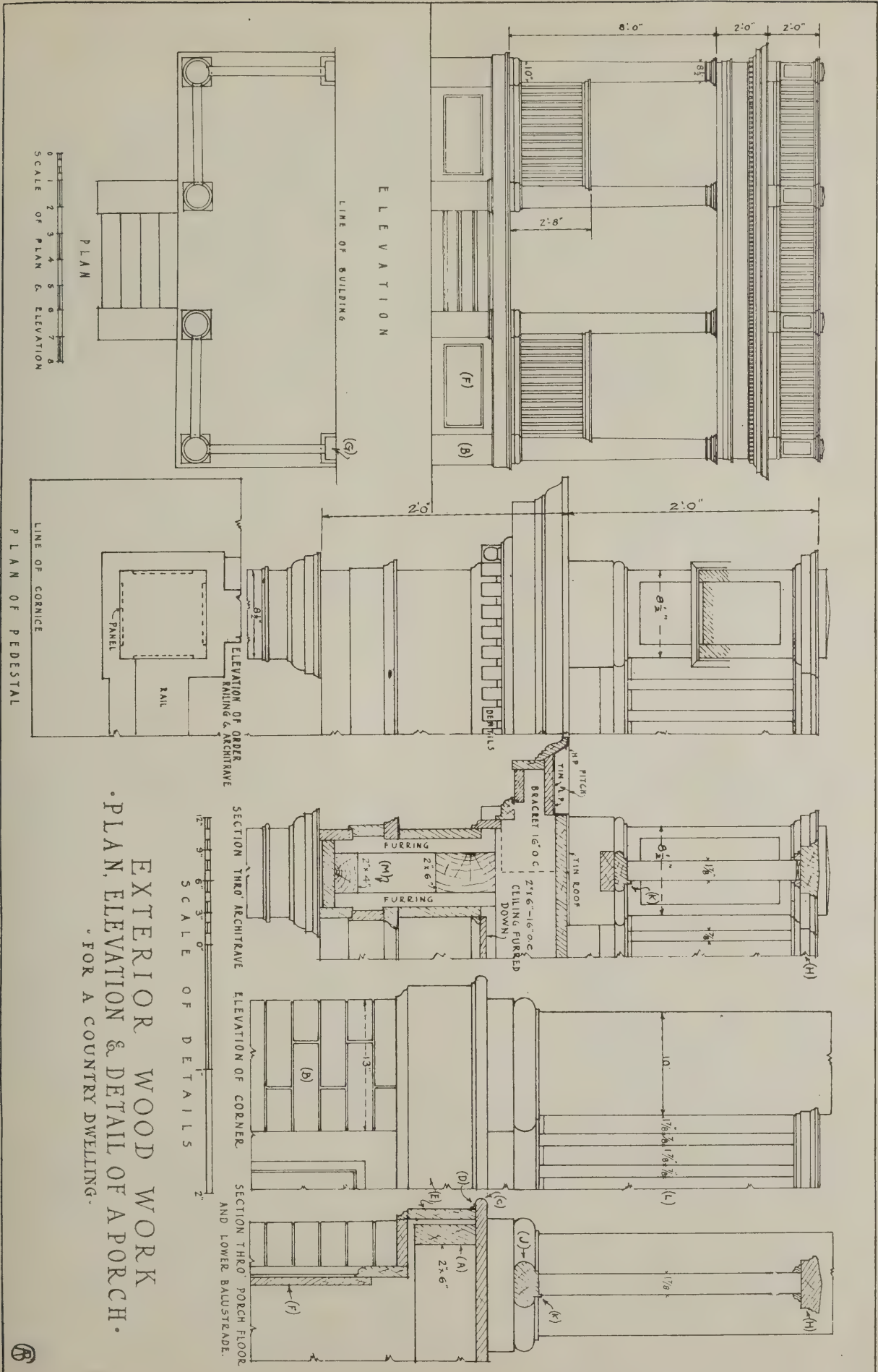
Builders and contractors are finding that a little dynamite saves a lot of time and labor when it comes to getting down frozen clay.

Charges are placed somewhat the same as in quarries. A row of vertical holes is put down to pit floor grade, a few feet back from the face. The amount of dynamite used depends on the height of the face, usually the holes are about two inches in diameter. The sticks of dynamite are dropped down them, so that resting end on end, the bore hole is filled to within one to three feet of the top, the hole is then tightly tamped to the surface.

It is advisable to use electric blasting caps and blasting machine to fire the charges, because the cumulative effect thus obtained produces better results than is possible when holes are fired one at a time with cap and fuse.

In a recent test in a clay pit one man working as described, was able to get down as much clay ready for loading on wagons as six men working with picks could do.

This was considered important in view of the present scarcity and high wages of labor.



ENTRANCES

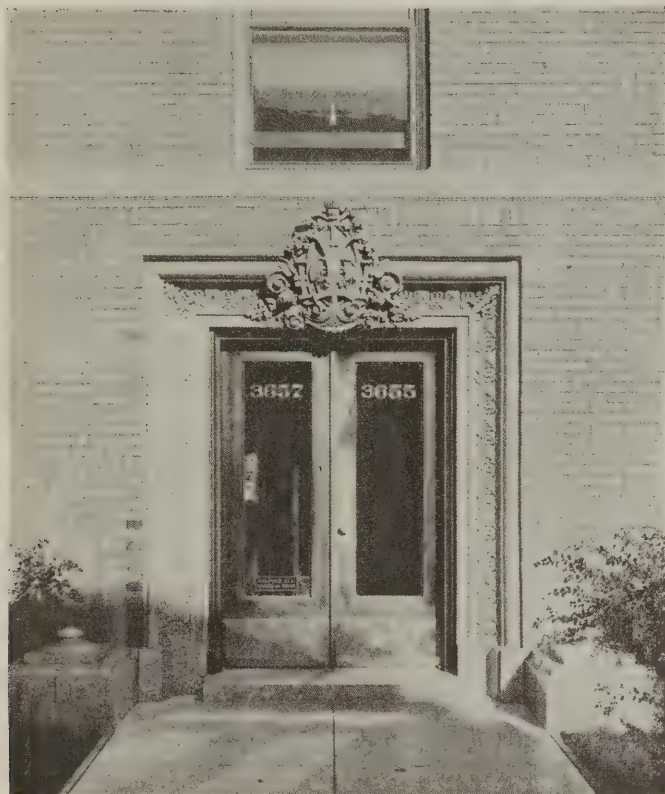


Plate 1—An entrance to a large apartment house. This is an ultra modern treatment in granite face terra cotta

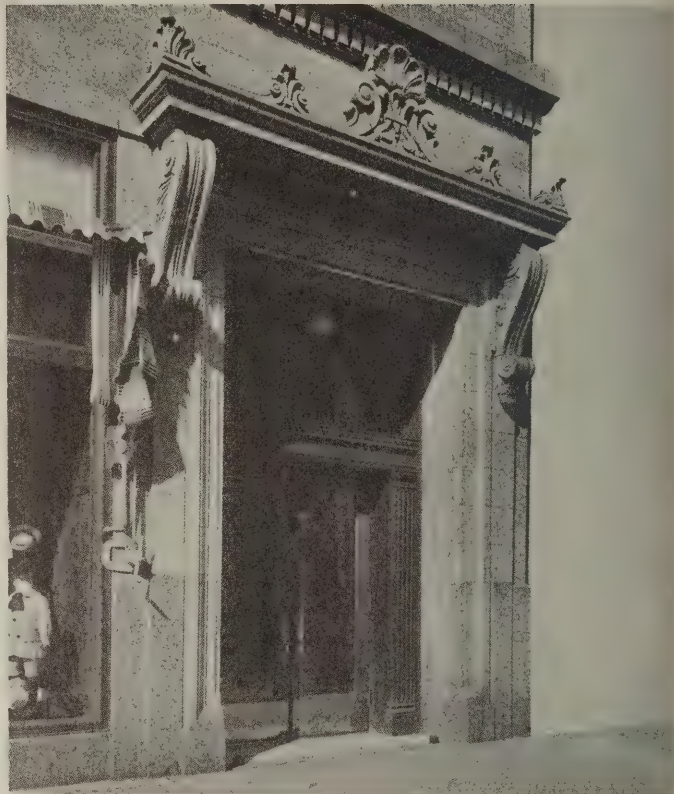


Plate 2—An office building entrance also in granite faced terra cotta. A very clean-cut and effective piece of detailing



Plate 3—The entrance to the Builders' Club at Milwaukee, Wisconsin. A dignified and appropriate design in limestone



Plate 4—Another apartment house entrance. There are too many different kinds of detailing around the windows

Representative Buildings



Plate 1—Y. M. C. A., Harrisburg, Pa.



Plate 2—Church, Pittsburgh, Pa.



Plate 3—Church, Pittsburgh, Pa.



Plate 5—Residence, Davenport, Iowa



Plate 6—Bank, Kenosha, Wis.



Plate 7—Residence, Chicago, Ill.



Plate 8—Residence, Battle Creek, Mich.



Plate 9—"Movie," Waukegan, Ill.



Plate 10—Residence, Pittsburgh, Pa.



Plate 11—Store and flats, Chicago, Ill.



Plate 12—Residence, Davenport, Iowa

Profitable Winter Work

THE slack season or winter months offer an excellent opportunity to builders for laying new floors in homes where old worn floors are in use. Some canvassing is necessary to secure jobs, when the work is started the entire neighborhood soon hears about it. A few floors laid in any neighborhood will bring about an abundant supply of jobs. New flooring can be laid in a room without disturbing any of the woodwork except the quarter round at the baseboard, and one room at a time can be laid and completely finished without disturbing the occupants to any great degree.

There is many an old house today that remains unrented because the old floors look very shabby and uninviting. If the owners of these buildings would lay new flooring over these unsightly old floors it would undeniably make a splendid investment. It would attract a better class of tenants or buyers, and would increase the renting or selling values. Astute landlords invariably emphasize hardwood flooring in the daily papers when they offer their house for rent or for sale. This gives the impression that the house is modern, and that all the other material used is of a high class standard.



Plate 4—"Movie," Madison, Wis.

The average home builder and even contractors are very often misled in regard to prices on flooring. Comparative prices clearly indicate that first class hardwood flooring is by far cheaper than

carpet. In fact, if you will take the trouble to find out the local prices on say, a good grade of Brussels carpet and compare its cost with the very best grade of $\frac{3}{8}$ -inch thick clear, plain white oak flooring,—using the same size room as a basis,—it will be found that the flooring can be bought, laid, scraped and finished for just about half the cost of the carpet. If $\frac{13}{16}$ -inch thickness clear plain white or red is used, about 30 per cent more will cover the cost of same, when compared with the $\frac{3}{8}$ -inch thickness. The $\frac{13}{16}$ -inch thickness is used chiefly in new buildings, whereas the $\frac{3}{8}$ -inch is used extensively for remodeling old houses that have old floors.

Builders taking up this class of work should have complete information in regard to the different kinds and faces of flooring, as well as the proper methods of laying the floor. Your local lumber dealer has free booklets and folders covering these points, as well as the filling and finishing with varnish or wax.

There has been many a builder during the last few years who has taken up this line of work as a sideline, and who has developed into a specialist of laying floors in new homes, as well as remodeling and improving old homes with new flooring.

Plan Reading and Estimating

By DeWitt C. Pond, M. A.

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ESTIMATING for the excavation for a garage was completed in the February issue. In that work, however, no cost had been allowed for material nor was there any allowance made for carting as the earth which was removed could be deposited on the lot.

Under the next item of concrete work both labor and material must be considered. On the calculation sheet under the heading of "Sub-Contracts" enter the words "Concrete Work—Walls." In the second column under "description" the following explanation can be made: Trench walls one foot wide, four feet six inches high. Mixture—one part Portland cement, two parts sand to four parts broken stone. Also in this column, although this might be entered in the calculation column, the prices are tabulated and the following arbitrary prices will be used: Cement, \$3.45 per barrel; sand, \$2.25 per cubic yard; stone, \$3.50 per cubic yard. As in the previous estimate for excavating the labor rate will be established first. Considering that one laborer will lay one-sixth of a cubic yard per hour and that labor is getting 60 cents per hour it would cost \$3.60 to lay a cubic yard. The next item is the number of cubic yards of concrete needed. The rear wall is 17 feet long, 1 foot thick and $4\frac{1}{2}$ feet wide and contains 76 cubic feet. The two side walls are 21 feet long, 1 foot thick, $4\frac{1}{2}$ feet high and together contain 189 cubic feet. The two small sections at the front measure 1 foot by 1 foot by $4\frac{1}{2}$ feet and together contain 9 cubic feet, making a total of 10 cubic yards.

The next item to be considered is the cost of a cubic yard of concrete. Some estimators figure this as a lump sum and this is good practice when speed is necessary, as it almost always is, but in the present articles the author feels that an explanation of every item should be made and that the cost per cubic yard of concrete should be explained in detail.

Referring to the handbook published by the Atlas Portland Cement Company, it will be found that in order to mix one cubic yard of rammed concrete mixed in the proportions of one part concrete, two parts sand to four parts of stone, the following quantities of coarse and fine aggregate are necessary: 1.58 barrels of cement, 0.47 cubic yards of sand, 0.94 cubic yards of stone. Figuring at the prices given in the column headed "Description" the cost of the ingredients of

a cubic yard of concrete will be \$3.45 multiplied by 1.58 equals \$5.45 for the cement. \$2.25 multiplied by 0.47 will give \$1.05 for the sand. \$3.50 multiplied by 0.94 gives \$3.29 as the cost of the stone; making a total of \$9.79 per cubic yard of concrete. Under the total quantity column ten yards is entered, under the unit cost \$9.79 and the cost of material will be \$97.90.

The next item is the labor cost. The unit labor cost being \$3.60 the total cost

the methods of applying the finish may differ. In this particular case the architect has not specified that the cement finish shall be laid before the concrete has set. Therefore, it will be possible to lay the concrete and finish up this job before applying the finish, which is a less difficult problem than when the concrete and the finish have to be laid almost simultaneously.

The rate for labor to lay the concrete will be considered as ten square yards per day per man. This will be the work of laborers at 60 cents an hour, so that it will cost \$4.80 to lay ten square yards. The rate, therefore, per square yard will be 48 cents. It will be noted that all calculations for floor laying are figured on the basis of square yards, the architect or contractor reducing all figures from the cubic yard basis to the square yard basis by multiplying the cubic yard cost, or the labor items, by the fraction five-thirty-sixth, it being borne in mind that the concrete is five inches thick.

For laying the finish the rate will be determined on the basis of a finisher at \$8 per day and a laborer at \$4.80 per day, laying 56 square yards of finish 1 inch thick in a day. This will make a rate of 23 cents per square yard. The total labor cost per square yard then will be 71 cents per square yard of concrete and finish.

In order to determine the cost of the concrete and finish per square yard the following calculations are necessary. By referring again to the handbook of the Atlas Portland Cement Company it will be found that for one cubic yard of plastic mortar of the proportions one part cement to one and one-half parts of sand there will be required 3.87 barrels of cement and .76 cubic yards of sand. At these proportions the cement in a cubic yard of mortar will cost \$3.45 multiplied by 3.87, or \$13.25. The sand will cost \$2.25 multiplied by .86, or \$1.93, making a total of \$15.18 for a cubic yard of mortar. As this is laid on one inch thick the cost per square yard will be one-thirty-sixth of this, or 42 cents. The concrete being five inches thick will cost five-thirty-sixth of \$9.79, or \$1.36 per square yard. The total cost then for concrete and finish will be \$1.36 plus 42 cents, or \$1.78. All that remains now is to tabulate this in the proper columns. Under Total Quantity will be placed the figure of 40 square yards; under Unit Material Cost will be placed the figure of \$1.78, which has just been determined,

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Refer to the garage
elevations and
plans in the first ar-
ticle of this series in
the February issue,
of which this article
is a continuation.

.....

of labor for laying ten yards will be \$36. Under the insurance column the rate is given as \$2.07 for every hundred dollars of pay roll, making 74 cents, which must be allowed for insurance. The next item is for floor and finish and in the description column will be placed the following: Five inches concrete, one inch finish, proportions of finish one part cement to one and one-half parts sand. It might be noted that this particular mixture is richer than ordinary, in many cases cement finish being specified as one part cement to two parts sand.

Under "Calculation" two rates of labor must be taken into account: First, the rate of labor for laying the five inches concrete and second the rate of labor for applying the top finish. The first item is easy enough to determine, but the second is somewhat of a problem, as

making a total cost of material for concrete and finish \$71.20, which is listed in the next column. The labor for laying both the concrete and finish has been determined as 71 cents, making a labor cost of \$28.40. Insurance is still \$2.07, as before, making this item 57 cents:

The next item to be considered in our estimate list will be the Carpentry, which will also include Millwork and Glazing. Before going into this item perhaps a few words should be given to the subject of plan reading. To the contractor who has dealt with blue prints and drawings all his life this subject offers very few difficulties. However, it must be realized that a plan means something more than a mere outline of rooms or a mere elevation, for from the plans and elevation must be obtained the kinds and quantities of materials that enter into the construction of a building. In this connection both the plans and the specifications, which are contract documents, must be considered together.

Some specification writers do not approve of showing any kind of materials on the drawings, assuming that the drawings give dimensions only. They prefer to have all information pertaining to materials found in the specifications. If this is the case the contractor must very carefully read through the specifications in order to find such information as was given in Article 1, where materials in the building were listed. He will find by a search of the specifications that the materials used in walls, flooring, etc., is wood. He will also find the size of timbers required, and then, going to the plans, he will take off the quantities necessary for the complete construction of the building. He will then make out a complete list to be sent out for competitive bidding. The author realizes that this is not always done, as contractors often place in the hands of the mills merely the plans and specifications, asking them to make out a material list from these and to give prices. This is by no means a good practice and it is far better for the contractor to make out his own list, which is not a difficult thing to do. The number list for this particular garage is given below:

Sills—4x4—1/20—1/4—2/22 spruce.
Plates—2x4—2/20—4/22 spruce.
Studs—2x4—60/8 1/2—15/14—34/4 spruce.
Rafters—2x8—40/16 spruce.
Rafters—2x4—6/6 spruce.
Ridge—1x12—1/22 spruce.
Floor Beams—2x10—20/20 spruce.
Sheathing—7/8x8—1000 B. M. N. C. pine.
Shingle lath—1x2 in.—1,965 lineal feet spruce.
Shingles—6,000 18 in. random width, cedar.
Ceiling—7/8x8—44 lineal feet N. C. pine.

Ceiling 7/8x4—44 lineal feet N. C. pine.
Ceiling—7/8x2 1/2 T. G. & B. 59 feet B. M. N. C. pine.

Verge board—7/8x3—68 lineal feet N. C. pine.

Clapboards—1,100 feet B. M. redwood.
Flooring (under)—1x6—410 feet B. M. N. C. pine.

Flooring (finished)—7/8x2 1/2—265 feet B. M. clear maple.

Base—7/8 in. x 6 in.—75 lineal feet N. C. pine.

9 window frames and sash as per detail.

7 pair blinds as per detail.

1 garage door, as per specification.

1 1 3/8 in. interior door 2 ft. 8 in. x 7 ft. (5 panel).

Stair material as per plans and specifications.

In order to make this list clear an explanation of each item is necessary. It will be noted that the first item is sills. Under the side walls of the garage and resting upon the concrete foundation walls there will be placed 4x4 in. spruce sills which are halved at the ends. One sill will be placed in the rear of the building, one at each side and two small sections at the front. The sill at the rear will be cut from a 4x4-in. twenty feet long; the two on the sides can be cut from two 4x4 in. each twenty-two feet long, whereas the little sections at the front would require one 4x4 in. four feet long cut in half. The plates on top of the studs can be made up of either 4x4 in. or 2x4 in. spiked together. If two 2x4 in. are used we will require two twenty feet long and four twenty-two feet long.

It will be noted that no plate has been called for at the front of the building. This is due to the fact that across the head of the door two 2x10 in. will be used and these will be listed with the floor joists later.

The next item will be the Studs, including bridging. Referring to the specification it is found that the studs are 2x4 in. spruce timbers, and according to the drawings it will be found that they are eight feet six inches long. In order to determine the number of studs in a given length of wall it is only necessary to multiply the length by the fraction three-fourths.

In the present case, the garage being twenty-one feet by nineteen feet outside dimensions with a fifteen-foot door in the front, the entire length around the building will be sixty-five feet and the actual number of studs necessary will be forty-nine.

It might be noted at this point that many contractors figure all side walls as solid and would not allow even for the large door at the front of the garage, but in this particular case the door is so large that it is considered better to make allowances for it. On the other hand all

studs are doubled at the openings and corners and therefore it would be wiser to order from the mill sixty 2x4-in. studs eight feet six inches long.

The studs at the gable ends of the building are figured as though the gables together formed one rectangle with a height equal to the height from the plate to the ridge and the width equal to the width of the building. In this case the height will be fourteen feet and the width nineteen feet. From this it can be determined that there will be eleven studs fourteen feet long, and here again a number are added for safety's sake, so that fourteen studs are ordered.

For the interior partitions on the second floor a number of studs will be needed. Judging that the chauffeur's quarters extend the entire length of the building there will be fifteen spaces or sixteen studs on either side, making a total of thirty-two studs four feet long. It will be noted that on the lumber list thirty-four are ordered.

The next item on the list is that of rafters, which is not difficult to understand as the length can be taken by scaling the length at the gables and the number can be obtained by determining the length—in this case, twenty feet—and multiplying by three-fourths and then by two. The fraction three-fourths is the same as used in determining the studs, which are placed sixteen inches on centers. This would actually give a figure of fifteen spaces or sixteen rafters on each side, making a total of thirty-two rafters on both sides, but as these are doubled at the dormers it is safe to order forty. The rafters over the dormers are 2x4 inches and the number can easily be determined. The ridge is naturally deeper than the rafters—in this case a 1x12 in. ridge is ordered, which is twenty-two feet long. The number of floor beams can be determined from the number of rafters. As these beams are specified sixteen inches on centers there will be one-half as many beams as there are rafters, or twenty, allowing for waste.

Sheathing is, of course, determined by first obtaining the number of square feet in the sides and ends of the building. Assuming that the sides are eight and one-half feet high and twenty-one feet long, there will be in each side wall approximately one hundred and eighty square feet, making a total of three hundred and sixty square feet in the two walls. In the rear wall underneath the gable there will be one hundred and sixty-one square feet, and in the small sections at the front wall, left by the door, there will be approximately thirty-four square feet, making a total of five hundred and fifty-five square feet for the walls, and the total number of square feet, including the areas of the gable

ends, will be eight hundred and twenty-one. It is usual to add twenty per cent for waste—in this case, one hundred and sixty-four square feet—making a total number of square feet of sheathing of nine hundred and eighty-five, or say one thousand feet board measure.

Shingle lath is ordered by the lineal foot. The garage is twenty-one feet long and the shingle strips are placed five inches on centers. The distance on centers is determined by the exposure to the weather of the shingles—in this case the shingles are exposed five inches to the weather. There will be thirty-eight spaces, or thirty-nine shingle laths, on each side of the roof, making a total of seventy-eight laths on both sides, which, when multiplied by twenty-one feet in length will give 1,638 lineal feet. However, one-fifth is usually added for cutting, making a total of 1,965 lineal feet.

Shingles are next determined on the basis of seven hundred and fifty shingles to each square of roof, making the overall figures for the roofing, including overhang, as 17x22 feet. The total number of squares is 7.48, at 750 shingles per square, would be 5,600 shingles. In this case 6,000 shingles are ordered.

Ceiling can be ordered by the lineal foot or by the square foot. In this case certain ceiling will be needed at the eaves as indicated in the elevations, eight inches underneath and four inches at the side. The total length of each type of ceiling is forty-four feet, as shown. There will be a certain amount of ceiling around the stairwell which will be tongued and grooved and beaded, and computation will show that fifty-nine feet board measure will be necessary.

The verge board is an easy matter to compute as it will only be necessary to determine the length at the gable ends; the size is given in the specification. The number of clapboards is determined by first obtaining the number of square feet in the sides and ends of the building. Assuming that the sides are eight and one-half feet high and twenty-one feet long, there will be in each side wall approximately one hundred and eighty square feet, making a total of three hundred and sixty in the two walls. In the rear wall underneath the gable there will be one hundred and sixty square feet, and in the small sections at the front wall left by the door there will be approximately thirty-four square feet, making a total of five hundred and fifty-five square feet for the walls.

The gables can be taken as a single rectangle as was the case in finding the amount of sheathing needed. In this case the same number of square feet of superficial area, or 821 square feet, will be found. Practice varies as to the amount to be added for waste and cut-

ting but the author feels that a figure of one-third is proper, which would make a total of 1,100 feet board measure, which should be ordered for this item.

Another item to be considered is the North Carolina pine base, which is used in the chauffeur's quarters, and of which there will be seventy-five lineal feet, or 37 board feet. This number of feet can be easily determined by taking the figures off the second floor plan.

The only other two items that remain to be figured are the under and finished flooring and these amounts can be determined easily by determining the number of superficial feet of flooring as shown on the plans, and add fourteen per cent to this figure for the under flooring, and twenty-five per cent for the finished flooring.

Remember that the prices and costs given in this series are not accurate market or wage prices. The prices here used are for the purpose of illustrating how to go about plan reading and estimating.

The limits of this article do not permit of much further explanation of the reading of plans and the taking of quantities or estimating the cost of same. A few examples of the estimating of both cost of labor and material for the various items will be given and the costs can be figured in a similar manner. For instance, taking the matter of sills—the amount shown on the list is one sill twenty feet long, and two sills twenty-two feet long, and one four feet long. The sills measure 4x4 in. The term "board measure" assumes timber one foot square on the surface and one inch thick. Timber which measures in cross section 4x4 in., may be considered as cut up into four pieces each one inch thick and four inches wide. If the pieces then are laid side by side the distance across will be sixteen inches and the depth one inch,

and for every foot of length there will be one and one-third board feet, and it can be calculated that from the sixty-eight feet of sill there will be ninety-two board feet. The reason for reducing these sills to board feet is that the mills always figure the price in this measure. In this particular case, spruce sills will be charged at the rate of \$72 per thousand feet board measure, making a total for the sills of \$6.72. Two-by-fours, which are used for plates, are just one-half as thick as the sills and therefore instead of containing one and one-third board feet for each foot of length, they contain two-thirds of a board foot for each foot of length.

In order to get the number of board feet required for the plates it is only necessary to add the length wanted and multiply by two-thirds. Referring to the list it will be noted that there are two wanted, twenty feet long, calling for forty lineal feet, and four twenty-two feet long, calling for eighty-eight lineal feet, making a total of one hundred and twenty-eight lineal feet. Two-thirds of this figure will give eighty-six board feet as the quantity to be ordered.

In the same manner the board measure of the studs is figured. The object of figuring the sills, plates and studs separately is that the rate per board foot is different for different lengths and the cost of sills and plates is somewhat higher than the cost of studs, unless the studs are unusually long.

The next item is the labor cost and this is determined in the usual manner, the entire cost being reduced to the cost of erecting timber per board foot. In this case the cost will be found to be 31c a board foot and this figure will be placed in the unit labor column. Multiplying this by the number of board feet needed, the labor cost will be \$32.36. Insurance for this labor will be considered as \$12.07 per hundred dollars of payroll and in this case will be determined as \$2.32. The same methods apply for determining the cost of labor and material for all carpentry work.

In the same manner the lathing, plastering, painting and varnishing must also be figured along with the sheet metal work and heating, but it is impossible to go into each one of these conditions separately. Merely a summary of the results will be given, and the author requests that should the reader take it upon himself to check these results he will notify the author of his findings.

In the author's final sheet for listing estimates he has two sets of columns; one in which the material is listed, and the other in which labor is listed. In the column for materials the following items are given:

Granolithic Work (including concrete work)\$169.10

Metal Furring and Lathing.....	50.90
Plastering	42.18
Carpentry	819.55
Mill Work	170.66
Paint and Varnish.....	33.58
Roofing and Sheet Metal.....	26.90
Heating	125.00
Electric Wiring	50.00
Lighting Fixture	12.50
The labor items are listed as follows:	
Granolithic Work	\$ 64.40

Metal Furring and Lathing	15.34
Plastering	55.20
Carpentry	167.44
Mill Work	36.19
Paint and Varnish.....	36.24
Roofing and Sheet Metal.....	12.06
It will be noted that for electric wiring and lighting fixtures no labor item has been entered, as these contracts are sub-let and the cost of labor and material is given in the first column.	

The total of all items, including General Conditions, is \$2,125.10, and if a 10 per cent profit is added the cost of the garage would be \$2,337.60.

The author realized that he has perhaps figured low and that the cost of labor and materials vary, and therefore, would be very much interested to find out how the results given in this article check with the results found by men in different parts of the country.

Cutting the Cost of Form Work

ANY method that will reduce the cost of concrete form-work should receive the attention of progressive builders. A method that is becoming very popular for foundations and similar work is to make up the forms in units. That is, a framework is built of two-by-fours and covered with planks. The units are set up side by side on top of the footings and secured in place with braces and clamps in a manner similar to that used for ordinary form work. The units may be used over and over again and offer a means of saving both material and labor.

The units should be made of sound material so that repair work will be reduced to the minimum. The usual size of the units is four feet, six inches wide by six feet long. But where they are to be used in building basement walls for stores and other buildings in which the basements are entirely below grade, the units are made eight feet long.

The framework of the units should be made with two-by-fours placed about two feet apart with two-by-fours at top and bottom. The framework is covered with one-by-sixes, either matched or plain. The corners of the frames may be strengthened and made more durable by reinforcing them with bands of hoop iron. If the faces of the forms are



Plate 1—Wooden unit forms used for putting in a foundation for a store building



Plate 2—The old way of building forms for concrete foundations. Wasteful of both materials and labor



Plate 3

Plate 3—The start of a large housing development. The forms will be used over and over again. Note the wide runway for handling concrete from the mixer



Plate 4

Plate 4—Taking down the forms.

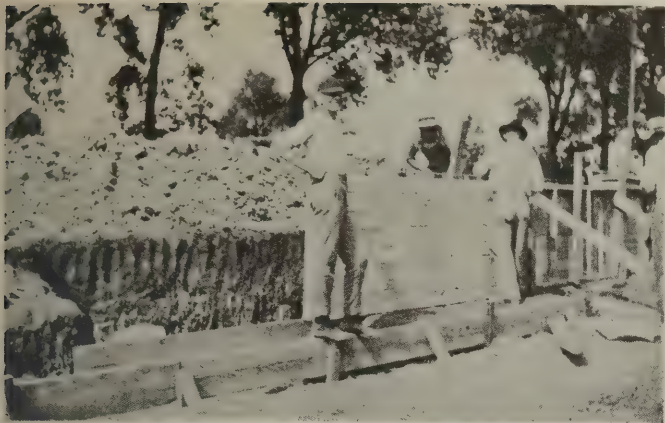


Plate 5



Plate 6

Plate 5—These forms will give trouble when they are taken down. They should be thoroughly cleaned before using. Plate 6—A generous coat of oil will prevent the concrete from sticking to the forms

coated with soap or oil before the concrete is placed the forms will come free easily and without damage to the work.

Metal forms employing similar principals are on the market. They are of course somewhat more accurate and will give longer service than wooden ones.

Iron Sticks in Concrete by Friction

The essential factor in the resistance exhibited by reinforced concrete resides in the adhesion between the iron and the cement. This adhesion is usually attributed to a sort of gluing action between the iron and the cement analogous to that between bricks and mortar. This is denied, however, by a recent experimenter, M. Vasilescu Karpen, who has just laid the results of his investigation before the Academy of Sciences in Paris, says the Scientific American.

If the cement employed in making reinforced concrete is poured upon a sheet of iron the adhesion observed is very much less than that exhibited in reinforced concrete. Moreover, it depends essentially upon the state of the surface of the iron. For example, if this surface is smooth and oily there will be no adhesion. Experiments made with bars of iron which are imprisoned, show on the contrary that there is adhesion between the iron and the concrete even if the bars are painted or oiled, though in this case there can evidently be no question of any gluing action.

Mr. Karpen is of the opinion that this solidarity is due to the friction between the iron and the surrounding concrete. He calls attention to the fact that the concrete contracts while setting; the bar of iron imprisoned within it is therefore gripped firmly by the contracted concrete, so that if an attempt be made to withdraw it it will be retained by friction. We are obliged to omit the elaborate calculations which the investigator employs to prove his point, merely stat-

ing his conclusions. He finds that the adhesion between the materials increases with the lapse of time just as the amount of contraction of the concrete does. While it is quite true that iron can also be glued to cement, this gluing action is not only slight and uncertain in amount, but can exist only through the contraction of the concrete and must cease if the latter expands even very slightly.

Mr. Karpen was led to undertake the study of this question by the observation of reinforced concrete works in the process of being demolished. He noted that

the concrete ceases to adhere to the iron unless the latter is entirely surrounded. As a general thing in the calculation concerning structures in which reinforced concrete is employed, no account is taken of the contraction of the concrete, since this factor is considered as being too uncertain. M. Karpen's theory, on the contrary, demonstrates that it is precisely this factor which produces the indispensable solidarity between the two materials, and shows the capital importance which must be attributed to the knowledge of the coefficient of contraction of the concrete.

Leveling Footings



A two-by-four laid alongside of a footing trench forms a good working edge for leveling off concrete

Modern Store Buildings

THE year 1920 should prove to be a record breaker in the construction of store buildings. The merchants are prosperous, most of them having just concluded the busiest year they have ever had, and all signs point to an indefinite continuation of boom times. The up-to-date merchant realizes the value of a modern and attractive business place. Many of them have for years been looking forward to the day when it would be possible to have larger and more modern quarters, and the present period seems to offer the opportunity to the most of them.

For this reason it behooves the live builder to give some thought and study to

solid panels to furnish a background for display purposes, it seems that top lighting by means of skylights should receive more attention than is customary. Of course, for stores housed in buildings more than one story in height, top lighting is seldom practicable, but for one-story buildings its adoption is recommended.

The fire regulations of most communities prohibit the use of wood for exterior use in business districts; therefore, only masonry walls will be taken up in this article. The exterior walls may be built of brick, concrete blocks, solid or reinforced concrete, or hollow tile. Roofs are usually flat and built of tar and gravel or prepared

if built of brick, and for three-story buildings the lower wall should be at least 16 inches in thickness. It should be remembered that a wall has considerable tendency to buckle and that although a thinner wall might be ample insofar as crushing strength is concerned, it is safer to provide against collapse by increasing the thickness. It should also be remembered that a comparatively thin wall, well built, is stronger than a thicker one, poorly built. The bricks should be well soaked—not merely sprinkled—in water just before they are laid, and cement mortar should be used where extra strength is required. All mortar should be protected against freezing until



Plate 1



Plate 2

Plate 1—The tile hood and the iron balcony of the building in the foreground relieves the "baldness" common to most store buildings. The interesting stucco and half-timber building in the background is well suited to specialty shop. Plate 2—A simple and attractive store and apartment building of brick with cut stone trimmings. The brickwork is laid in Flemish bond with a diaper pattern between the upper belt course and the coping

this subject. The planning of the average store building is probably the simplest problem that a designer meets; the size and cost of course varies, but the elements of the plan are simple and have but a few variations. Store buildings on corner lots, however, sometimes develop into quite complicated problems and require considerable study before a suitable scheme is found.

Plate 1 may be considered a typical example of the one-story store building. These are sometimes known as "tax-payers," from the fact that they are often built on valuable property that is being held for speculative or other purposes. By putting up a "tax-payer" the owner is assured some income during the time that he is waiting to put the property to its intended use.

The average store building consists merely of a rectangular box, the street side of which is glazed with plate glass. These windows are usually the only source of outside light and in view of the fact that this source of light is often obstructed by

roofing. The roofs are supported on plank trusses set about two feet on centers, and the ceilings are formed on their under side. Fireproof roofs and ceilings are made of thin, reinforced concrete slabs or of a combination of steel, gypsum block, or hollow tile fillers, with reinforced concrete joists. The combination type of construction is light and requires the minimum of form work. The top of concrete roof slabs is mopped with hot tar or asphalt and the roofing laid on this in the usual manner. Fireproof roofs involving long spans are usually framed with steel or reinforced concrete girders and beams on which the slabs are supported. Metal lumber is also recommended for fireproof roof framing. Ceilings are made of plaster on wood or metal lath, of sheet steel plates stamped in various patterns, or of ceiling lumber. Ceilings vary in height from 10 to 14 feet, or even higher, but 12 feet is the usual height. The walls for one or two-story buildings should never be less than 12 inches thick

if built of brick, and for three-story buildings the lower wall should be at least 16 inches in thickness. It should be remembered that a wall has considerable tendency to buckle and that although a thinner wall might be ample insofar as crushing strength is concerned, it is safer to provide against collapse by increasing the thickness. It should also be remembered that a comparatively thin wall, well built, is stronger than a thicker one, poorly built. The bricks should be well soaked—not merely sprinkled—in water just before they are laid, and cement mortar should be used where extra strength is required. All mortar should be protected against freezing until

it has set hard and the top of freshly laid work should be covered during rain storms. The surfaces of green walls exposed to driving rain should be protected with tarpaulins. Green walls are often bulged or blown down by comparatively moderate winds, and for this reason a little time is well spent in bracing them. Windows on side or rear walls should be guarded against entrance by thieves, by means of heavy bars or solid shutters. Solid shutters made of metal also offer considerable fire protection. Frames and sash made of metal and glazed with wire glass are highly efficient against fire. If rods are used as window guards they should be of steel securely bedded in the masonry at top and bottom and should be not less than $\frac{3}{4}$ inch in diameter and set not more than 8 inches apart. Extra long rods should have a cross bar tying them together at the middle to prevent them from being sprung apart. Transoms over rear or side doors should also be guarded or omitted



Plate 3—A one-story building of brick with terra cotta trimmings. A large variety of "stock" patterns are carried by the manufacturers, thus offering economy and quick delivery

entirely and glass should not be used in such doors. Scuttles in roofs should be provided with sliding bolts on the inside, but key-operated locks should not be used for such purposes as it may be necessary for firemen or others to have free access to the roof from the inside.

Interior partitions in stores may be made with wood or metal studding plastered on wood or metal lath. Or hollow tile or gypsum blocks may be used for this purpose. In one-story buildings, toilets may be lighted and ventilated by means of skylights if desired. The basement may extend under the entire floor if desired; may consist merely of a space for fuel and the heating plant, or may be omitted entirely and the heating plant placed in a shed extension of the main building. In any case the boiler room should be fireproof with masonry walls, concrete floor and at least a metal lath ceiling. In a building without a basement the floor may be made of concrete laid on a bed of cinders or gravel. Fireproof floors over basements may be made of reinforced concrete, or combination slabs, resting on reinforced concrete, steel or metal lumber supports. Metal lumber is made of pressed steel and is light, strong and is cut to fit by the manufacturers so that is easily and quickly erected. Every person interested in modern building methods should obtain catalogs and descriptions of the various uses to which metal lumber may be applied. Concrete floors may be grooved to form patterns and may be colored by means of mineral pigments incorporated in the wearing surface mortar, or they may be finished with a wooden floor laid on sleepers or special attachments embedded in the concrete base. If wooden floor joists are used where there is no basement below, ventilation to prevent rotting should be provided by digging out the earth for at least six inches below the bottoms of joists and by inserting grille ventilators in the walls under the joists. Roof spaces should also be ventilated by means of grille

ventilators in the walls or with dome ventilators in the roof. Roof ventilation not only makes the building more comfortable, but also aids to prevent sweating of the ceiling. Masonry walls should always be furred

for the same reason. The wall-furring may consist of wooden or metal strips, metal lath formed with ribs which hold the lath away from the wall, or by means of hollow bricks, and hollow tile or gypsum furring blocks.

Five Dollar "Kinks"

Never before in the construction industries was there a greater need for builders to aid each other with practical suggestions and "kinks" that help to save time and labor and make a better job.

NATIONAL BUILDER wants to bring the co-operation of builders with each other into greater activity in these pages. Five dollars at least will be paid by us for any "kink" that our subscribers will send to us and we publish. Whenever possible, send a sketch or a photograph of what you wish to explain, and tell what your experience has been in the use of the "kink" or plan you describe.

Remember that by doing your part you not only get paid for it, but also will receive the advantage of the ideas of other builders everywhere.



Plate 4—Another combination store and apartment building. The walls are of tapestry brick with terra cotta trimmings. The piers appear "skinny" and timber added to their width would be an improvement

Wall Shingling--By John Upton

In wall shingling one should begin with a double course, and to get this straight may use a line or straight edge. For the other courses, a straight board tacked on

On the sides under the eaves the shingles can be run straight up to the roof or a frieze board can be put on, either before the shingles are, or on top of them.

the slant. One must get the courses level and straight and place the nails so they will be covered. If desired, the corners or ends of the shingles may be trimmed to



Plate 1—Rear of a Dutch Colonial house with shingled walls



Plate 2—A Swiss chalet bungalow with shingled gable

the building will be found helpful as a guide and also for holding the shingles till nailed.

On good work the courses should come



Plate 3—Shingles sawed to a pattern have been out of favor for some years

even with the tops and bottoms of windows, as in clapboarding. In cheap work this is not absolutely necessary, and a narrow board or some shingles may be placed horizontally at the windows.

Over the doors and windows a cap can be used with the shingles lapped over it, or the head casing may be beveled and flashed and the shingles butted onto it. Use two or sometimes three courses over the openings.

On the gables a frieze board may be used or not, as desired. The shingles can be cut to fit the slant of the roof or can be stopped four inches from the ends and then finished like a "Boston hip," as in Plate 1, or the last shingles can be turned at right angles to the others and have the thin end cut to fit the slant, then a row may be put on up the roof to cover the ends.

The last shingle of each course may be of a certain width and turned to run with

a pattern. In pattern work all the shingles are usually the same width.

A simple way to obtain an ornamental effect is to use alternate wide and narrow courses as in Plate 4. Another way is to lay the shingles wide apart, say with about one inch joints between them. This treatment may be used with good effect by laying the shingles of one course wide apart, with the joints of the next close together, and so on.



Plate 4—Showing the ornamental effect of variation in the width of shingle corners

Gable Finish on Shingles

The accompanying photograph shows an unusual treatment for the edge of the gable of a shingled roof.



The shingles along the edge of the roof at the gable are lapped over to give an effect somewhat similar to that of a Boston-hip.

ROOF FRAMING

Compiled from the Contributions of a Number of the Leading Writers on the Subject. Continued from the February National Builder

Any carpenter who is familiar with the laying out of a hip roof, composed of straight rafters, with the steel square, can easily shape his common hips and valleys, of any curve or pitch, before

First lay out the rafter as though it were to be straight and cut top and bottom cuts. Then drive a nail at the extreme ends as near the top edge as possible. These nails are for a radius

nail in the thin part, and nail on a piece of board at each end and you have a rafter, board-width all round (Figure 2), very strong, and no timber wasted. It looks odd to see them so wide, but

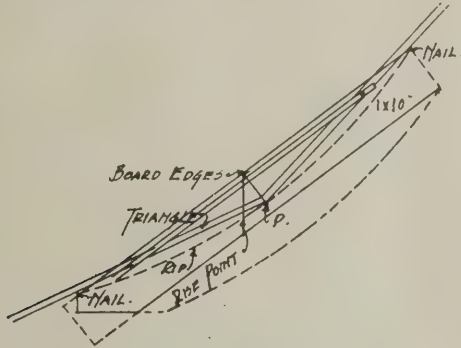


Fig. 1

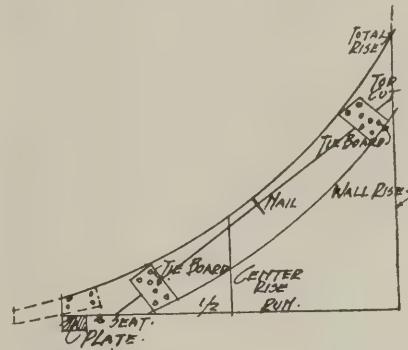
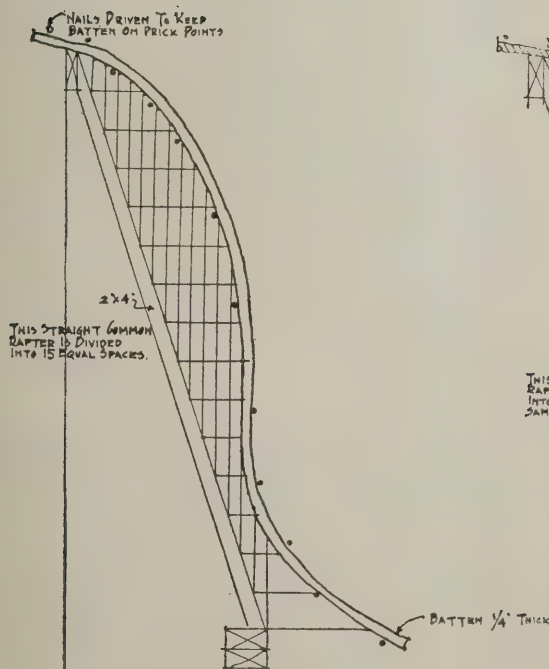
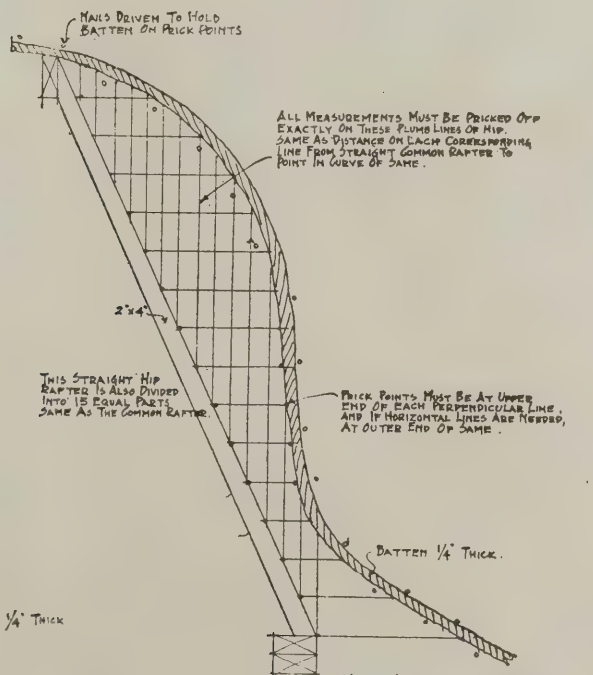


Fig. 2



CUT OF MAIN OR COMMON RAFTER.
THIS RAFTER SHOULD BE FORMED AS PER
THE ARCHITECT'S DETAIL DRAWINGS.

Fig. 3



CUT OF HIP RAFTER
OR VALLEY.

Fig. 4

CURVED RAFTERS

putting them in place. Sometimes it is required to build a concave porch roof, with possibly a hip at one end, or both. There is hardly ever a specified radius that these curves shall be, but if so, this plan works just the same.

triangle to slide against (Figure 1).

Then at mid-length, top, make plumb mark. At this point, radius line cuts nearly to the bottom edge of board. Take a sharp rip saw, and rip out the top and place it on the bottom. Put a

they cannot be built any cheaper for time and material.

Now to make radius triangle, take two light straight-edge pieces, the length of rafter at least. Nail them together at ends so they hinge. Place this point

to pencil (Figure 1), the other ends against nails. Tack a strip across to hold them, and by moving it with pencil on center from one nail to the other, you have a perfect curved line.

Proceed exactly the same for hip or valley, except to find out just how much to cut out of board. That is determined by the rise in center common rafter (Figure 2).

The rise in center of hip must be the same. To find this rise, after having the common rafter cut out, lay it flat down. With the seat cut against a straight-edge, with the top, the total rise away, measure on straight-edge one-half the run and square up center rise. Note this length; then having hip rafter cut top and seat, lay it down flat, and measure one-half its run, make the center rise

same as the other, and you have three points to cut to, and by straightening out the triangle to fit them, you have a corresponding curve when the rafters are up in place. Don't let hip or valley swing off of 45 degrees and this is sure to work. Always cut top and bottom of rafters to fit first. Use lower end of common rafter for jack pattern. Side cut same as any, from straight line.

For ogee roofs the following method is used: Take a clean sheet of sheathing paper and tack it firmly to the floor, and have it sufficiently large. Then locate the plate and ridge thereon, and lay out the lines of straight—say 2x4 inch, common and hip. Proceed to divide each of them into an equal (common to both) number of spaces, and the more spaces, the more accurate the

work will be. (See Figures 3 and 4.)

Now proceed in the same way a boat builder would do to get a plank sheer, "taking spiling," with prick points and nails driven to hold the thin batten in place. The batten should be cut from edge of good clear spruce board, say one-quarter or three-eighths inch thick, to bend truly and evenly.

After laying out both the straight common and hip or valley, prick off the exact distance on the plumb cuts of each rafter (after having drawn all lines on each pattern parallel to the plumb and seat cuts on both of the patterns; see that each measurement is on the corresponding line of each pattern, and drive the nails so the batten will bend evenly on the outer side of the prick points. (See Figures 3 and 4.)

THE BIG FOUR



Plate 1—The workman, the infantry of the builders' army. The men upon whom the success or the failure of any job depends

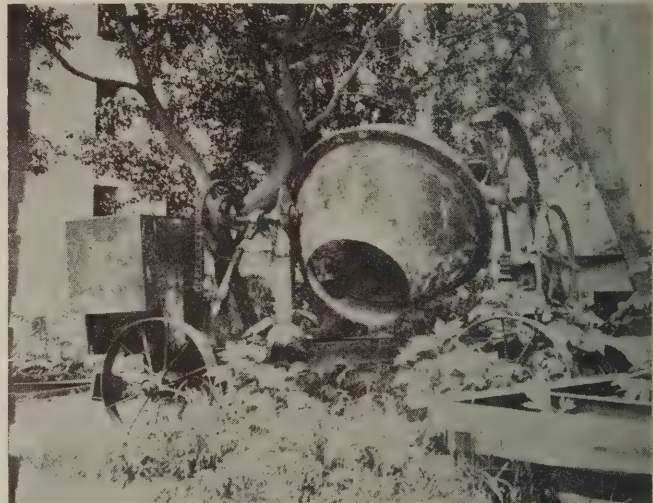


Plate 2—The mixer, the field artillery that is constructive instead of destructive. No modern builder can go over the top without one



Plate 3—The saw rig, the machine-gun crew that is always in the front line trenches of every well-equipped builder's operations



Plate 4—The motor truck, the S. O. S. that keeps the munitions moving up to the front line. A glutton for punishment that has saved the day on many a hard-fought field

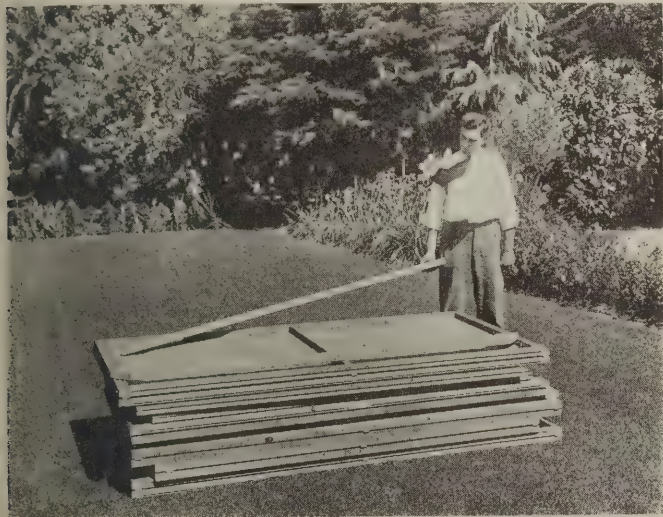
This House Can be Erected in Thirty Minutes

By Charles Alma Byers

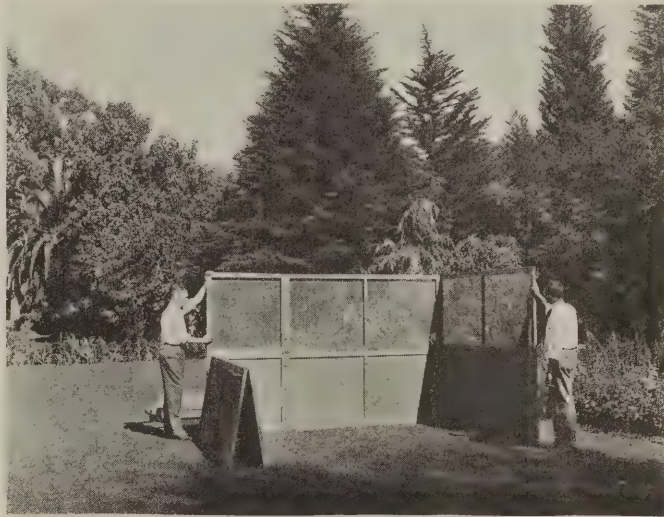
A COLLAPSIBLE, all-purpose house, costing but a little more than \$100, which can be erected anywhere by two persons in about thirty minutes, is the product of a factory at Los Angeles, Calif. The

It can also be used with satisfaction as a summer cottage for the seaside or mountains, and for the camping, hunting or fishing trip it is especially desirable. Furthermore, it is sometimes used in connection

the factory in panel style, are composed of composition board for the lower half and wire screening for the upper half, with a pine frame. The panel sections are fastened together with hinges and hooks, no



The house collapsed



Setting up the walls



The house complete



The interior

house, when collapsed, makes a very small, compact bundle, weighing approximately 250 pounds, and for transporting can be strapped either to the running board of an automobile or to the back of a burro.

The house, when erected on the lawn, porch or roof of the city home, makes an excellent children's playhouse, fresh-air sleeping quarters, or outdoor lounging room.

with hotels, sanitariums and resorts to provide an overflow room, and it has even been employed by railroads and construction companies for the housing of the workmen. The house weighs but little more than a tent, can be erected almost as quickly and is certainly much more comfortable and home-like.

The walls of the house, constructed at

bolts, nails or screws being used for its erection. The ceiling is also of composition board, and is fastened on in the same manner as the walls are put together. The roof is of heavy canvas, pitched in tent fashion, and between it and the ceiling there is naturally provided a roomy storage space. Awning-like curtains are fastened beneath the edges of the roof canvas, which may

be extended in awning fashion or fastened down at the bottom to comprise curtains for the screened portions of the walls. In this way the admission of sunlight and air can be regulated to any extent desired. Flooring can be had with the cottage if wanted, and this is ordinarily designed so as to constitute a sort of crate for the other

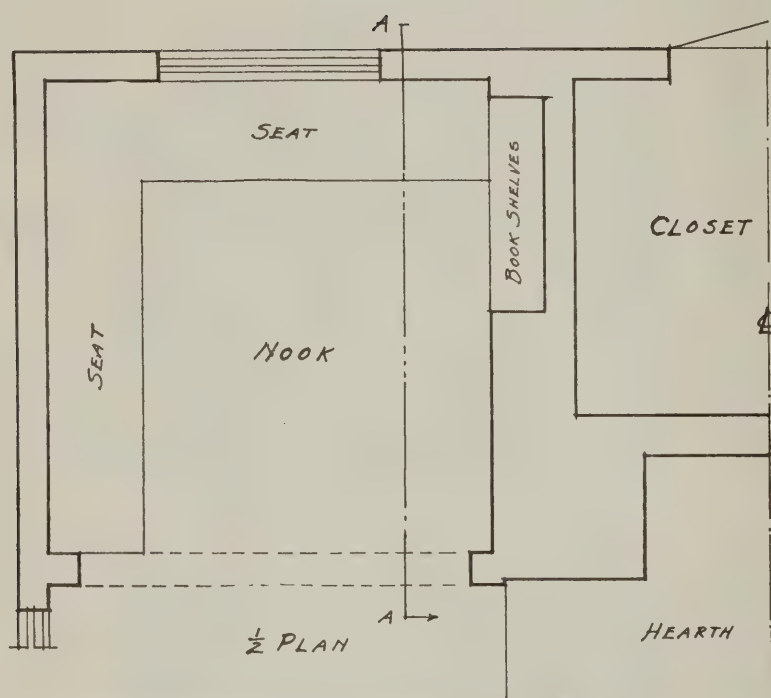
material during transportation. The whole is fastened to the ground by anchor bolts.

The house here shown, in several stages of erection, which is the most popular size, is $7\frac{1}{2}$ by $10\frac{1}{2}$ feet in dimensions. By the use of extra panels, however, the house may be made almost any size, or it can be put

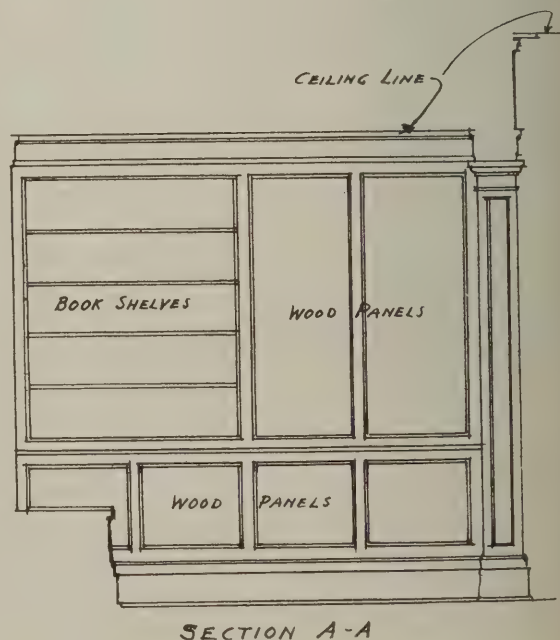
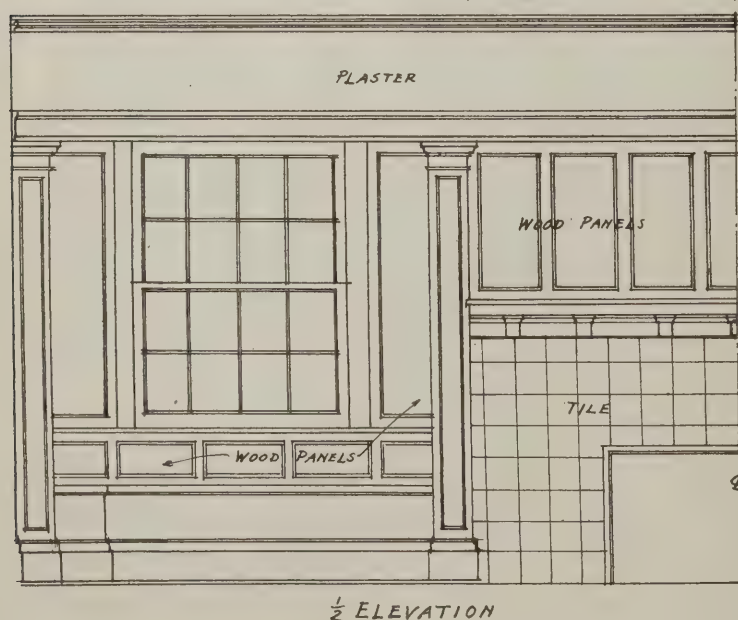
together so as to possess any number of rooms. The size illustrated weighs 250 pounds and is sold at prices ranging from a little over \$100 upwards.

The idea will naturally suggest many possibilities, both in construction and in uses. The particular house here shown has been sold quite extensively throughout the West.

The Inglenook



No one feature of an English cottage better depicts the typical domestic comfort of those home-loving folk across the sea than the inglenooks built in either side the fireplace. Encased and ceiled with wood, they provide delightful seclusion for the book-lover, who has his treasures close at hand, with comfortable cushioned window-seats and good light and warmth.



Bond and Decoration of Brick Work for Small Houses--By John Y. Dunlop

TO BUILD a brick wall to its maximum strength it must be well bonded. The mortar joints are the weakest part of the wall, hence the necessity of having the brick courses to overlap or bond with each other. Besides the firm hold which is obtained by having a good bond, it also causes the load which may be set upon one brick to be distributed over a great part of the wall.

Of the principal arrangements which are adopted in building brick walls the wall which has the greatest number of headers is the strongest. For this reason English bond is much stronger than Flemish bond and Flemish bond stronger than common bond, although it must be said that this arrangement of brick is one of the most pleasing which can be arrived at.

Double Flemish bond has the same arrangement of bricks on both faces of the wall, but for buildings it is usual to build Flemish on the outer face and English or common bond on the back.

A cheaper price can usually be had for a wall of the latter type and it is probably just as strong as double Flemish.

Almost every country and district has its own style of common bond. In Europe and England this type of wall is often built with only three or four courses of stretchers and one of headers, while in America five or six courses of stretchers to one of headers is common.

Whichever bond is used it is essential that the bond be maintained all along the wall and also at the corners. This is obtained by using a closer immediately after the first header is set. This causes the vertical joints in the course above to fall over the brick below. The closers should extend through the full thickness of the wall and are cut from the ordinary brick. When the closer is cut across the brick it is simply called a closer, but when it is cut longitudinally it is called a queen closer. Brickwork is under certain conditions decorated by protecting courses, such as string courses and cornices, which may be built from what are known as moulded brick.

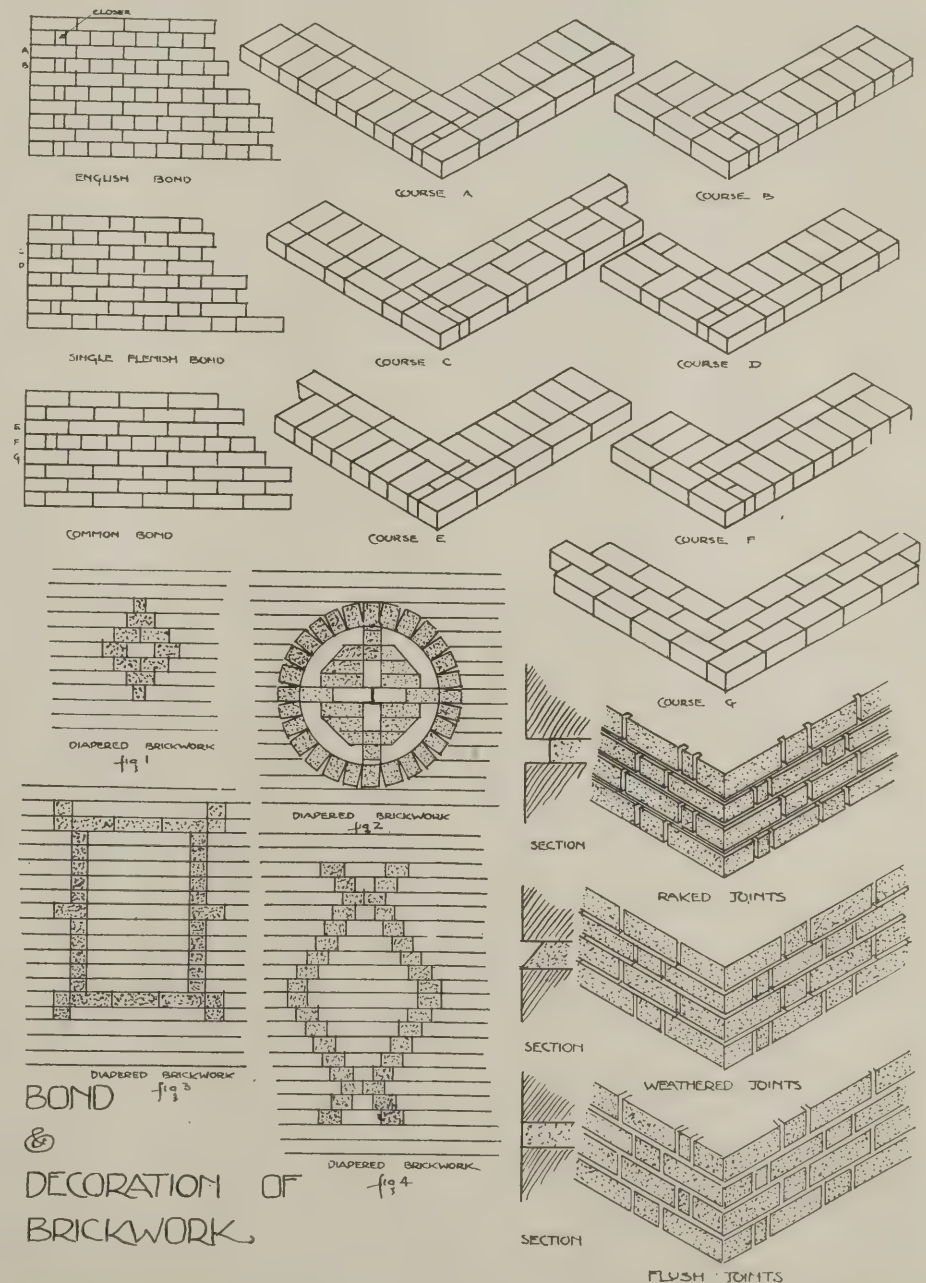
The principal decoration, however, is usually formed by a pattern which is built in and forms a part of the wall and generally follows the lines of some simple geometrical form. This decoration being part of the wall and having but slight, if any, protection or sinking, is usually done with dark or light colored brick to contrast with the body of the

wall. For instance, with a red brick wall a dark blue or a yellow colored brick is often used in the patterns. The whole idea being to obtain some simple form which will give sufficient contrast and yet keep the colors in harmony, so that the surface of the brick wall in which the pattern or draper is formed may be freed from the monotonous lines of headers and stretchers.

This type of decoration is very popular in some districts and some designs are so elaborate as to appear overdone. Still

it is worth consideration and if the design is properly chosen and built it forms a source of relief to the eye in viewing the flat and decidedly plain lines of a brick wall.

In building a brick wall the mortar in the joints serves a double purpose; it binds the whole wall into one solid mass and it helps to distribute the pressure evenly by having filled up all the crevices between the bricks. The joints should not be made excessively thick, as then the lime or cement mortar will



squeeze out and project past the line of the brick. Work with the joint projecting in that way will not stand the frost of one winter without crumbling away.

A very common method with bricklayers when building face work is to rake out the joint slightly from the face so that when the work has properly set the joint can be brushed out and pointed with lime or cement mortar.

Lime is used for ordinary brickwork. It is made with freshly burned lime properly slaked and is mixed with from two to three parts of clean sand. Work which is to stand a heavy load, and that which is built in damp places should be built with cement mortar, as this material sets rapidly and will set under almost any conditions. Cement mortar is made with portland cement mixed with two parts of sand.

Too much attention cannot be paid to the laying of the bricks in each course, as on that depends the stability of the wall. Brick should always be laid on a full bed of mortar and as each brick is being laid in position it should be pushed forward so that by the time it has arrived exactly in its place the mortar behind and in front will have risen up in the joint.

Of course most bricklayers in laying brick always work from the right side of the wall to the left, so when the bricklayer is about to set a brick he lifts the brick and at the same time turns the end which is to be pointed slightly upward and lays with his trowel on the end sufficient mortar to form the next vertical joint. This joint, if the shoving motion is carried out properly, is sure to be flush so that the bricks as they are set are insured a flush transverse joint. When the course is complete the longitudinal joints should be flushed up and the next horizontal bed spread.

Bricks when laid in dry weather should always be sprinkled freely with water as in this way the surface of the bricks are freed from dust and the addition of the water gives the mortar a chance to set before all the moisture has been absorbed from it.

In building with brick the work should as far as possible be carried up equally all around. This will prevent any unequal settlement which would occur if one part of the wall is rushed while the other may be raised at intervals and in easy stages.

The pointing of the brickwork which is the finishing of the joints after the work has been raised is done in a great number of ways, the most common of which are the weathered joint and the flush joint. Pointing of brickwork has the best results when the work has been allowed to stand for some time after erection. Then the joints are neatly raked out and brushed with a stiff brush

to insure any of the loose matter from being left and covered up. The wall should then be sprinkled with water, and if the joints are to be filled they are struck back on the top to form the weather joint shown in the drawing, or they may be filled flush and jointed with a steel jointer.

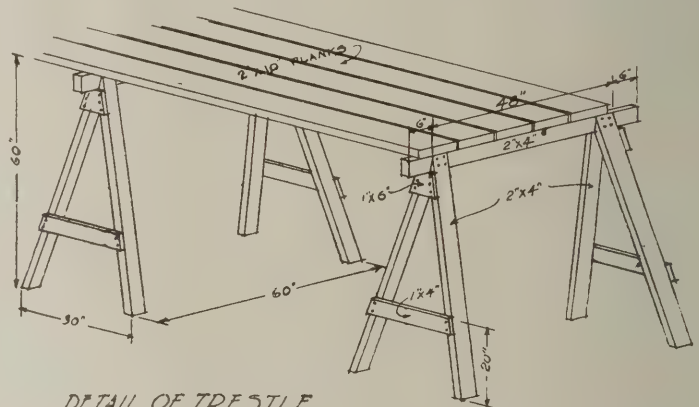
In England a very favorite form of joint for brickwork is what is called tuck pointing. In this work the joint is filled flush and the whole wall rubbed over with a piece of soft brick. The joint is then jointed and the small rectangular groove formed in the soft joint is filled

in with some white mortar. If this form of pointing is neatly done and the white lime mortar made to project slightly past the face of the brick and cut V-shaped it looks exceedingly well. Of course, to stand a wet climate the lime from which the mortar is made must be hydraulic, otherwise it peels off with the first season's frost. Tuck pointing is a very slow job and means extra cost in the finishing of the wall, still for those who have some feature in their house built with this material it gives a decidedly decorative effect which can be obtained in no other way.

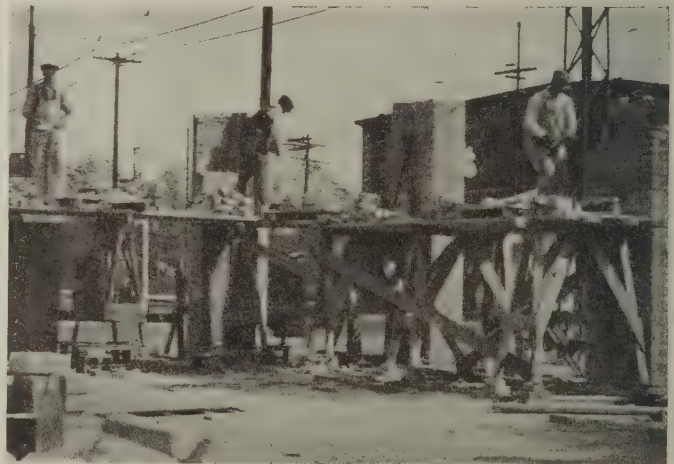
Scaffold Trestles

THE accompanying drawing shows a trestle recommended by the Common Brick Manufacturers' Association for use in bricklaying. Most practical

some of the bricks or sticks forming the support may become dislodged and cause the scaffold to topple, thus injuring the workmen or damaging the green



DETAIL OF TRESTLE
MATERIAL FOR HORSES & PLANKS - YELLOW PINE



bricklayers, however, would prefer that side braces be run from the legs to the extension bar in order to stiffen the trestles and to prevent the scaffold from swaying. Trestles braced in this manner are shown in the photograph, which also shows additional braces running from trestle to trestle.

The method of blocking up the legs of the trestles shown in the photograph is open to criticism from the fact that

brickwork. Of course, trestles must often be leveled up, but there is no need to pile bricks under them in this manner, even though the story height is a little higher than usual.

Trestles are usually placed about eight feet apart and their ends should not be closer than 3 inches to the brickwork, so that the swing of the scaffold will not bulge a green wall.

Sleeping Porches

THE sleeping porch continues to be popular among a great many people. True enough, they are not quite so popular as they were a few years ago, but

prevented. Of course, sleeping porches do not ordinarily require so much heat as bedrooms, as they are usually used in connection with other rooms which

The windows used for sleeping porches may be hinged or pivoted at top, bottom or sides. They may be double-hung, casement or sliding. Casements have



Plate 1—A remodeling job in which an old-fashioned porch is turned into a sleeping porch above and a living porch below



Plate 2—Another combination porch; sleeping porch above, living porch below. These porches are well tied to the house and are as much a part of it as any rooms

there still remain a large number of people who require provision to be made in their houses for outdoor sleeping quarters.

One reason that the popularity of

may be used for dressing. They should, however, be provided with enough heat to take the edge off in zero weather. When heating apparatus is installed in such exposed locations it is necessary to

long been preferred, as they offer 100 per cent of clear ventilating area when open, but there has lately been placed upon the market a double-hung window in which both sashes slide up into the



Plate 3—A sleeping porch built into a roof. Note the pergola effect of the pattern-sawed rafter ends

sleeping porches has fallen off somewhat has been due to the misguided efforts of the fresh-air fiends, many of whom seem to hold the idea that only COLD air is fresh air. This idea is absurd and has probably been responsible for quite as much sickness as it has

provide proper insulation to prevent freezing. Hot water systems are very difficult to protect, and if installed, are largely dependent upon the owner's judgment. Warm-air, of course, is not subject to these dangers, and gives good results.

head, thus also making the full opening available for ventilating. One of the most popular types of casements for sleeping porch use is one which by means of special hardware may be fitted so that the windows all slide to one end or the other of the opening, thus leaving



Plate 4—The sun-parlors of apartment buildings are often fitted with wall beds, and thus become available for use as sleeping porches

the entire space open and free from mullions or other obstructions.

Wall or disappearing beds have done much to make sleeping porches practicable. One of the objections to sleeping porches has been that it is difficult to prevent the beds from becoming damp, dusty and clammy. Wall beds, however, overcome these objections, as the beds when made up are contained in closets and are protected from dust and dampness. When sleeping porches are placed next to bed rooms the wall beds



Plate 5—A sleeping porch over a rear porch. Stucco and half-timber is well suited to details of this nature

may be installed so that they may be used either in the room or on the porch. Then, for instance, if a sudden storm comes up, the bed may be turned into the bedroom and the remainder of the night spent in there.

Probably the greatest value of wall beds, however, lies in the fact that the sleeping porch may be used as a serving room or

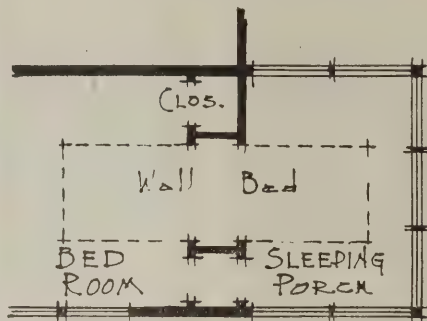


Plate 6—With this arrangement the wall bed may be used either in the bedroom or on the sleeping porch

an upstairs sitting room during the day time, thus increasing the efficiency of the entire house.

Sleeping porches should always be provided with one or two closets. These are handy for storing extra bed clothes, and if the porch is used as a sewing room there

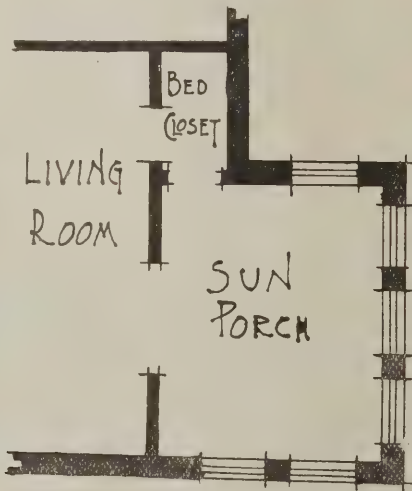


Plate 7—An arrangement for an apartment or flat. The bed may be used in the living room or on the sun porch

should be a closet for the sewing machine and a wardrobe for unfinished sewing.

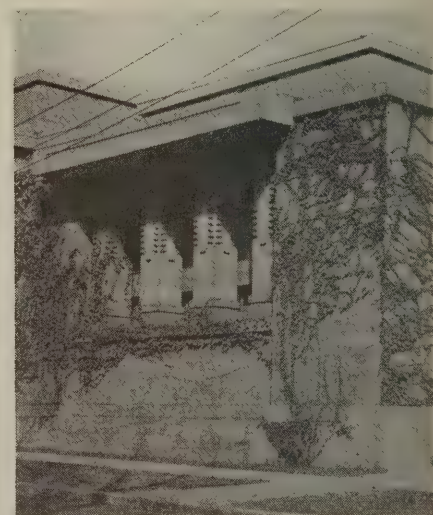
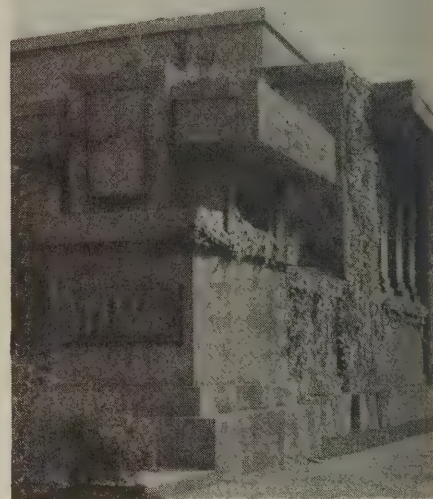
Don't forget to include extra electric receptacles for reading lights, electric bed warmers, sewing machine motors, and so forth.

The tendency nowadays seems to be to make the sleeping porch just like an ordinary bed room except that it contains more windows. The walls are usually plastered or covered with wall board and the finish is usually of good quality. Doors opening into bed rooms are often French doors. When ordinary beds are used on the porch

these doors are usually double so that the beds may be rolled into the bed room during the day time or in bad weather.

Sleeping porches are sometimes designed with windows along only one side. These seldom prove satisfactory and under ordinary conditions are not so well ventilated as a bed room with windows in two walls. Sleeping porches should not have a "tacked on" appearance. They should receive some apparent support from the ground and not rest merely on brackets or stilts. Sometimes by calling a client's attention to the advantages of a living porch, the two may be combined to form an attractive feature.

Unity Church



Two recent photographs showing details of the famous Unity Church building designed by Frank Lloyd Wright at Oak Park, Illinois.

Your National Builder, if delayed, is, in all probability, on its way to you in the mails. Wait before writing. The mails are congested. NATIONAL BUILDER almost invariably issues on time.

Questions and Answers

PLANS FOR ROUND BARN

R. M. S., Minerva, Ohio, asks "Where can I get detail plans of round barns such as shown in October NATIONAL BUILDER?"

Answer—Agricultural Experiment Station, University of Illinois, Urbana, Ill.

PLAN READING AND ESTIMATING

A western builder writes: "The articles on plan reading and estimating are good. The items on 'permits,' 'insurance,' 'surveys,' 'temporary runways,' 'stairs,' etc., will save some of us money as a great many contractors forget to allow for them."

SAVING WITH A MILL

A subscriber writes: "The One-Man Mill story in the February number is great. I have a two-man mill, 14 by 30, and one machine. I sure make money out of it. Brick house frames average 2 by 4 feet, size of outside of sash opening, and cost \$2.76 each complete on the job. The lumber yard price was \$4.50 for these frames, knocked down. Allow 50 cents for nailing up, and I saved the difference between \$2.76 and \$5.00, or \$2.24 each."

LICENSING BUILDERS

"Reading the article in NATIONAL BUILDER about defective chimneys," writes a building superintendent, "I wish we all had to pass a stiff examination before being allowed to superintend work. Lots of superintendents today would go by the board and lots of them would take interest enough to read up a bit."

WANTS BOOKS ON GRAINING AND WOOD FINISHING AND PAINT MIXING

S. K., Chicago—"The Expert Wood Finisher," and "The Expert House Painter," A. Ashmun Kelly, Downingtown, Pa., author and publisher, will probably meet your needs. Late prices are not at hand.

ANCHORING SILLS TO FOUNDATIONS

W. H. L. asks for information about anchoring wooden sills to concrete foundations.

For this purpose $\frac{5}{8}$ or $\frac{3}{4}$ -inch bolts are used. They should be about 2 feet long, threaded at one end, and have the lower end bent into a 4 or 5-inch hook. The hook will be found amply secure in concrete work and takes the place of the flat anchor plate used at the bottom of anchors in brickwork or other masonry.

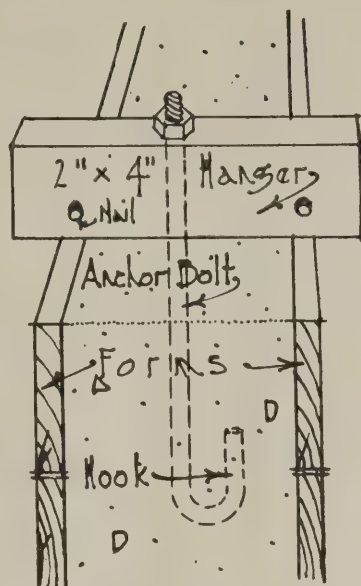


Plate 1—A two-by-four with a hole bored for the bolt makes a good temporary hanger for anchors while the concrete is being poured. These may be used over and over



Plate 2—Anchor bolts in place ready to receive the wooden sill

The anchor bolts should be embedded in the concrete about 4 or 5 feet apart, and for doubled or 4-inch sills, the threaded end of the anchor should project about $5\frac{1}{2}$ or 6 inches above the concrete.

In setting the sills the top of the foundation should be cleaned off and thoroughly wet down. Then it should be leveled off with a thick coat of cement mortar and the sill bedded in the wet mortar. The sill should also be drenched with water before setting. This prevents

too rapid drying of the mortar, which causes it to become crumbly. One and one-half-inch washers should be used between the nut and the sill. Care should be taken that the anchors are set true so that they will register with the holes bored in the sill to receive them, otherwise considerable time will be spent in making the bolts fit the holes. The holes in the sill should be amply large, say one inch in diameter.

Sills should always be securely anchored to foundations, as the frame is stiffened thereby, and less rocking will occur during high winds. Comparatively moderate winds have been known to shift an unanchored frame building on its foundation.

POLE AND POST HOLES IN WINTER

Everybody will admit that pole and post holes should be dug when the ground is not frozen, but everybody knows that emergencies necessitate the digging of such holes in freezing weather.

The diggers make slow progress, because post hole excavators cannot be used. Picks can be used only on the first few inches of frozen soil.

Low freezing dynamite, suitable for use in the open, in winter, is becoming popular with hole crews. It takes much less time and labor merely to put down a two-inch bore hole in frozen earth than to dig a 12x15-ft. hole. The stick or half-stick of dynamite is pushed to the bottom of the bore hole, tamped in (sometimes with snow) and fired with cap and fuse. It is then a quick and easy operation, after the soil has been broken up and loosened by the shot, to dig out the hole to required size.

There is little danger of unduly loosening up the sides of the holes, when the ground is frozen. But even if an occasional hole is broken out a little too wide, it can usually be depended upon to freeze up solid again over night.

Contractors' crews are using dynamite quite freely now for winter pole hole work.

HOW TO USE COBBLESTONES

Cobbles are often combined with other materials with good results. Brick, dressed stone, and concrete may be used for copings and ornamental features. Flower-boxes lined with cement are often built into porch and terrace rails and wooden trellises may be applied to the wall surfaces.

Cobble-stone surfaces should present a

uniform face. That is, no stones should project more than about an inch beyond the general face of the wall. Corners should be full, so that wide open joints are not too evident. It is a good plan to reinforce corners with small steel rods bent at right angles or with barbed wire laid in the joints. This strengthens the corners against shrinkage and temperature cracks.

COLUMN CLAMPS

One of the expensive features of reinforced concrete form-work is the wooden bands or clamps used for tying together the sides of column forms. Wooden bands require considerable fitting and wedging and are wasteful of material, as they can seldom be used more than once or twice.



Plate 1—Metal clamps in place around column form

There is on the market a type of metal clamp that may be rapidly applied and may be used over and over. The accompanying photograph and the sketch show the application and principle of these clamps, and it is evident that their use should result in a considerable saving in both time and expense.

The clamps are made of strap iron and are adjustable to a considerable range of column sizes. Each clamp consists of four straight pieces of metal hinged together in pairs by means of a loose riveted joint. The free ends of the clamps are punched with lines of holes to permit adjustment. A special lug (not shown in the sketch) fits over the intersection of the loose ends. The ends of the clamps are held together by means of these lugs and a cotter pin. The clamps may be used on either square or oblong columns and may be fitted very accurately, as the adjusting holes are even closer than is indicated in the sketch. Nails partly driven into each side of the forms

just under the clamps will prevent the bands from slipping down in case they become loosened. This precaution, however, is seldom taken, as the clamps may be drawn quite tight.

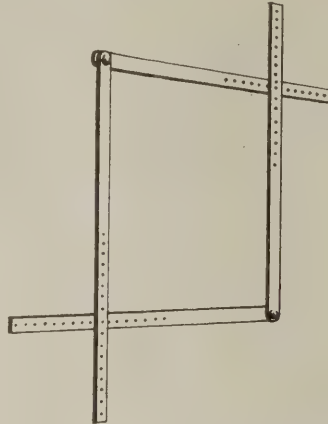


Plate 2—Sketch of metal clamp with adjusting connection omitted

Bands or clamps are usually spaced about 18 inches apart for the lower third of the column height; 21 inches apart for the middle third, and 24 inches apart for the upper third.

ELECTRIC WIRING AND ELECTRIC INSTALLATIONS

Numerous requests for information

regarding electric wiring and electric installations received from contractors who have had contracts of this kind included in their regular practice require explanations that are too extensive for answer in these columns. Reference should be made to the text books for information on the principles and fundamentals of electrical installations. Among these are: "How to Become a Successful Electrician," Norman W. Henley, 2-6 West 45th Street, New York, price \$1.00; "House Wiring and Electric Lighting," by Norman H. Schneider; Spon & Chamberlain, 123 Liberty St., New York.

Numerous works on these subjects and on building construction work are published by John Wiley & Sons, Inc., 432 Fourth Avenue, New York; McGraw-Hill Book Company, Inc., 239 W. 39th Street, New York; D. Von Nostrand Co., 25 Park Place, New York; U. P. C. Book Co., 243 West 39th St., New York; and the publishers already named. Catalogs will be sent to you by these publishers on direct request from you to them. If you give the name of your technical society or a business reference, books desired will be sent to you by most publishers on ten days' approval.

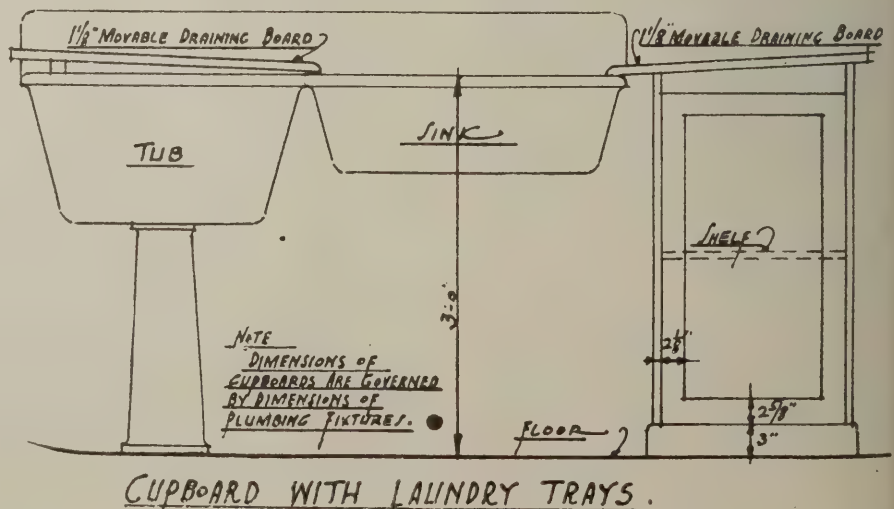
A Kitchen Combination

The accompanying detail is one adopted by the Ontario Housing Commission for use in their projects.

Sink and tub combinations are becoming popular for kitchens and are now made up in several styles. On cheap work the combination equipment serves in place of a separate laundry, but even where a laundry is provided, a tub in the kitchen will save steps when only a few pieces are to be rubbed out.

The accompanying detail shows a very good arrangement with tub, sink and a cabinet, side by side. The cabinet makes a

handy place for soaps, dish cloths, rubbing boards, and so forth. The draining boards are removable, and here's a tip to pass on to the housekeeper; when the dishwashing must be put off for a while, the soiled dishes may be placed in the tub under the drain board and thus hidden from view until the time comes to wash them. Don't forget to set the sink high enough, from 33 to 36 inches, depending on the height of the woman, makes a convenient working height. Even sinks with legs are now made adjustable so that any ordinary height may be obtained.



National Conference on Concrete House Construction

THE National Conference on Concrete House Construction, held in Chicago, February 17 to 19, was a gratifying success. Hundreds of scientific men, interested in the use of cement, were present from all parts of the country.

Three days were spent in addresses and discussions covering more than forty important subjects. The facts brought out will prove of great value to the whole country.

More production of building materials, as well as more construction of houses, was declared to be the need of the hour; as the shortage of building materials makes it possible for profiteers to fix their own prices on what they have to sell.

This has resulted in what is known as a "sellers' market," which means a market in which the seller can dictate his own prices and terms.

It was declared that the only way to beat the profiteers is to increase production, and that "production is the deadly enemy of profiteering."

Unrest in the labor world was attributed, partly, to the decrease in proportion of people owning their own homes. A partial remedy advocated is active measures to make it possible for all men to own their own homes.

There was little discussion as to the actual cost of house building, on account of the unsettled condition of the labor market as well as of prices of materials. It was freely asserted that "houses will cost more this year than they did last."

Government regulation of prices, under peace conditions, was little touched upon, but it had no friends. The only argument against it was that it is ineffectual.

"Build houses; don't buy; as the buying does not help the housing situation," was recognized as a truth to be impressed on people who have means to build houses to help the housing situation.

Building houses in groups of 25, 50, 100, or more, was advocated as an important method of reducing cost.

The organizing of co-operative societies was urged as a means of getting many houses built at the same time in any one locality. By this means a small working force can be kept constantly at work and can build many houses in a year.

This was declared to be "building by wholesale" in opposition to the usual plan of single house construction, which was described as "building at retail."

The insulation of houses against loss

of heat was given much attention, as it is a big item affecting the cost of fuel for the family that occupies a house. The saving on coal will help pay for the house.

The spirit of the conference was tremendously aggressive and humanitarian. It presages a successful campaign for the building of many houses and the creation of many real homes.

FARM BUILDINGS OF CEMENT

As to farm buildings, some very valuable suggestions were made. When this matter shall have been brought to the attention of the farmers, it will, without doubt, cause many of them to avail themselves of the new methods advocated.

The idea, however, was expressed that the farmer would be the last to see the advantage of changing from wood to cement in the construction of his house and barns. Said one speaker: "Substitution of material in the farm home will come slowly. The average farm house is built by the local builder; and that builder will be the last to change in the kind of material he is using."

But there are several good reasons against this viewpoint. One is that the farmer is not hampered by union labor, as the city house builder is. In the discussion, one contractor said that in the state from which he came, union men were refusing to use some of the machines provided for work in cement house construction. Another man said that in his state union men would not apply one coat of stucco, but would apply three coats. The farmer is under no such handicaps.

On many farms, the farmer, his sons, and the hired men do any kind of job that comes along, and they can generally furnish a high quality of unskilled labor for any undertaking connected with farm improvement.

As some methods of cement house construction require but little skilled labor, those methods are particularly available for the farmer. As a matter of fact, farmers are already doing a lot of cement construction themselves; and cement is becoming a favorite material for use on the farms.

Of all houses, the farm house is less likely to be removed to make way for other buildings. In harmony with this idea, Professor J. B. Davidson said: "Farm buildings should be constructed to last longer than such buildings gener-

ally do; and to make them last longer it is important that we should have better material and better construction than we have had."

FINANCING HOUSE BUILDING

In considering ways of housing the American people, the greatest problem is how to finance the man who wants to own his own home, and has not the money or credit with which to do this. Some of the possible ways of providing the money were discussed.

It was declared that there is a shortage of over one million houses, as compared with pre-war conditions, and that the supply of houses under pre-war conditions was far from the ideal number; as even then too many people lived in rented houses and too few in houses owned by themselves.

Reference was made to what foreign governments are doing to help people build homes. In some countries, notably England, government aid of a most liberal character has been extended. The loans made are for a long time. They are at a low rate of interest and provide for a small annual payment on the sinking fund. One speaker said that one objection to our ready adoption of any of these schemes is that none of them have been in existence long enough for us to find out how they are going to work out in a long period of years.

Of efforts made in this country, the most talked-of plan was that of Detroit, where a fund of \$3,000,000 has been raised, which money is being loaned out to house builders for the construction of homes not exceeding \$6,000 each in cost.

Members said that these housing societies are springing up all over the country and are helping to finance would-be home owners who could never finance themselves in this enterprise. This plan was objected to by one speaker, who declared that if a man cannot save up enough money for the initial payment of 10 per cent he is not entitled to help in building a house.

It was, however, realized by many members present that such a limitation would leave unsolved much of our housing problem, which concerns largely the people who have not been able to accumulate considerable sums of money, often through no fault of their own. However, the drift of discussion was in favor of the plan requiring an initial payment of 10 per cent, with a monthly payment of 1 per cent on the principal.

One important suggestion in this connection was that a housing society could well afford to finance this initial payment of 10 per cent, or, if that be paid by the house owner, the society could finance the 30 per cent between the 10 per cent and the 60 per cent if the balance of the cost be defrayed from capital borrowed from a money-lending institution that was willing to loan money on 60 per cent of full valuation. A man from Omaha said that in his city the banks would now loan on only 50 per cent of such valuation.

PRICES AND COST IN HOUSE CONSTRUCTION

That prices of material and labor do not necessarily determine the cost of building houses was brought out in discussions.

It was shown by one speaker that since 1913 the price of building materials had advanced 268 per cent, and that, comparing 1913 with 1919, there had been an advance of 72 per cent in the cost of union labor.

Yet, later in the convention, it was demonstrated that new methods in house construction could offset a large part of these advances. Especially was this the case where cement was largely used.

One way to reduce the cost is to build a better house at the same price as formerly asked. This can be done by using more care in building and inspection and by using materials better suited to permanent construction. A St. Louis real estate man said: "Last year, in one of our subdivisions, we built fifty houses, and this year we are going to build more. We will not build a cheaper house than last year, but we will build a better house at the same price as last year; which means that the buyer will get more for his money."

One manufacturer of houses said he had found a way to reduce the amount of money he was paying for excessively high-priced labor. This was the introduction of methods that required little skilled labor, but the utilization of a larger proportion of unskilled labor.

The construction of 100 or more houses at one time in one locality helps to reduce cost, as, in that case, all labor can be used to the best advantage, and there is little "dead time" to be paid for.

"The great problem of the day with us is how to produce cheaper houses," said a building inspector from Brooklyn. He said a method of cement construction seemed to him the way of solving the problem.

PERMANENCY AS A HOUSE QUALITY

"Any building worthy to be called a house should be built for permanency and should serve at least three generations," said Fred W. Lumis.

This viewpoint was objected to by a

member who said that in many localities of a growing city it was desirable to build houses that would not last long, as they would have to be torn down; and the cost of tearing down a strongly built house is so great that it makes it unprofitable to wreck it.

Later, in a discussion, Mr. L. H. Allen said: "There are people today who are advising us not to build permanently. I think this is a mistake and that the experience of the world favors permanency. In the eastern parts of this country are houses of wood and of other materials that have been in use for a hundred years or more. They are still in good condition and occupied."

Another member declared that permanency in construction could not be urged as an objection in any case; for where the business district of a city grows into the residence portion and causes the demolition of a house, that very fact proves that new conditions have made profitable the destruction of the residence to make way for a more profitable kind of building. In all such cases it will be found that the increased value will more than offset the cost of demolition. It does not pay to build less permanently merely for the sake of increasing the value of the scrap material.

In discussing the financing of new houses, Mr. L. H. Allen said: "Any building on which money is to be loaned should be constructed as permanently as possible; for men are more ready to loan money on such a building than on one that will deteriorate rapidly. This is a distinct advantage in building a cement house."

CEMENT AS FLOOR MATERIAL

A sharp difference of opinion was expressed regarding the use of cement in floors. Some of the members declared that using cement for floors was overdoing the use of cement. They said that wood was the natural material for floors.

A few members brought forward testimony of actual experience in the use of cement for floors. One of these was from the superintendent of the orphanage at Mooseheart, Ill., who said:

"We are housing about 780 children, and we try to give them good floors. We are using cement for floors in most of our buildings. At first we covered the cement with various kinds of things to make it easier for the feet; but we have found that it is not necessary. At the present time we are covering the cement only in a few rooms where we want to make it look homelike. In the dwelling houses there is no complaint about the floors being hard; but in the workshops, where the carpenters stand on the cement all day, they complained that it was hard on their feet. So they get rubber heels, which removes the difficulty."

Other members told of having cement floors, which were satisfactory, but some of them covered their floors in places. One man said he was using cork covering with great satisfaction. One member said: "We use carpets, rugs and mats on the cement floors, more for looks than for any other reason. I think there is a great deal of imagination connected with the objections to using cement for floors."

Saving in Buying



Buying in carload lots reduces cost and reduces the possibility of delays. There is always a market for "left-overs" nowadays, too

Associated General Contractors of America Meet

THE annual meeting of the Associated General Contractors of America was held in Chicago, February 18 and 19. There was a good attendance of contractors, both from the vicinity of Chicago and from widely separated sections of the country.

The association is a new one, having begun its work on the first day of February a year ago. Its creation was a part of the great movement for the organization of the construction industries.

One of the first speakers was Ernest T. Trigg, president of the National Federation of Construction Industries, which organization is itself of recent birth. Mr. Trigg declared that the building industry is still one of the most unorganized industries in the country. The keynote of the two organizations is found in the assertion of Mr. Trigg: "Associated effort is better than competition; associated effort avoids the waste of competition and the objectionable features of combines and trusts."

The report of the Executive Board showed the new association to have made great progress in its year of work. A number of important committees had been created and set in action; and these had been able to do some very valuable work. In addition, a number of association "Services" had come into existence, some of which had had a remarkable growth.

One of these is the "Publication Service," the object of which is to keep the members informed on all work of the association and of other things that may affect the contractors.

The report of the committee on labor evoked a discussion that touched one of the underlying causes of some of the unrest in the labor world. One of the practices scored was that of big contractors going into a distant town and offering 25 per cent advance in wages to take local laborers from their jobs. One contractor said: "Some of the big contractors make it a practice to get their jobs by promising to bring in a full equipment of men and machines, so that the work can be done quickly. They bring in their force, but of what does it consist? It consists of a manager and a couple of foremen and a clerk or two. They do not bring in any mechanics or even unskilled laborers. They then insert in the local papers advertisements stating that they want men and will pay from 25 to 50 cents an hour over the rates being paid locally. The local contractors cannot meet those prices, be-

cause they have taken their contracts based on a lower price for labor. The big contractors can afford to pay the advance, as their work is for a short time and they have saved money by not having to transport men. Also, the local contractors cannot make a rate of payment good for a short time only, for they would be expected to continue that rate permanently. The result is that the local contractors find themselves deserted by their men, and the big contractors can take the best and leave the poorest, if they do not want all. But that is not all the damage done; for, in paying the bonus to get the men, they make the laborers believe that they have been underpaid before that time. That belief causes general unrest when the big job is done and the laborers have to go back to working for local contractors."

The committee on labor also reported that it had been investigating the Federal Employment Service, which the Executive Board had previously endorsed. The committee's investigations had led to the belief that "It is doubtful whether the re-establishment of the Employment Service can serve any good. During the war its principal object seemed to be the furtherance of organization by the American Federation of Labor. Its service must serve to unduly inflate the rate of wages, because it is managed and controlled by the unions."

The same committee also reported adversely to the passage of a national law prohibiting all immigration for a number of years; but it expressed the opinion that some form of selective immigration should be provided for.

The "cost plus" plan of contracts is not in favor with some members of the association, who declare that such a plan does not protect the public against unreasonable charges and that it stifles competition. The committee on contracts reported that the Research Division of the association is gathering data on the "cost plus" plan and that such data may be used in relation to the United States Senate bill prohibiting contracts on the "cost plus" plan.

The papers and discussions at the meeting covered eight different fields: (1) Buildings; (2) Streets and Highways; (3) Railroads; (4) Bridges; (5) Sewers and Waterworks; (6) Rivers and Harbors; (7) Reclamation and Drainage; (8) Foundations and Tunnels.

The work of creating a division for each of these interests is still in progress. Three such divisions have already been created—the Building Contractors, the Highway Contractors, and the Railroad and Public Work Contractors.

There is thus in process of being built up a nation-wide association that will touch every construction interest that does work by contract.

A Public Fountain

The accompanying photograph shows a public fountain at Oak Park, Illinois. It is built of concrete and has watering troughs for horses at each end, with a drinking fountain in the center.

The top slab contains a flower box which is filled with growing plants in season, and these, together with the modeled panels, relieve the composition of any appearance of stiffness.

Structures similar to this are popular in small towns and communities where it is desired to erect some sort of memorial to commemorate the World War or other event. Where funds are limited it is being recognized that it is far better to erect a minor structure that will always be a source of pride, rather than to attempt a more ambitious structure that will always have a cheap, shoddy appearance. Features of this kind, with the accompanying flowers and foliage, give visitors a favorable impression of the community.



Announcements and Publications

Henry Chisholm, architect and engineer, has moved his offices from East Boston to 8 Beacon Street, Boston, Mass., and will be pleased to receive manufacturers' catalogues and samples.

Howard Russell, architect, formerly of 106 Mason Street, Milwaukee, Wis., with offices in the Hathaway Building, announces from Westport, Conn., that he is no longer a practicing architect—closing his offices in 1917.

William Goldsmith, construction engineer with the city of New York, has resigned his position to become president and general manager of the Riverdale Construction Co., Inc., at 1440 Broadway, New York City, specializing in housing development work for private interests in New York City and vicinity.

Brick—How to Build and Estimate—By William Carver—A well-prepared book of 47 pages presenting facts and construction data on brickwork for contractors and builders. Issued by the Common Brick Manufacturers of America, 111 West Washington Street, Chicago. Price, \$1.00.

General Fireproofing, No. 2, Vol. 4, February, the house organ of the General Fireproofing Company of Youngstown, Ohio, announces as special features a leading article each month from a prominent architect or contractor. Important articles in this issue are by Wharton Clay, commissioner of the Associated Metal Lath Manufacturers, C. O. Powell, assistant commissioner; and construction details by a prominent architect.

The Humphrey Radiantfire gas heater is described and beautifully illustrated in colors with blueprint details and dimensions in a handsome catalog and supplementary folders, issued by the General Gas Light Company, of Kalamazoo, Mich.

The White Pine Series of Architectural Monographs, always exceptionally beautiful in its preparation, gives in No. 1, Vol. VI, a series of photographs by Kenneth Clark of the houses on the Boston Post Road, with an introduction by Peter Augustus Pindar, the pen name of a well known New England architect. Announcement is made of the fifth annual competition, the program being for a roadside tavern. The prizes are respectively \$750, \$400, \$250, \$100—and six mentions. The competition closes at 5 p. m., Monday, May 3; judgment, May 14 and 15. Architects and architectural draftsmen are cordially invited to compete. Issued by the White Pine Bureau, Merchants Bank Building, St. Paul, Minn.

Better Building for Less Money is the title of a folder illustrating and describing the multiplex mold for poured concrete building blocks, air-tight window and door frames. Issued with price list by C. W. Hodgen Company, Kansas City, Mo.

Mixers is the title of a handsomely designed and copiously illustrated 48-page catalogue, No. 17C, of the Lansing equipment for contractors, issued by the Lansing Company, Lansing, Mich.

The Knickerbocker Line of Contractors' Equipment, Catalogue No. 20, issued by the Knickerbocker Company, Jackson, Mich., illustrates and describes the types of mixers and accessories manufactured by the company in its first section and in the second section, Catalogue W-20, illustrates and describes the Knickerbocker woodworkers' portable combination swing cut-off and ripping machines and gas engines. Section 30, catalogue P-19, illustrates and describes the pumping units and types of hoisting machines manufactured by the company.

Koehring Dandie Mixer, catalogue issued by the Koehring Machine Co., Milwaukee, Wis., illustrates and describes various types of mixers and bar cutters and bar benders.

Waterloo Construction Machinery is a handsomely printed and comprehensive catalogue of mixers, pavers, builders' hoists, back-fillers, trench pumps and gas engines, issued by the Waterloo Construction Machinery Company, Waterloo, Iowa.

Contractors' Equipment, issued by the Oshkosh Manufacturing Company, Oshkosh, Wis., illustrates and describes the company's mixers of various types with construction details, saw rigs and attachments, portable graders and back fillers, trench pumps and gives names and addresses of users.

The Hollow Wall Way is the title of an illustrative and descriptive catalogue issued by the Universal Cement Mold Co., Villard Avenue, North Milwaukee, Wis., showing in detail the methods of construction employed in various types of buildings with the molds manufactured by the company.

Matthews Full Automatic Lighting, issued by the Consolidated Utilities Corporation, 730 South Michigan Avenue, Chicago, is a handsomely printed and copiously illustrated catalogue describing the various types of full-automatic generating unit and storage batteries designed to meet the varied range of needs for private installation and use in suburban and farm homes.

Building Ordinance, issued by the architectural and building code service of the National Lumber Manufacturers' Association, Lumber Exchange Building, Chicago, is a well designed book, bound in boards, "intended to serve as a reasonable regulation of ordinary building construction where congestion is not abnormal, but is not a building code in the ordinary sense. It should prove a reliable guide for safe construction legislation pending the natural growth of a community." The work is illustrated with numerous plates and diagrams, has a full reference index and blank pages for notes and memoranda.

The Safety Meter Box is the title of a folder issued by the Safety Meter Box Company, Cleveland, Ohio, illustrating and describing meter boxes for both electric or gas service installed so that inspection may be made from the outside of the house, thus avoiding the danger of irresponsible intrusion and the annoyance of inspection visits.

Oak Flooring, How and Where to Use It.—Issued by the Oak Flooring Manufacturers Association, Ashland Block, Chicago. Illustrative and descriptive of the methods of laying and caring for oak floors.

Abram Double Action, Long-Handled Tools.—Illustrated and descriptive catalogue issued by the Abram Cement Tools Company, 616 Marquette Building, Detroit, Mich. Gives testimonials of users and information on sidewalk laying and treatment of concrete.

Boss Labor-Saving Construction Machinery.—Illustrative and descriptive of the various types of mixers, saw-rigs; gas, kerosene and electric hoists; back-fillers, material elevators, pumps, and woodworking machinery manufactured by the American Cement Machine Company, Inc., Keokuk, Iowa.

The Champion Mortiser.—Illustrated descriptive folder showing construction and types of mortising by machines manufactured by the Colgan Machinery & Supply Company, Columbus, Ohio.

Concrete in Architecture and Engineering—No. 1, Vol. 3, Feb.-March.—Issued by the Portland Cement Association, 111 West Washington Street, Chicago, shows among other interesting features, elevations and plans of concrete schools in California, by William H. Weeks, Architect; First State Bank, Plano, Ill., by Henry K. Holsman, Architect; Second Church of Christ Scientist, Los Angeles, Calif., by A. F. Rosenheim, Architect.



It Locks Stucco into beautiful, enduring walls

STUCCO walls become almost as imperishable as granite when their *base* is Bishopric Board.

There is no way for the Stucco to get away from Bishopric Board's dovetailed key—it must remain imprisoned forever. Bishopric Board, itself, is nailed immovably to the studding or sheathing. No other base can be nailed so securely. When there is no movement of the stucco, it cannot sag or crack.

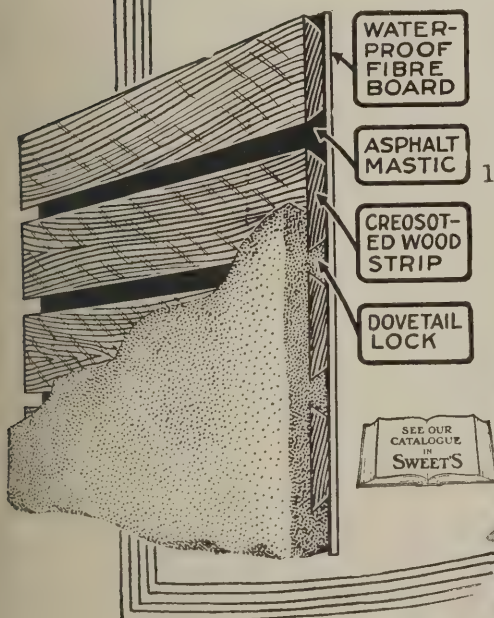
Architects and contractors like Bishopric Board not only because of the rigidity and permanency of the wall it produces, but because of the ease with which it is handled and the simplicity with which it is applied.

Bishopric Sheathing replaces ordinary sheathing at a saving of 30 per cent. It makes a solid wall in which there are no knot-holes.

Write for the booklet that tells in detail all the remarkable facts about the economy and efficiency of Bishopric Stucco Board and Bishopric Sheathing. It contains stucco formulas and valuable hints on methods.

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NATIONAL BUILDER

Volume 63

Chicago, April, 1920

Number 4

The Situation

ONE of the most encouraging signs that a better understanding of conditions is slowly making way in the building industries is the announcement from the Federation of Labor headquarters of an agreement that the thirty-six unions engaged in building will leave all jurisdictional disputes to the decision of a board of award and that no work shall be stopped pending such decision.

This means that building will not be subject to the uncertainties and interruptions due to jurisdictional disputes among the union workmen.

Indications are that prices will not decline except after a long time, and then only to a limited extent, and for some materials the tendency will continue upward. Among the reasons for this at the present time is the fact that there is not only a shortage of cars, but the decision of the Supreme Court ruling that the Interstate Commerce Commission shall value the railroad properties at their present replacement value instead of at their original cost will, in the opinion of experts, make the valuation of the railroads in excess of their total capitalization. This means higher freight rates.

Added to this is the demand for wage advances totalling \$1,100,000,000 by the railroad employees presented to the joint conference of railroad managers and workers held in Washington. However this demand may finally be compromised it is a safe assumption that substantial advances will be conceded, with a consequent addition to freight rates.

As it should be evident that the development of the nation and its resources must be seriously slowed down by the almost insurmountable obstacles placed against building in the matter of transportation, the burden that this industry carried as a war measure should not only be removed but an impetus given to building at this time by at least a limited period wherein it could be encouraged by a preferential tariff. That such a tariff has reasonable grounds is shown in part by a quotation from the resolutions passed at the National Conference on Concrete House Construction wherein these views are expressed:

"No further increase in freight rates on building materials and equipment should be allowed by the Interstate Commerce Commission or by the various state utility commissions having jurisdiction in such matter, pending the relief from the house

famine. * * * Materials used in building operations, such as cement, brick, stone, lumber, steel, etc., are shipped in carloads. The majority of them are transported for relatively short distances only, and utilize the full cubical or weight carrying capacity of cars. * * * The freight rates on traffic in general throughout the United States, on June 25, 1918, were increased 25 per cent as a war measure, while the average advance made in freight rates on

The demand for building is an essential demand and must inevitably surmount all the difficulties that tend to hinder.

building materials was 50 per cent. In the case of building construction, the transportation rate plays a very important part. The ratio of freight paid to total cost is higher with reference to building materials than to commodities in general; for instance, on sand, the rate of freight is often many times the value of the sand at the pit, while on a silk shirt the cost of transporting across the continent is so small a per cent of the selling price as to be negligible. Therefore, to increase freight charges on building materials one cent per hundred pounds is to enhance the cost of the structure greatly. This is permanently reflected in the rental. An increase of even \$5 per one hundred pounds in the rate on silk shirts would be barely noticeable to the purchaser. Any further advance in freight rates on building material will retard building operations and will serve to perpetuate and further aggravate the inequitable and unjust advance in the rates on building materials that was put into effect on June 25, 1918."

Apart from the serious obstructions to building due to the railroad situation there remains the demands of labor for increased pay. That these increases may ultimately be conceded must be gauged by the fact that there is little likelihood of the

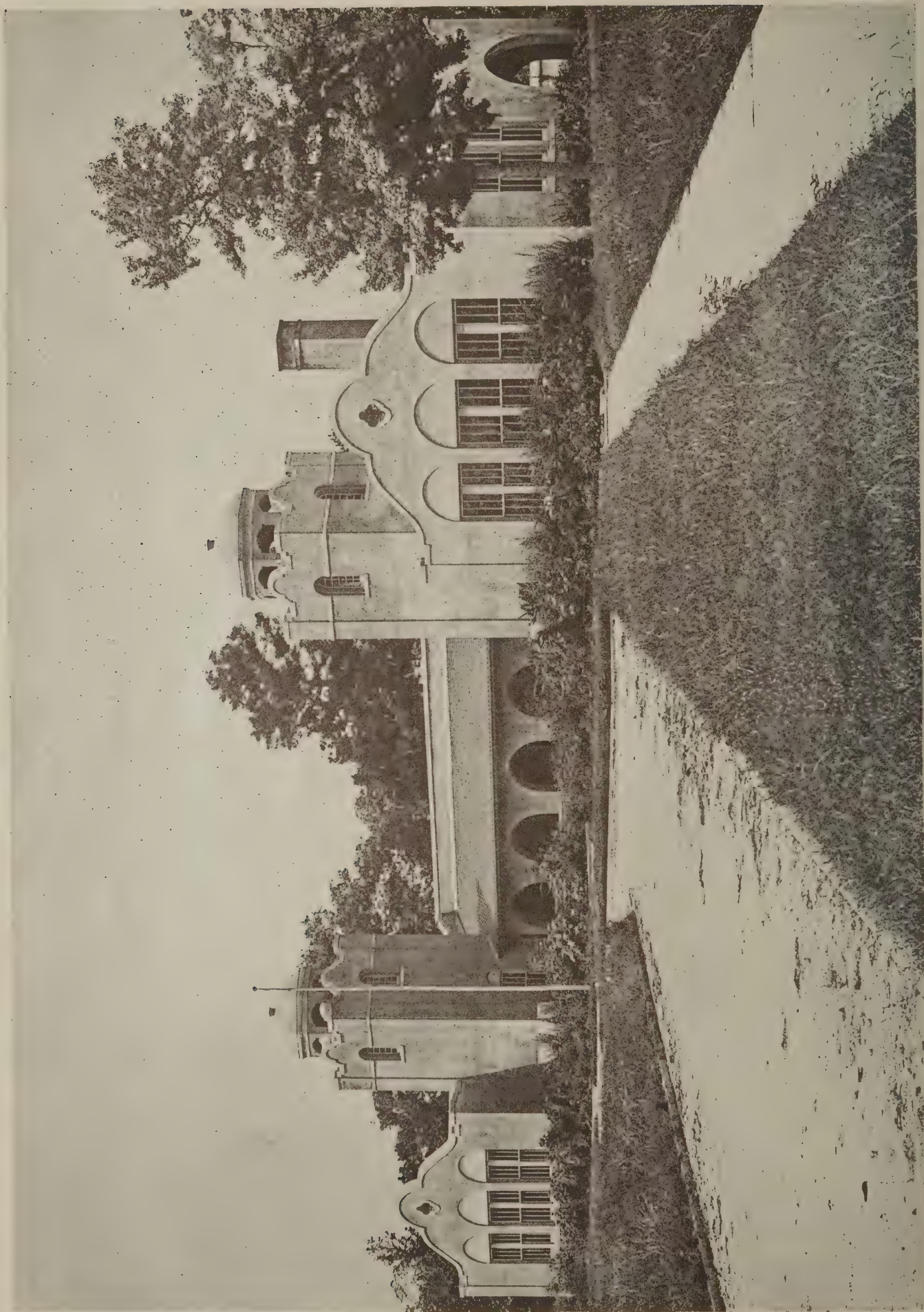
cost of living being reduced, and that whatever reduction comes will come slowly as production arrives closer to filling demands of all kinds.

Representative of the feeling in many communities a letter from the chairman of a committee of the Chamber of Commerce in a western city says: "Like practically all localities we are faced with a serious house shortage. There is an inclination to build, but there is, of course, not only the unusual difficulty in getting materials, but there is fear that the present high level of building cost may not be sufficiently maintained to make the investment a safe one."

In meeting this condition it is asserted that the safeguard against any important recession in the value of building will be the slowness of production in the face not only of a national shortage but of a world shortage. Further, that there is the growth of communities commercially and socially to sustain demand. Hesitation about building cheap, and more or less temporary buildings is justified, but well-planned, well-designed and well-equipped buildings have in the past almost invariably proved realizable assets, and in addition have an important influence on neighborhood values. The use and profit from such buildings is confidently expected to offset any more or less remote recession in building costs.

In a review of the building situation in his address before the Associated General Contractors of America, February 18, Harold G. Moulton, Professor of Economics, University of Chicago, pointed out that the high price level reduces bank reserves, and in consequence discount rates have been materially raised. Raising wages with living costs is the road to disaster, in his opinion, because adjusting wages to a higher price level fails to reckon with the total amount of business to be done on that price level and must ultimately break on the rock of exhausted reserves.

The possibility of a panic as the means of breaking the "vicious circle" has been mentioned. On this Professor Moulton commented: "While nobody knows whether we shall have a panic sometime in the coming months, in view of the restricted credit situation and the necessity that is imposed upon the bankers of curtailing lines of credit as far as possible, it behooves every builder to look to his own financial and credit position first, last and all the time."



A School of the Pavilion Type

A School of the Pavilion Type

THE one-story schoolhouse idea which originated on the Pacific coast some ten years ago has resulted in two distinct types or arrangements for such buildings. For the purposes of this article the one-story school will be considered that type in which all of the class rooms are on one floor and covered with a roof in common. The pavilion type of school (also known as the cottage or unit type) will be considered the type in which each class room is in a separate building, each connected with the other by means of covered walks or cloisters. The one-story and the pavilion types have many features in common, but in this article the latter will be stressed. It is of course understood that this article deals only with the application of the one-story or pavilion schoolhouse idea to the problem which has been commonly solved by the two-story building. It is not directed toward the small, one-story, rural schools which represent probably half of America's school building capacity.

The advocates of the pavilion type of school buildings claim the following important advantages over the two-story type:

First: The plan is elastic and therefore economical, as only enough units may be provided to take care of the immediate requirements and additional units to take care of the needs of a growing community, may be economically built without disturbing existing buildings. In this way school districts may be consolidated from time to time as the advantages of consolidation become evident and desirable.

Second: The fire and panic hazard is reduced to the minimum. Non-fireproof construction may be used with comparative safety. Fire is not readily communicated from one portion to another, and the loss from water is reduced.

Third: Stairs and corridors are omitted thus conserving space and removing the sources of much dust, dirt and noise. Stairs have been responsible for many accidents resulting in serious injuries. Cleaning and janitor service is reduced.

Fourth: Light and ventilation may be had from any direction.

Fifth: Class rooms are isolated, resulting in less noise and confusion. Fire drills may be omitted; special recesses may be given classes without disturbing others; likelihood of exposure to contagious diseases is reduced.

Sixth: A greater opportunity is given the teachers and the classes for the expression of originality. Strict formality may be replaced by a certain amount of home-like atmosphere.

The chief objections to the pavilion type are that considerably more ground area is required and that the heating problem is

complicated. The former objection stands, but with regard to the latter it is claimed that the difference in cost of installation and operation is negligible in view of the fact that long, vertical runs are replaced by slightly longer horizontal ones, and that the simplification of the building construction in the pavilion type overcomes the increased cost of the heating equipment.

Probably the most satisfactory heating equipment for such schools is the "washed air, fan system." In some cases the tem-

Reproductions of the Original Plans of this School Photographed Directly from the Architects Blueprints are Shown in the following Pages

pered air is reheated by means of coils placed in the ducts near each class room. This method provides recirculation of air in the class rooms even when the fan air is not running. In a few instances each class room has an individual fan, air washer and heating coils. These may be placed in the space above cloak rooms and directly regulated by the teacher.

An important feature of the pavilion type is the absence of a basement. Heating plants are usually built in a separate building and connected to the pavilions by means of ducts. For steam or water systems the boiler may be placed in a pit to provide drainage for the returns.

Pavilion type schools require considerable space for their proper development. Tracts for grade schools should contain at least four acres and high schools may often require as much as twenty acres. By proper development these large grounds may be made to serve not only for the purposes of a school, but also as recreation and athletic grounds for the entire community.

Another important feature of the pavilion type school is the administration building. This is usually a two-story building containing the principal's office, the library, auditorium, gymnasium, toilet rooms, mechanical equipment and other features that have common relation to the entire school. In the most successful schools the administration building serves as a community hall, and together with the recreation grounds, has become an important social center.

The pavilion school shown on the accompanying pages was planned for the city of Houston, Texas, under the administration of Maurice J. Sullivan, city architect. The site is triangular in form and shows the ease of fitting this type of school to almost any location. The tract contains approximately five acres and was utilized for a group containing an administration building, gymnasium building and six pavilions containing two rooms each.

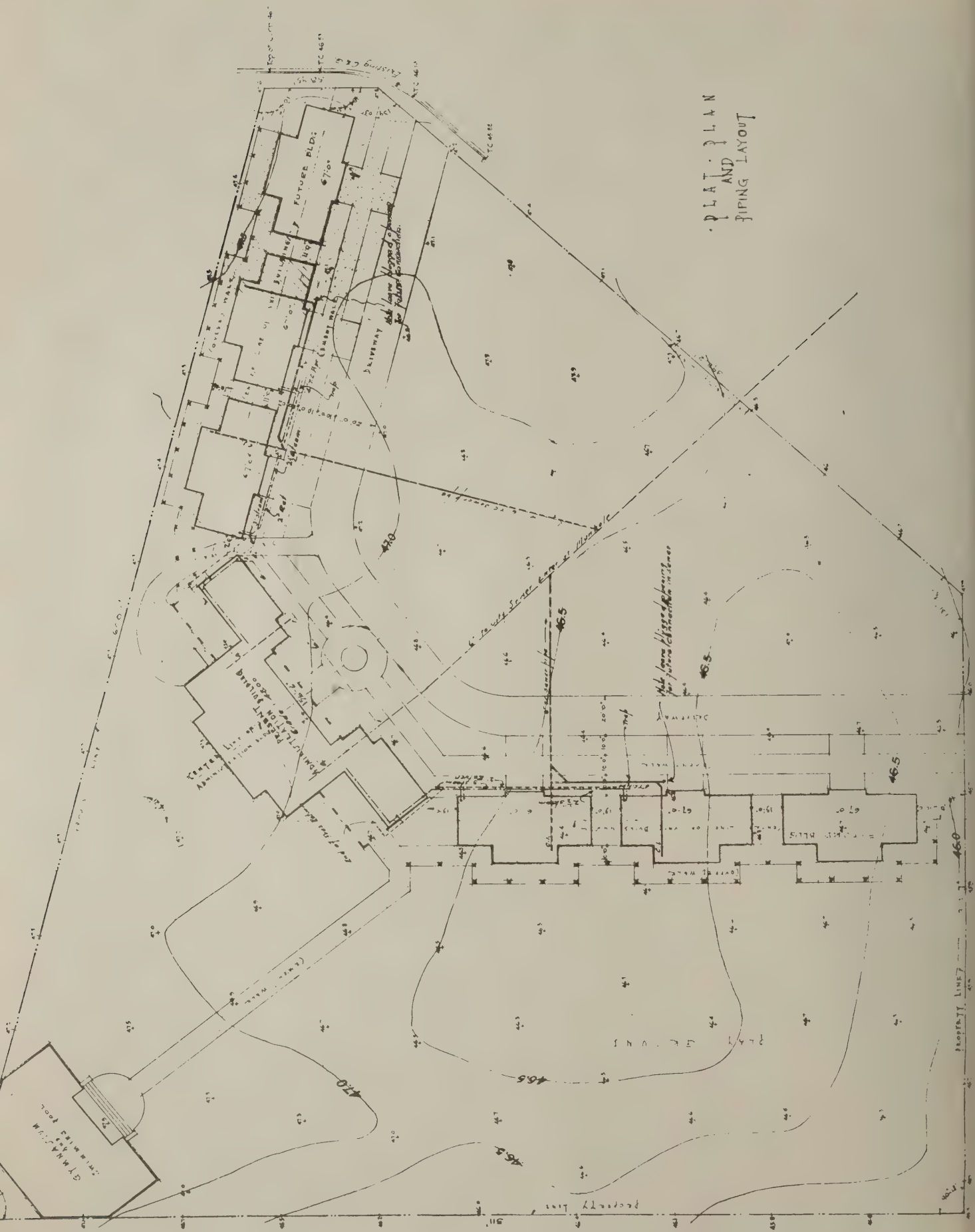
The administration building contained several class rooms on the first floor and also the school library, heating plant, offices, etc. This building was built first and the pavilions have been added as the need grew. The gymnasium building is located in one corner of the grounds and contains the usual equipment, together with a swimming pool.

The photograph shows the administration building, while the drawings show a typical pavilion or unit.

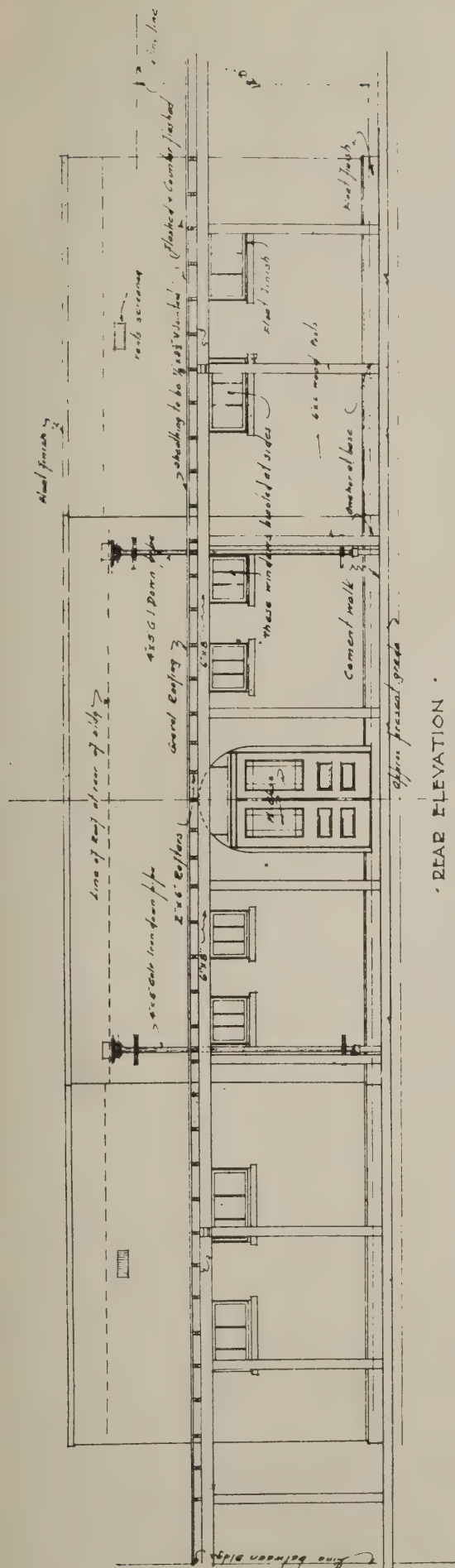
The walls are of hollow tile, stuccoed. The floors are of edge grain yellow pine laid on a concrete sub floor. All trim is of pine except the base boards, which are of cement. The roof is of frame construction covered with felt and gravel.

Each contains a drinking fountain and each class room has separate toilets. If general toilet rooms were provided in the administration building this item of expense would be reduced considerably. The buildings are heated by means of a steam system employing ordinary radiators.

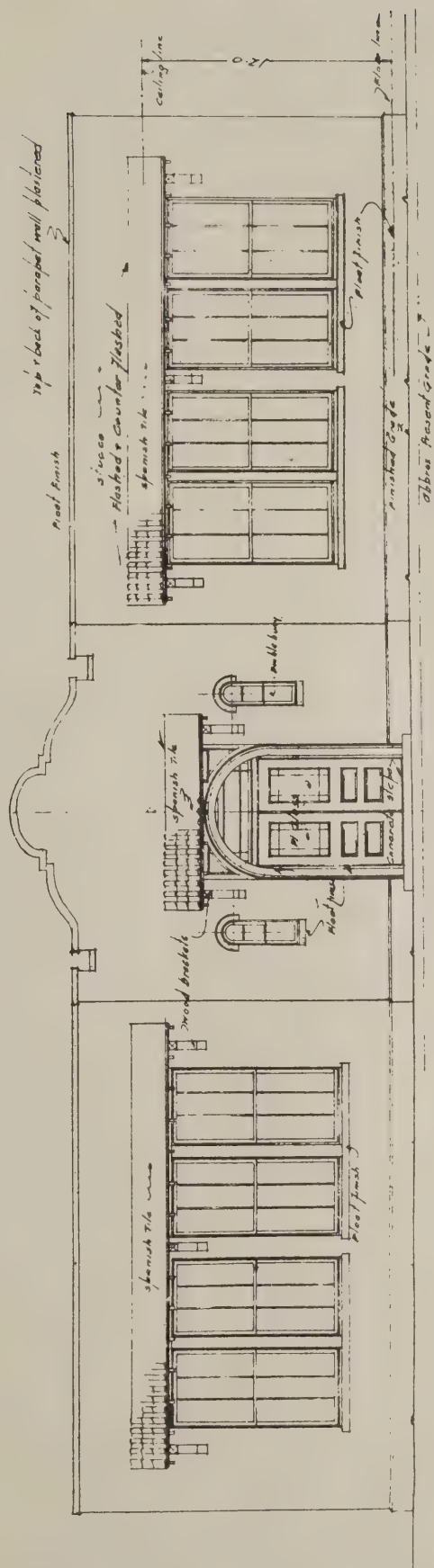
The introduction of corridors between the class rooms defeats one of the aims of the pavilion type. It may be said, however, that the corridors prevent noise from being transmitted directly from one room to another. The same result might be obtained by forming vestibules at each doorway with cloak rooms between.



PLANT AND PIPING LAYOUT

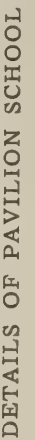


REAR ELEVATION.



- FRONT ELEVATION

ELEVATIONS OF PAVILION SCHOOL



Profit in Apartment Buildings

By Charles E. White, Jr.

The First of a Series of Articles on the Planning, Construction and Operation of Apartment Buildings

THE big demand for apartments by an army of home seekers continues and the movement for flats, large and small, has now assumed the proportions of a boom. This applies not only in large cities with populations up in the millions, but to smaller cities and towns in which, hitherto, apartment buildings have been the exception rather than the regular form of building. Even towns with a population as low as 10,000 now find that a considerable proportion of their inhabitants require flats.

This ever increasing demand for apartments has been largely brought about by the demand by housewives for less arduous labor in housework and more time for educational and recreational pursuits. A certain number of families in every community are home builders, of course, and they continue to require a considerable number of houses and home sites, but the proportion who require apartments is constantly increasing. This demand must be



Plate 1—Typical two-flat building which has been found profitable in many communities. In small towns this idea can be used to excellent advantage as it makes it possible for a thrifty man to "own a home" and rent a portion of it, besides. Johnson and Tyden, Builders



Plate 2—A subdivision showing two-flat buildings which, in this instance, were sold as fast as they could be built. The best way to operate is to build first on alternate lots, and then improve the vacant lots between. Johnson and Tyden, Builders

met by investors seeking to put their funds into enterprises where returns will be commensurate with the amount of money involved, and at the same time keep capital properly safeguarded.

Scarcity of apartments as well as increased cost of building has driven rents up to a point which conservative real estate authorities believe is higher than that which will attain in normal times. At the same time it is granted by experts that rents will never, probably, go back to the low level of 1915. They point to the fact that cost of labor and materials will probably not materially decrease during a period of five or six years and possibly more. Thus, cost of building, while it may be now slightly above what it will be a few years hence, will probably remain uniformly high, and of course rents must remain proportionately high as well.

There is no better way for the investment of the surplus capital of any individual who has by industry and thrift built up a surplus from his earnings, than in financing and building apartment buildings.

Hardly any town is too small for at least a number of these buildings which always have been and now are increasingly in demand. The character of such a building, of course, is largely determined by the size of the town, personality of its population and value of the district in which the building is built. In some places it pays to include apartments of generous size containing a large number of rooms, charging high rents accordingly. In others, smaller apartments will prove more profitable.



Plate 3—A large apartment building containing small two and three-room flats renting from \$65 upwards. In the construction of this building the materials were kept down to the lowest possible cost without using inferior grades

Before beginning plans for any apartment building the situation should be looked over carefully to see what kind of investment will prove wisest in a given locality. In this way mistakes can be avoided and one may be assured of a wise investment—one that will improve as time goes on and yield a good profit on the capital employed.

Consider, first, a town of, say, 15,000 to 20,000 inhabitants—a self-supporting manufacturing community, where the chief revenue is derived from local industries, not from outside sources.

It has been found in such towns that a certain proportion of the population prefers to house itself in small homes, and it has now come to be the custom for business interests to build such homes and sell them to their employees on installments.

Another considerable percentage of employees, however, prefer to live in apartments, financed either by the business interests of the town, or private individuals.

In towns of this character the most popular demand requires about four or five rooms, consisting of living room, dining room, one or two bedrooms and kitchen. Frequently a wall bed is placed in the living room or dining room. Flats reduced to a lesser number of rooms than this are popular in larger towns and cities, but rarely in the smaller towns where wage earners usually have large families and need more room.

A very popular type of apartment building for small towns is the "two-flat" building standing by itself on 30 to 50 feet of ground, with sufficient room in the back yard for a small garden. Thrifty wage

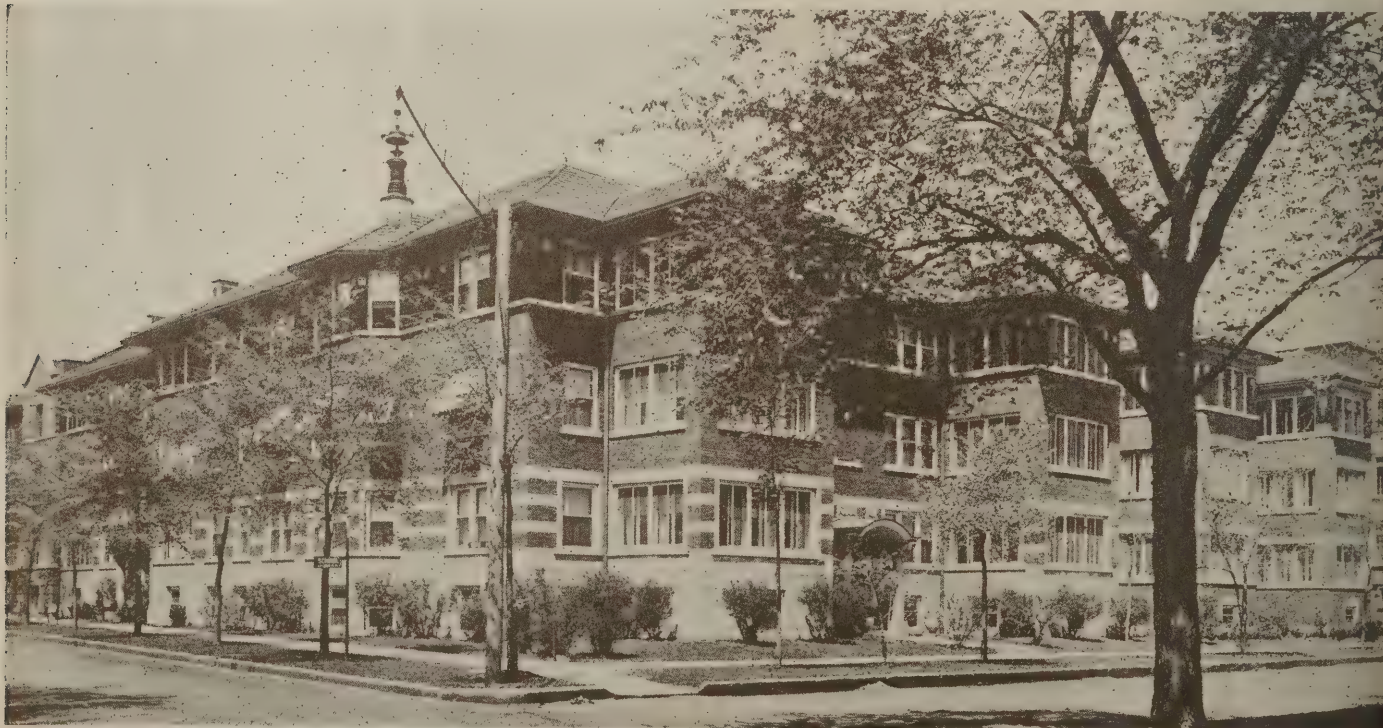


Plate 4—An elaborate apartment building for a choice location in a prosperous town where tenants demand the best and are willing to pay for it. These apartments are usually profitable only in towns or cities of upwards of 35,000, where business men are well-to-do and can afford high rents

earnings appreciate the advantages of owning such a building, living in one flat and renting the other, thus getting their own rent practically free. The initial investment is small, compared with a larger structure and there is active and ready demand for such buildings so that any owner can sell out quickly and, usually, at a substantial profit.

Manufacturers welcome apartments of this character because it helps them to solve the housing difficulties of their employees more rapidly and with less land required than when single homes are built. More families can live within a given area, the buildings are constructed more rapidly and frequently are more salable than single homes. Thrift has always been a national institution with most foreign labor and now, in our own country, the educational energy of the government in encouraging thrift during the Great War has taught thrift to the majority of American wage earners. "Floaters," of course, are not attracted by housing investments of any sort but the reliable wage earners, the kind all manufacturers are seeking, and when found the sort they are endeavoring to keep in their employ are greatly attracted toward the "two-flat" housing proposition.

Real estate operators, appreciating the profit to be derived in this field, are buying up huge tracts of land in smaller manufacturing towns where business is good, and erecting row after row of these little buildings; the general custom is to build on alternate lots of 35 to 50 feet in width, the lots between buildings remaining vacant for the time being. After the flats are sold the new owners are encouraged to purchase and improve the vacant lots next door, and it has been found that they usually meet with ready sale. If not sold, the original owners build on the remaining vacant and thus realize upon the entire project.

As soon as you get into cities of, say, 25,000 to 50,000 population you will find a demand for the smaller apartments in which the wall bed becomes the most conspicuous piece of furniture. These buildings, usually covering an entire square, frequently contain 25 to 50 apartments, consisting of a living room, bedroom, kitchen-breakfast porch, and sometimes a dining room. A wall bed is usually contained in the living room and often in the dining room, when there is a dining room.

There is every reason to build large buildings containing the greatest possible number of small apartments in communities where the size of population makes it feasible, because of the increased value of the land in such a city. The ordinary building lot with 100-foot frontage might contain not more than three two-flat buildings housing six families, but when a large structure covering two-thirds or three-quarters of the lot is built containing 3-room apartments, as many as 25 or 30 fam-

ilies can be accommodated. Thus, on a given investment for land, the returns are much greater from the larger number of families. This more than offsets the increased first cost of the larger building.

Another quite remarkable fact in favor of the larger building is this: In a live town, where the location of the building has been carefully studied and the building is built on a really desirable piece of property in a good district not too far from transportation, the rent for each of the smaller flats is often as much, and sometimes more, than what one can get for a larger apartment in a two-flat building.

The wall bed, of course, has made small apartments possible and there are many families who will actually pay more for a small wall-bed apartment than they would pay for a larger flat. Many wives are discouraged with the increased difficulty of getting servants to do the housework, and as they do not care to make slaves of themselves, they welcome an attractive, sanitary little home where it is easy to do their own work in a very few hours a day, freeing them forever from the anxiety of keeping up a larger home.

Now this brings the proposition right down to the investor. Granted, that apart-



Plate 5—Often old brick buildings can be remodeled into modern apartment buildings as was the case with this building situated near Boston, Mass. The interior was slightly rearranged and a new front was built. Frank C. Brown, Architect

ment buildings are profitable in most towns, how can they be financed, and how many architects and builders cash in on the enterprises?

Local Business Men's Associations and Chambers of Commerce are alive to housing needs of their towns as never before. In fact, the future prosperity of many towns, especially manufacturing centers, rests very largely on the successful solving of the housing problem. Mechanics cannot be expected to remain in a town where they cannot secure comfortable accommodations for their families. In fact, it has been proved that mechanics will throw up their jobs and move away from towns where houses and apartments are inadequate, and cast their lot in other more progressive places where the conditions are more ideal.

Architects, builders and real estate operators can take advantage of the needs of

forward-looking town improvement organizations to help in the financing of apartment buildings. Bankers can be shown that their interests lie in the promotion of such plans as will put their town in a better strategical position along the lines of manufacturing, as well as general business. They will help if a definite, concrete proposal is put up to them.

It is up to architects and builders to formulate some definite plan for the housing of an extensive population by means of apartments and single homes. Go before the local Chamber of Commerce or Business Men's Association with a comprehensive layout of property, carefully worked out in every detail. Show just how much such property would cost and how much revenue can be expected.

With a well formulated plan carefully thought out and backed by a group of men

of known and tried integrity you will find that every manufacturer and business concern of the town will be interested. You may reasonably expect that they will take hold of the plan and put their own money into it, if it stands on a sound basis.

No business man can be termed progressive unless he looks ahead for the good of his town. It is up to the builder to stand at the fore-front of constructive progress of his town just as it is up to the architect, and it will be found that "dollars and sense" make a happy combination when grouped with ideas. The future growth of any town or city will be stable and assured if the leaders in the business life of the community are pushers. The time has come for the builder to get into the band wagon and not only push, but be a real leader. It is by such methods that American communities grow.

ENTRANCES



Plate 1—A simple Colonial entrance just a trifle wide for its height. A flower-box built into the top would be effective



Plate 2—A very charming entrance, simple yet interesting. The slight projection of the cornice and the curved roof line add grace to the composition



Plate 3 and 4—Entrance to a parish house in Houston, Texas. Cram & Ferguson & W. Ward Watkin, Architects.
English half-timber work, very simple and effective



Plates 5 and 6—Unusual entrance in New Orleans. The brick trimming around the doorway is well handled. Note the cement seat in the corner and the graceful iron balcony above

\$500 Plus Brains Makes a Millionaire Builder



A row of bungalow homes in Oklahoma City

SOME ten years ago E. L. Aurelius arrived in Oklahoma City with five hundred dollars. Today he is reputed to be a millionaire and is the president of the Aurelius-Swanson Company, Incorporated, which operates a building department having a paid up capital of half a million dollars, and a lumber and builders' material department having a paid up capital of 150,000 dollars. In addition to these interests the company also carries on an enormous business in real estate, mortgages, bonds and insurance.

Upon his arrival in Oklahoma City Mr. Aurelius engaged in the real estate business. This line, however, did not offer a sufficient outlet for his creative abilities. One has to talk to Mr. Aurelius but a very few moments before becoming conscious that here is a man who could never content himself by merely making money. He has the creative instinct that demands some



E. L. Aurelius

medium of self expression for its appeasement. To him a house which he has built represents an achievement, and not merely a source of profit.

In the past ten years the company's needs have grown from desk room in a small office to the present extensive suite which occupies the entire tenth floor of a modern office building. The company has built more than six hundred homes in Oklahoma City alone, entire residence districts testifying to the enormous activities of the company; 130 houses representing well over a million dollars' worth of work were erected in 1919 and the company expects to easily double this record during 1920.

The company refuses to proceed with any building work until complete sets of working drawings have been prepared. Mr. Aurelius states that this precaution is a highly important one, as no builder no matter how well experienced can afford to



One of the fleet of trucks



The woodworking shop



Modern needs are practically and artistically carried out

guess at the probable cost of a building nor expect his men to erect economical and efficient houses from floor plan sketches alone. As the major portion of the company's building work is in the nature of real estate development, an architectural department has been established for the preparation of plans and specifications. An estimating department prepares an accurate itemized estimate for every job undertaken by the company, no matter whether a one-car garage or a mansion is involved.

The company's building department alone employs from 125 to 250 men, according to the season. The loyalty of the men to the

organization is unquestioned. To hear almost every employee, from the executives down to the water boys, speak of *our* company instead of the company, gives an index to an important reason for the success of the business. It has lately become generally understood that the success of any business depends to a great extent upon the contentment of the employees and upon the co-operation of every member of an organization. This policy is not new to the Aurelius-Swanson Company, however, but has existed from the beginning of its operations.

The company does practically all of the

work that enters into a building. Electric work, plumbing, painting and decorating and other work which is usually done by sub-contractors are handled through subsidiary departments, which also carry on an extensive retail business, as well as work for other builders.

The lumber company mentioned in the beginning of this article is an important feature of the organization. The lumber company is an outgrowth of the building business and was organized about three years ago. It is in every sense, except ownership, a distinct establishment that furnishes materials not only to the company's



Typical interiors



Plate 2



Plate 3

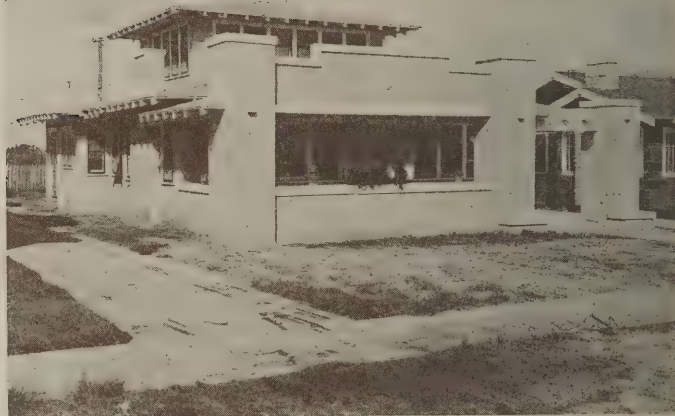


Plate 4



Plate 5



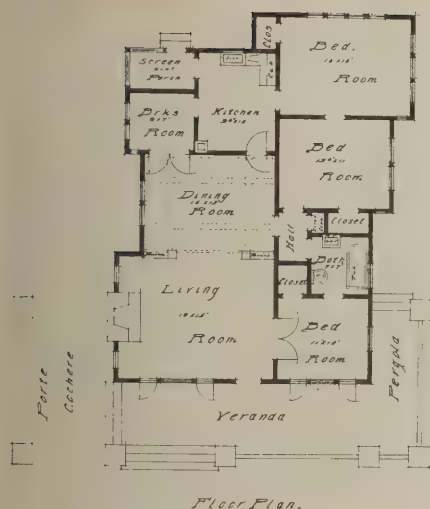
Plate 6

building department, but carries on a regular retail business, including the furnishing of materials to other builders. The lumber department sells its stock to the building department in precisely the same manner as would be employed by two independent concerns. In this way the good-will of

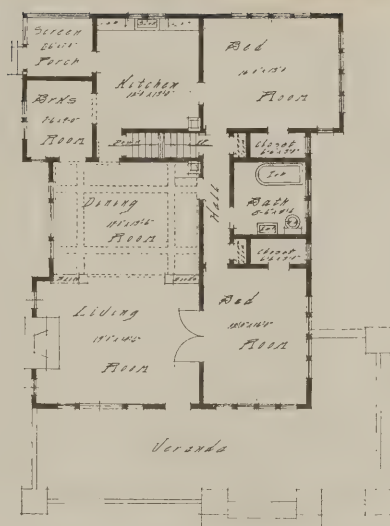
other builders is kept to a surprising degree. That the lumber company has been highly successful in the few years of its existence may be gathered from the fact that it stocks over four million feet of lumber and its estimated sales last year amounted to upward of half a million dol-

lars. Five motor trucks are kept busy by the lumber company and teams are used only in the yard for unloading purposes.

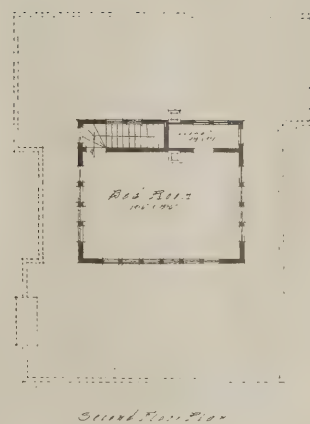
The company has recently purchased additional space for a lumber yard which it is claimed will be the largest in the state. A new millwork plant of reinforced con-



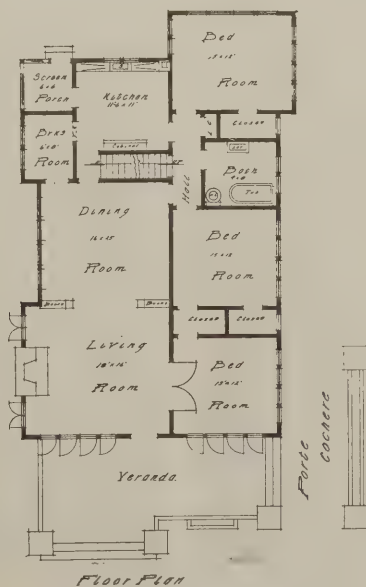
Plan of plate 3



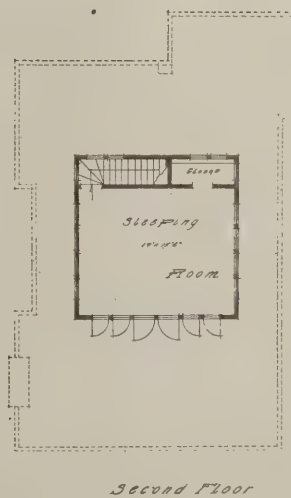
Plans of plate 4

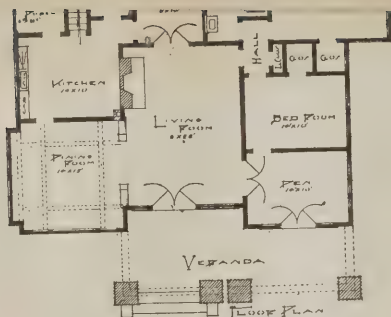


Plan of plate 5



Plans of plate 6





Plan of plate 7

crete, two stories high and 100 feet square, is nearing completion. This plant will replace the present one which, although large and well equipped, does not furnish the necessary amount of millwork required by the expansion of the company's business. The new mill will carry on the work of the old in furnishing sash, doors, cabinet work and all other millwork requirements.

In view of present high costs it is interesting to note that Mr. Aurelius has

grade plumbing, lighting fixtures, cabinet work, heating plants, interior decorations and quality in every particular were not often insisted upon by the average man. Today, however, such things are taken as a matter of course and only the highest grade products will meet popular approval.

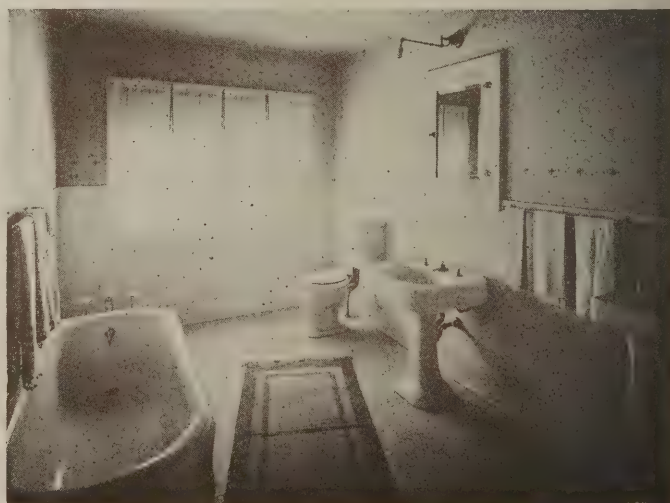
The large number of illustrations which accompany this article give a faint idea of the volume of work carried on by the company. The houses built by the company range in cost from \$5,000 to \$35,000, but for the purposes of this article it was thought best to select houses of moderate cost which have a general appeal. Several of the houses shown are of the airplane type, bungalows with sleeping rooms built in a magnified cupola. This type is very popular in the Southwest, as the windows on three sides of the rooms assure that on hot nights full advantage of cool breezes may be taken.

With respect to the purely architectural worth of these designs there is much to

in an effort to please his clients. That he is giving the people what they want is attested by the volume of business handled.



Type of some of the bathrooms



Typical bedroom and bathroom



The "balloon" type of bungalow is ventilated by the air from every quarter



Typical kitchens and kitchen equipments

A builder who can earn an increase of capital of more than thirteen hundred per cent in ten years has surely earned respect for his judgment and methods of business.

A notable feature of the houses built by

this interest is the studious care in providing the latest and most ingenious types of household conveniences. The illustrations which accompany this article are merely suggestive of these, and it is in

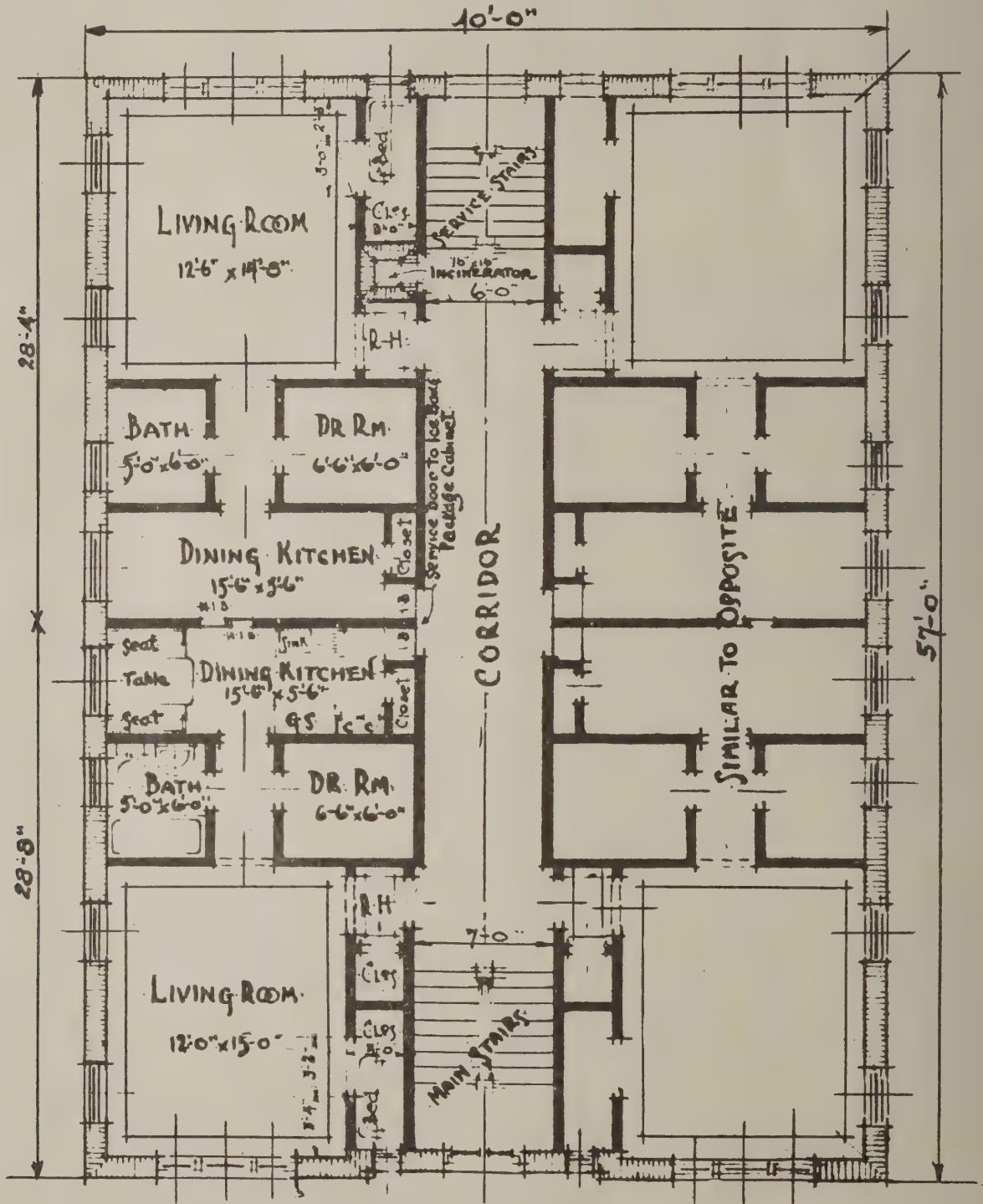
such matters that the comprehensive understanding of the buyers' tastes and needs are shown, as well as in considerations of his preferences in the character of design and construction.

Twelve-Apartment Building

THE accompanying illustrations show a kitchenette apartment building built by the McCaules Investment Company for the Gregg Realty Company of Kansas City, Mo. During 1919 the Gregg company built

similar to the one illustrated, and nineteen are 6-unit, 5-room apartment buildings. At the present time four 24-unit and three 12-unit apartment buildings are under construction for this company.

the lintels of the wide windows is unusual. An improvement would result if the stone corner blocks of the small windows were omitted. The cornice is somewhat heavy but it should be noted that steel lintels are



27 apartment buildings having an aggregate cost of nearly a million dollars. Of these one is an 80-unit kitchenette apartment, seven are 12-unit kitchenette apartments

The treatment of the exterior of the building illustrated is simple and direct. The wooden balconies add interest to the front. The treatment of the brickwork at

saved by extending the cornice down to the upper windows.

Each floor contains four apartments consisting of a living-room, dressing-room,



Plate 1—The exterior is a simple design in brick with wood and stone trimmings.

bath and a dining kitchen. A wide corridor runs through the center of each floor and connects with the main stairs at the front and with the service stairs at the rear. The

building has no rear porches and the rear stairs are contained inside of the main walls. This makes a compact arrangement, and as a garbage chute leading to an in-

cinerator is provided the service may be kept clear at all times. The refrigerators may be iced from the corridor, and package delivery cabinets are provided, so that



Plate 2—The living-rooms are well lighted and their simple treatment harmonizes with almost any style of furnishing.



Plate 3—Another view of the living-room showing the wall bed swung into the room.



Plate 4—One end of the kitchenette. Reference to the plan will show that some changes were made during construction.



Plate 5—The other end of the kitchenette showing the built-in seats and table.

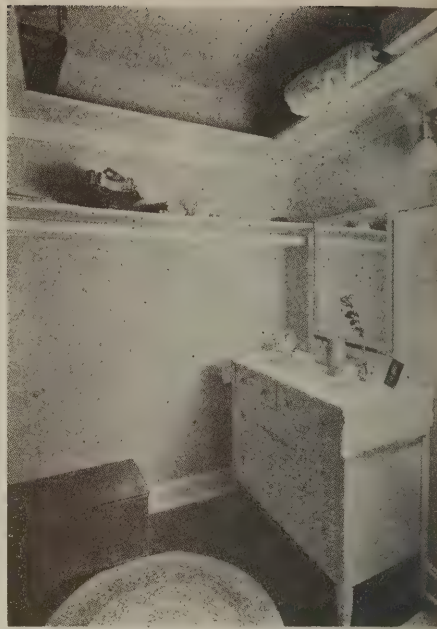


Plate 6—A corner of the dressing closet. Note the storage shelf running around the upper portion.

deliveries may be made in the absence of the occupants of the apartments.

The apartments are entered through a small entry leading off the corridor. The entries contain coat closets at one end.

Each living-room has a disappearing bed and thus becomes the equivalent of two rooms. The merits of this scheme for reducing building costs for the owner and for lessening housekeeping labor for the tenant are too well known to require explanation.

The dining kitchens are conveniently arranged. The kitchen portions are well equipped with built-in features such as refrigerators, cabinets, closets, ironing boards, and so forth. The dining portions will accommodate four persons comfortably.

In this case the company rents the apart-

ments completely furnished, but it should also be recognized that in renting unfurnished apartments the important advantage of built-in furnishings forms a very effective talking point that will again merit consideration when our present housing shortage is overcome.

Damp Course for Tile Wall

HOLLOW tile, or any masonry walls for that matter, should always have a damp course inserted between the foundation and the upper wall. The purpose of such a damp course is to prevent moisture from passing from the foundations—which are almost always more or less damp—into the upper walls.

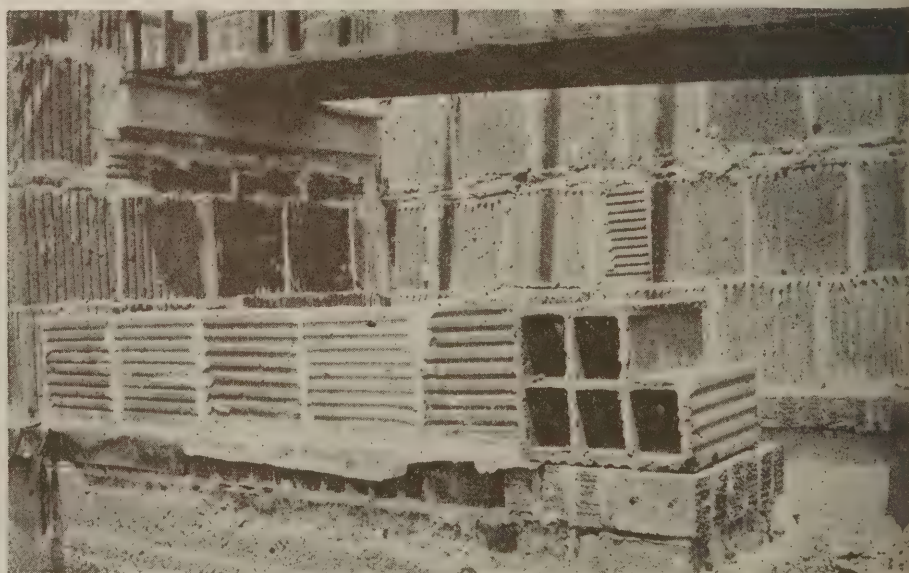
This passage of moisture is caused by capillary attraction or by absorption, and may be compared to the action of oil soaking into a lamp wick. Damp walls are not only unhealthful, but are subject to rapid decay and are often rendered unsightly by the action of moisture.

The accompanying photograph shows



Plate 7—The bathrooms have tile floor and wainscot. The large medicine cabinet is a practical convenience.

The dressing-rooms are large enough for their purpose and the bathrooms, although compact, are well arranged.



Damp course for tile wall

an effective way of forming a damp course for a tile wall. In this case the brick course is used merely for the ornamental effect and is supposed to finish just above the finished grade. The top surface of the brick work is first coated with hot asphaltum, then a course of heavy waterproof paper is laid on the asphaltum, and this in turn is given a

coat of hot asphaltum. Finally the hollow tile is laid in this. Thus a waterproof membrane or skin is formed between the foundation and the upper wall, and if this skin is continuous and unbroken around the entire building there will be no opportunity for moisture to penetrate the upper walls from below. In the present example it would have

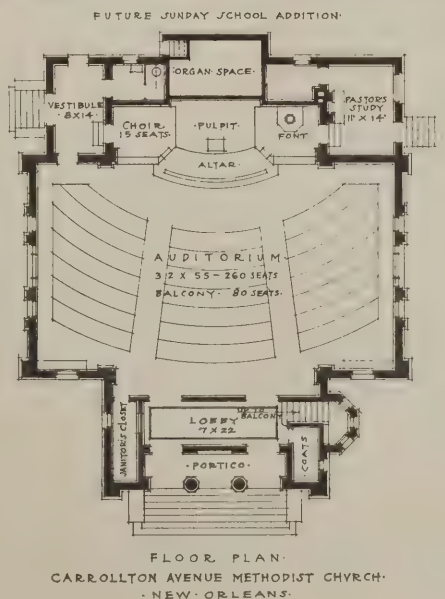
been as well to place the damp course between the brickwork and the foundation instead of between the brickwork and the hollow tile, as shown. Thin slate slabs are also used as damp courses and may be used in connection with asphaltum or with cement mortar, as desired. Slate is considered by some to make the most durable damp course.

A Novel Church



TO the average man the word church implies a building in the Gothic style. In fact, church building committees usually specify that the building be designed in this style. In connection with this requirement it is also often further required that the auditorium be of the square type. Now the principal characteristic of a true Gothic church is the long, narrow plan upon which the design is based, and the attempt to graft a Gothic design onto a square plan results in the flat, pancake appearance that has caused so much criticism of modern church design. It should be understood that the writer has no quarrel with Gothic as a style for churches. Its use is logical and highly desirable when properly used. But there are other styles better suited to the square plan favored by many congregations.

The accompanying illustrations show a church designed for the Carrollton Avenue



Methodist Church of New Orleans. The architect for this building was Samuel Stone, and both he and the congregation are to be complimented for the very excellent building which has resulted from their departure from the stereotyped customs of church design.

The style is a free handling of Romanesque with a flavor of Byzantine. The walls are of hollow tile faced with brick and stucco. The roof is of tile.

A noticeable feature of this building is the absence of carved or modeled detail. The only stone used is in the columns and the buttress caps. The detailing of the brickwork is almost faultless, although more logic might be introduced if the buttresses were replaced with pilaster strips. The contrast of the dark red brick with the white stucco gives a sparkling effect that is heightened by the introduction of the

jade green tiles into the band course around the loggia or portico.

The plan of the auditorium follows the outline of a Greek cross rather than a square. The auditorium seats 260 people and additional space is provided by the balcony which seats 80 people. The balcony is reached by means of a stair from the lobby. A small coat closet is provided adjacent to the stair. At the opposite end of the lobby is the janitor's closet.

There is also an entrance to the auditorium from the side street. This entrance is through a large vestibule which may be utilized as a choir room. A door leads from the vestibule to the choir space. A toilet room is provided near the rear of the vestibule. The space immediately behind the pulpit platform is used as an organ chamber.

The pastor's study is also placed at the rear of the church. It has a private en-

trance from the side and a door leading to the rostrum. This room has a fireplace and a large storage closet. The latter might be provided with toilet facilities if desired.

This church, taken as a whole, is a splendid example of what can be done in the way of introducing novelty into church design without departing from reason and good taste.

Wooden Floors on Concrete Slabs

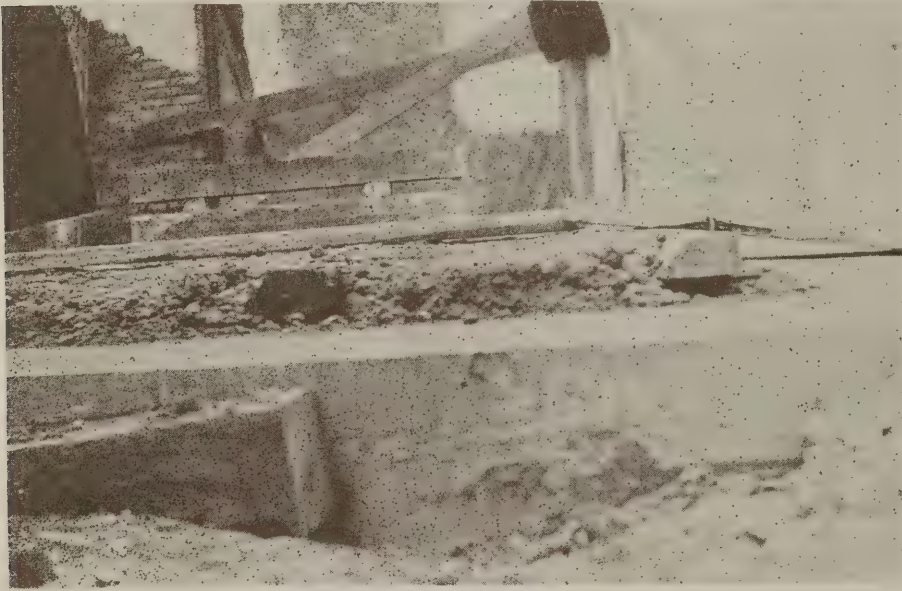
THERE are several methods in use for laying wood floors over concrete slabs. Probably the most common method is the one shown in the accompanying photograph, in which wooden sleepers are used to provide a bearing for the flooring.

The sleepers are made of two-inch stuff with either one or both edges beveled. Two-by-sixes ripped on a bevel down the center are often used. These are

been nailed to the bottom of sleepers and embedded in the filling to prevent the floor from springing. The strips may be made of $\frac{1}{8}$ by $1\frac{1}{2}$ -inch hoop iron, cut in about 10-inch lengths and nailed to the sleepers at about 3 or 4-foot centers. Where sleepers pass over steel beams they may be secured to them by means of clips hooked over the beam and having the other end fastened to the sleepers.

against dust filtering through from the mortar filling. It should be remembered that the spaces between sleepers are used for running pipes and conduits in the floor and that the mortar filling should not be placed before this work is done.

Devices for fastening sleepers to concrete floors have lately been placed on the market. These are composed of a pressed steel perforated ring with a wooden core, and are cemented to the concrete slab. The sleepers or floor screeds are nailed directly to these fasteners and the flooring placed on top in the usual manner.



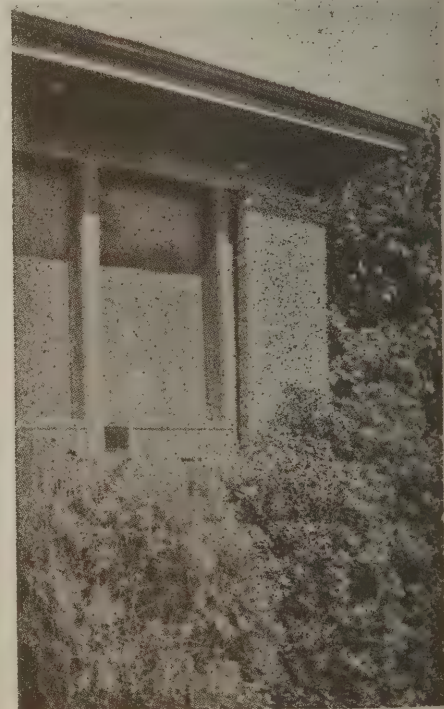
Wooden floor on concrete slabs

laid on top of the concrete slab at about 16-inch centers and mortar is poured between them and leveled off flush with the top. The mortar filling may be ordinary deafening mortar made of lime or may be made of cinder concrete. Its principal purpose is to form a fire stop and to prevent vermin from running beneath the floor, and it should be light in weight so that the concrete floor slab may be made as light as possible. The mortar filling should be made of a mix that is rich enough to hold together so that it will not dust and pass up through the flooring after it becomes old. A mix of one part cement to eight parts of cinders has given good satisfaction.

In some cases hoop iron strips have

The sleepers should be made of sound, durable lumber, as they are highly subject to rot and are not easily inspected nor replaced. Chestnut and cypress are considered excellent for use as sleepers, but any sound heart-wood, well creosoted, should prove satisfactory. Care should be taken to lay the sleepers level, as rough floor slabs are usually very irregular and, of course, will result in an uneven floor surface unless the sleepers are set level. The finished flooring is nailed directly to the sleeper just as it would be to ordinary joist construction. Sometimes a double floor is used on sleepers, but this is not considered necessary, although such construction does offer some additional insurance

Brick Veneer Failure



Failure in brick veneer almost invariably occurs around some such member as the one shown in the illustration. Piers and other long, slender members should be built of solid brick whenever practicable, as it is almost impossible to avoid settlement at such points. In this case the settlement has caused the veneer to spring away from the frame wall.

Polytechnic High School

THE little city of Santa Ana, Calif., has what is probably the most artistic and beautifully arranged Polytechnic High School buildings and grounds to be found anywhere in the state. At the

and tapering firs, about the buildings. Out of this gracious setting the white structures rise in majesty, facing a great open space of velvety lawn. Back of the gleaming white buildings lies another

the rear, have an expanse of six acres. Between each of the main buildings space was left for another when it becomes necessary to erect it—enough of it to avoid the appearance of crowding—



Polytechnic High School, Santa Ana, Calif.

time this school was built the town had about 10,000 inhabitants.

The buildings, of reinforced concrete, were erected six years ago at a cost of \$450,000. Beside the general facilities, which are quite up to the usual standard expected of such structures, there is a singular beauty in the simple, yet artistic arrangement of the buildings that is unique.

This effect has been achieved with grounds which, at first sight, seemed to offer very few artistic possibilities. They are perfectly flat, without even a knoll to break the monotony. But there was one advantage: the grounds were ample, as high school grounds in rapidly growing western towns go, comprising twenty-three acres.

Trees in any quantity, or a grove of any sort on such a level surface would have rendered the grounds commonplace. The landscape gardener, with excellent taste, planted low-growing shrubbery, interspersed with a few graceful palms

wide, level space; the whole effect being one of nobleness and spaciousness uncommonly pleasing to the eye.

The group of buildings are disposed at right angles from one another, forming three sides of a square, the central one being the administration building, with plenty of space between all the struc-

tures which would make a group of five when complete.

While there are other high school buildings and grounds where the same general plan was followed, most, if not all of them, lack the spaciousness and dignity of effect achieved in this instance, due largely to the wide, open spaces and more extensive grounds.

One unique feature of these buildings and grounds is that no matter from what angle they are approached the general effect is artistic and beautiful.—*Delphia Phillips.*



The buildings and grounds are interesting at every viewpoint

tures. In the rear are the shops, with accommodations for 300 students, and the model bungalows, where the girls learn to keep house and dispense hospitality. The athletic grounds, also in

every licensed architect in states having a registration law shall be admitted to membership and every honorable petitioner in other states, thus uniting the entire profession in one national body.

ORGANIZATION

The American Institute of Architects is developing a plan of organizing societies of architects in all states in which none exist today. The committee in charge plans that

Kitchen Cupboards

IN THE February issue of NATIONAL BUILDER the location and types of kitchen cupboards were discussed. In this portion of the article the details will be taken up.

Drawers

Drawers for kitchen cupboards should

With high cupboards it is a good scheme to make the lower drawers step fashion, as shown by the sketch. When it is desired to reach a high shelf the step-drawer may be pulled out and used as a step. This is a practical convenience that is appreciated by women.



Plate 1—A somewhat unusual kitchen cabinet. Note the receptacle provided for electrical devices. Up-to-date ideas such as this make a hit with the housekeeper

generally be wide and shallow rather than narrow and deep. The number, arrangement and sizes are governed by the conditions and by the wishes of the housekeeper. A good arrangement, however, is to have the drawers for silver at the top of the base portion. These should be about 3 inches deep and may be divided into separate compartments for knives, forks, spoons, and so forth. Drawers for table linen should be about 6 inches deep. In some families the table cloths are rolled onto long wooden rollers and are not folded in the customary way. In this case the drawers for table cloths must be made long enough to take the rollers. The rollers are loose and are supported by cleats inside the drawers at the ends. The cleats are notched to take the rollers, the whole arrangement being somewhat on the order of a roller towel. The drawers at the bottom of cupboards are usually made comparatively deep, say 9 or 10 inches, and are used for holding wrapping paper, string, shoeshining outfits and the like.

Drawers should always be well made and it is wise to spend a little extra time and trouble on them, as a drawer that binds will surely be a source of annoyance to the housekeeper. In Figure 3 are shown two types of joints used for the corners of drawers. The half-lap dovetailed joint is used for drawers on good work, but on cheaper work the ordinary half lap joint is popular. Drawers on good work should always be mounted on metal or hardwood slides, and the bottoms of all drawers should be housed into the sides and ends.

Some women like to have a nest of small drawers built in the cabinet for holding spices and so forth. These are often placed at one end of the work space, as shown in Figure 4. A narrow shelf in this open space is also often found useful.

Toe Space

Another thing that should be provided is a toe space under the edge of a cupboard at the floor. This allows one to stand closer to the working shelf and goes far toward preventing tired backs,

scuffed shoes and ruffled tempers. Toe spaces should be made about 5 or 6 inches high, and should be open at the ends or else have splayed corners so that dirt may be easily removed with a broom.

Working Shelf

The working shelf is subject to much abuse and requires care to make a durable job. Slate slabs are sometimes used for this purpose, and are highly desirable, except that some women say they do not make a good appearance, and that they are responsible for much damage and breakage of crockery and utensils. This latter fault may, of course, be overcome by using rubber mats and as for the appearance, this objection is due to prejudice rather than reality. Marble, extra thick plate glass, and opalite slabs are also used as working shelves. They are usually placed on a wooden foundation or sub-shelf.

Maple is probably the most satisfactory wood to use for working shelves. It should be about 1½-inch thick and should be in narrow pieces, say 2½ or 3 inches wide on the face. The pieces should have tongued and grooved or splined joints and should be well glued up. Other woods may be used for working shelves, but should usually be covered with sheet metal. Zinc is the standard material used for this purpose, but there is on the market a material known as nickeline that is preferred on good work. Nickeline is somewhat similar to German silver in appearance and makes a very handsome and satisfactory covering.

Sheet metal used for working shelves should be in one piece and should cover the exposed edges as well as the top. These are all subject to corrosion if salt or acid are left standing on them.

Backs

The backs of kitchen cabinets should

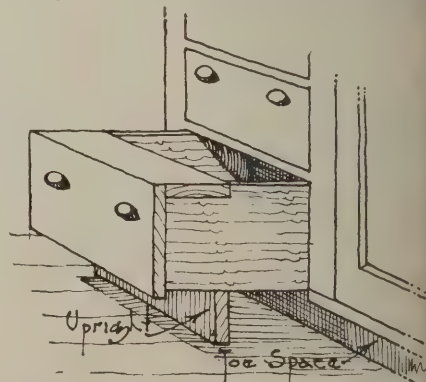


Plate 2—A step-drawer. If the cabinet has no toe-space, the upright may be omitted and the bottom of the drawer allowed to rest directly on the floor

be lined with wood, hard plaster or wall board. If wood is used for this purpose it should have matched edges and present a smooth surface that may be easily kept clean. Beaded or "Vd" lumber should not be used, as it collects dust and dirt. Hard plaster, painted, makes a good back that may be washed down

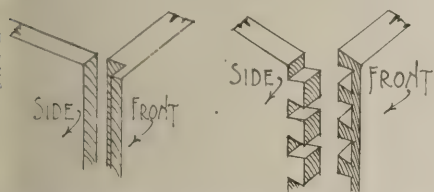


Plate 3--Joints commonly used for drawers. At the left is the type used on cheap work, at the right is the one used for first-class work

whenever required. Wall board is also good and is easily applied. In addition to the back lining, the wall surface back of the cupboard should be plastered or covered with wall board. The back of the working space should always be lined with wood and this backing should not be paneled.

Flour Bins

The old style pivoted or hinged flour bin placed in the base of the cabinet is seldom used nowadays. Metal flour bins with sifters attached, similar to those used for manufactured kitchen cabinets, may now be obtained. They are placed in the upper portion of the cabinet just over the working shelf. They are dust and vermin proof; may be easily removed for cleaning and are generally preferred by housekeepers.

Doors

Ordinary doors for kitchen cabinets are usually made one inch thick. If the doors are to be glazed or are quite large they should be thicker, say 1½-inch, as a minimum. The stiles and top rail should be from 2 to 2½ inches wide on the face and the bottom rail an inch or so wider.

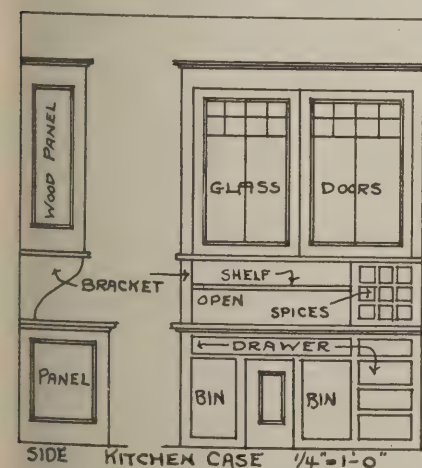


Plate 4--Front and end of a small kitchen cabinet. Note the nest of small drawers and the extra shelf in the work space

Glazed doors are usually used for compartments that are used for china and wood paneled doors elsewhere. The appearance of a glazed door is improved if small panes divided by muntins are used, but they are, of course, harder to clean

should be given two coats of special white paint and then finished with four or five thin coats of enamel. This will form a very durable finish, similar to glass. For cheaper work two coats of white paint and one of enamel are used.

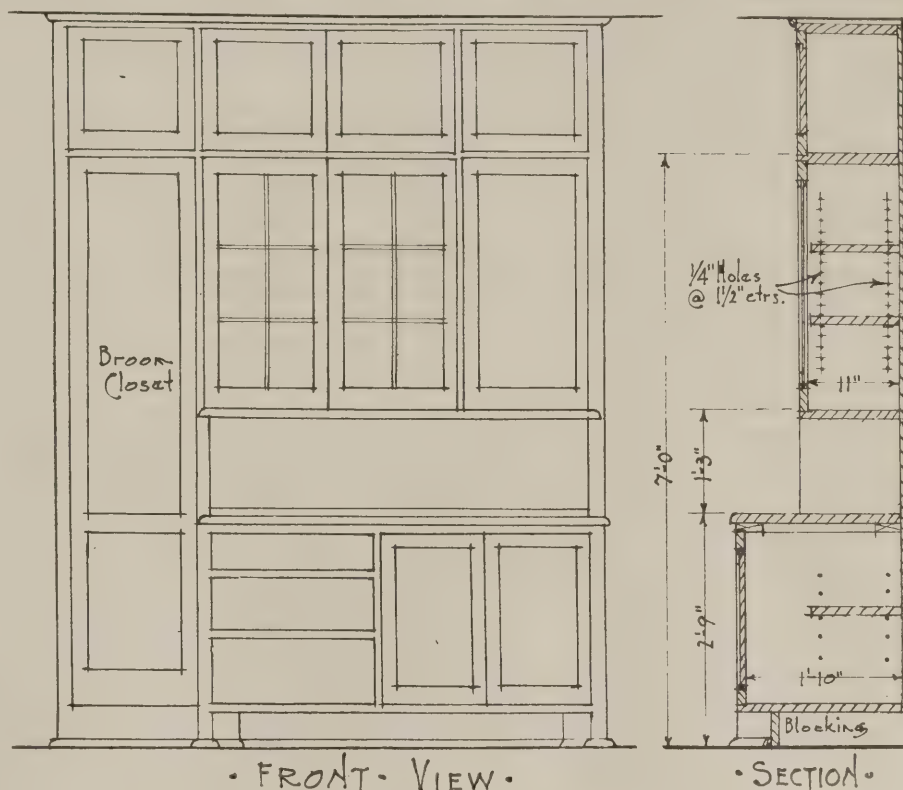


Plate 5--Detail of an up-to-date kitchen cabinet. Note the broom closet at the side and the toe-space under the edge of the base portion

than a single sheet of glass. Lead muntins will partly overcome this objection provided that the extra expense is justified. Whether to use sliding or hinged doors depends on the circumstances and the preference of the housekeeper. Sliding doors do not permit the entire compartment to be opened up at one time as do hinged doors, but on the other hand they do not project into the room when open. If metal tracks and guides are used and the doors are not made excessively tall and narrow, sliding doors will usually operate smoothly.

Doors should be made as dust-proof as possible and should close against stops around the edges. The meeting edges of doors that are hung in pairs should be rabbited, and rabbited joints should be provided where doors close against shelves at top or bottom.

Finish

The finish of cupboards usually matches that of the other kitchen woodwork. Kitchen woodwork is subject to considerable abuse, such as constant cleaning and scouring, and the action of steam and moisture; therefore the finish should be very durable. Enamel is probably the best finish if properly applied. For first-class work the woodwork

Stain is better than varnish for this purpose, but, of course, is not so durable as enamel. Ordinary paint used alone is unsatisfactory, as it rubs off in spots and becomes patchy in appearance.

Miscellaneous

The hardware should be simple and

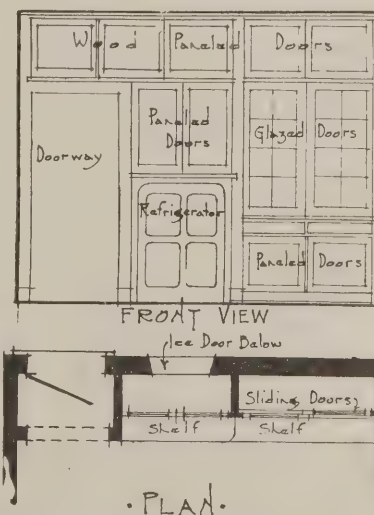


Plate 6--A special cabinet. The compartment above the refrigerator is useful for cooling hot food before it is placed on the ice. A door in the cased opening would form a vestibule or entry at this point

durable. Drawer pulls and door knobs may be of metal or glass. The latter make a very attractive appearance against white woodwork. Two by two and one-half-inch butts are commonly used for doors, and if the doors are large, three butts should be used on each door. Where doors are hung in pairs, the one that closes first should have a hold fast at the bottom to keep it closed when the other door is opened. Door latches of the spring actuated type make a neat appearance. With these the latch and keeper are mortised into the

edges of the doors and are hidden when the doors are closed.

Where space permits, a broom closet is often built at one side of the cabinet as shown at the left of Figure 5. Such a closet forms a convenient place for brooms, mops, vacuum cleaner, dust cloths and the like. A space 12 inches deep, 18 inches wide and 5 or 6 feet high with one or two shelves at the top will usually prove sufficient.

In some cases a plate-warmer is placed in the cabinet for warming the dishes before they are placed on the table.

These usually consist of a steam or hot water coil with grated shelves above.

Sometimes a soiled clothes chute is provided in the base portion of the cabinet. A hole left in the floor with a chute leading to the basement and made accessible by means of a small door in the cabinet will prove convenient.

When a part of the space under the working shelf is left open, a fixed seat may be provided. These seats are the same as those used in some dry goods stores, and are attached to the floor and swing up when not in use.

Housing Development Snapshots



Notwithstanding the large number of industrial housing developments that were completed in 1919, the 1920 activity along

these lines bids fair to establish a record.

Employers of labor have found that contented workmen come from contented

homes, and also that a man without a home will in all probability become a man without a country.

Rear Porches

REAR porches are now receiving as much attention as other portions of house exteriors. In their way they are being made as attractive as other features of the build-



Plate 1—A very simple treatment for a rear entrance. It would be more practical if it had a tight roof to form a shelter

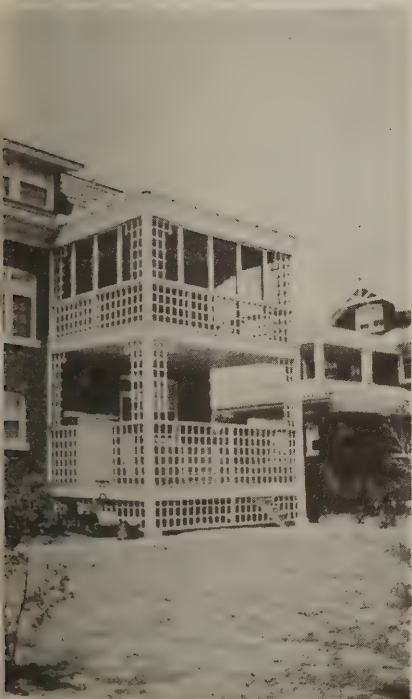


Plate 2—A simple and attractive treatment for a large rear porch. The second story part is screened for use as a sleeping porch. The first story porch would be more useful if it were also screened

ing, and are often quite elaborate in their treatment. This is no doubt due to the fact that Americans are waking up to the fact that a house that is "all front and no back" is not well designed, and that the pleasing effect of many houses is almost, if not entirely, spoiled by slighting the minor elevations. Too many houses have been designed on the principle of stage settings. That is, on the assumption that they would be seen only from the front. Their designers ignored the fact that principal bedrooms often overlook the rear of a house and that the neighbors and their guests



Plate 3—This house is on a corner lot and the rear entrance is directly off the side street. In such cases a decorative treatment is almost compulsory

have an unobstructed view of the rear elevations of the houses across the way.

Another reason for the increased attention given to the design of rear porches is probably due to the scarcity of servants. In the old days when almost every family had one or more maids, the rear of the house was considered to be the servants' province. Nowadays, however, when most women, who formerly employed help, do their own household work, the rear porch has forced itself upon the housekeeper's attention, and its former ugliness will not be tolerated.

The size of the rear porch is one of those things that must be decided by the individual who uses it. It may be said, however, that it seems that rear porches are being made smaller than before, as women have found that a large rear porch increases the space to be kept clean and is

apt to become a dumping place for things that should be thrown away or stored in the basement or attic. In fact, in many houses the rear porch has become a mere platform or stoop at the back door.

Trelliswork is very popular for ornamenting rear porches, and with its aid many attractive treatments may be worked out. Trelliswork is especially appropriate for use on porches where the yard or house is ornamented with trelliswork, such as arbors or supports for vines.

Trelliswork makes a very effective treatment and is comparatively cheap. It may be easily applied to either new or old work, and in most cases may be made up in the shop and brought to the job ready to set up.

It should be remembered that one attractive rear porch may be the means of landing a dozen or more similar jobs in the same neighborhood. It is well known that if one person makes an improvement, the neighbors soon follow suit.

Aside from new houses, the chances for remodeling old rear porches are unlimited; a walk up almost any alley in a residence district will show the possibilities for such work.

Making Cavities in Concrete With Ice

Up to the present it has been possible to make only small cavities in concrete, but under a new German patent a big advance appears to have been brought about. Pieces of ice, corresponding to the measurements of the cavity required, are imbedded in the concrete mass, and small channels are introduced to allow of the rapid removal of the water after melting, says the *Scientific American*.

In this way not only can small concrete constructions such as pillars, beams and stairs be supplied with a hollow space, but large fixed blocks can be made with several chambers, such as are required for walls of houses or ships. The process is of particular advantage in reinforcing concrete with iron. The iron parts are not built in during the stamping, but are attached to the ice blocks before the beginning of the work, which increases its strength.

The continuing moistening usual in concrete work is rendered unnecessary by the new process, as the loss by evaporation is made good from the melted ice.

Bricklayer: "Us workmen haven't a chance—the contractor makes all the money." *Owner:* "Why don't you go in for contracting?" *Bricklayer:* "Can't; wages are too high."—*Chicago Tribune*.

Two Interesting Bungalows

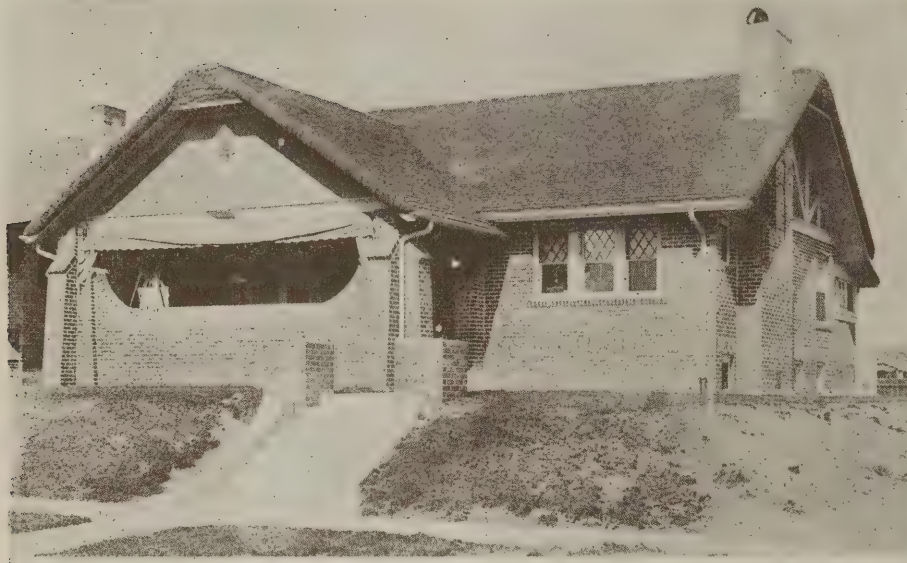
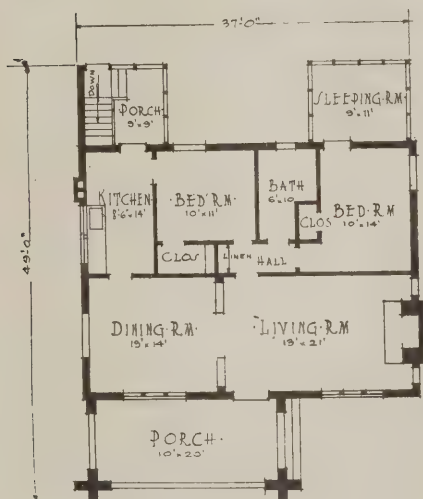


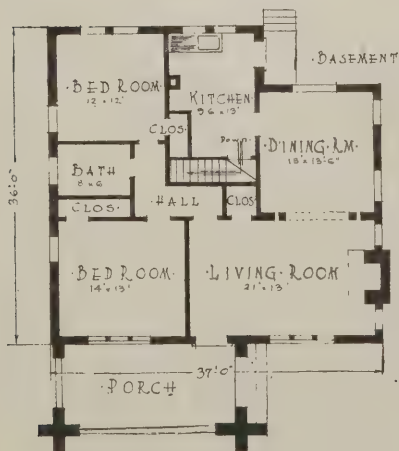
Plate 1



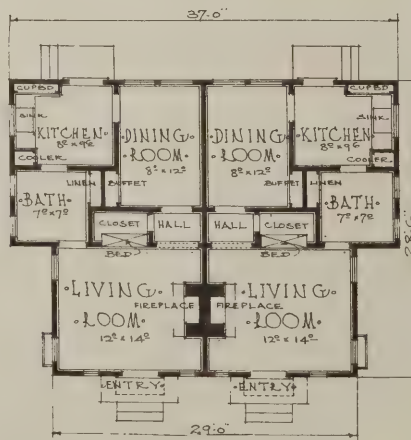
Plan for plate 1



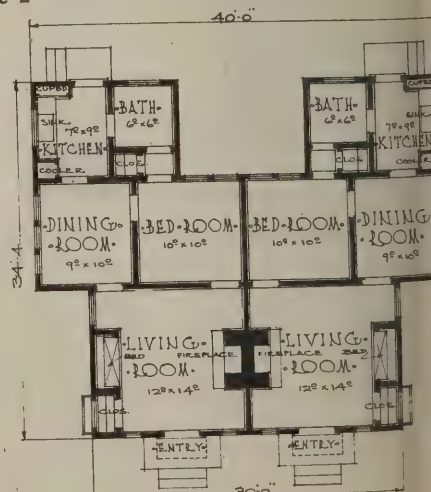
Plate 2



A second plan for plate 1



Plan for plate 2



Second plan for plate 2

THE BUNGALOW probably has more genuine friends, and likewise enemies than any other distinctive type of house. In this respect they resemble some people in that one is either for them or against them—strong! And, when one looks about at the multitude of sins that have been committed in the name of the bungalow, it is small wonder that people of good taste often instinctively duck when the word is uttered and that many designers refer to them as “bungle-ohs.”

When the average dabbler in this style is brought to realize that simplicity is an absolute essential in good house design and that clumsy brackets, tremendous porches projecting across the entire front of a house in one span, and, worst of all, the jamming together and piling up of a multitude of dormers, bays and roof lines invariably results in a scrambled and restless effect which resembles a species of building

gymnastics rather than house design, then we may expect a genuine demand for the bungalow type.

The two bungalows on the accompanying pages were designed by Ye Planry, Inc., of Dallas, Texas, and are very intelligent applications of the bungalow style.

Plate 1 has brick walls with the gables formed of stucco on metal lath. The roof is of shingles laid in a variant of the thatched method, and is not marred by dormers or other tricks. The rolled edges of the roof overcome any feeling of thinness at this point. The porch has a wide span, but the buttressed piers are well proportioned and give a feeling of ample and well balanced support. The chimney is well proportioned and interesting.

Two plans are shown for this design. Each plan contains five rooms and a bath. The plans are compact and well arranged and in each of them the bedrooms are separated from the living-rooms by a small hall. The living-rooms and the dining-rooms are about the same size in each case and differ only in their location. The bedrooms are somewhat smaller in the first than in the second plan, but the sleeping porch would make the first plan preferred by many people. The first plan also has a kitchen porch that is lacking in the second although one could also be provided here if desired.

Plate 2 is a double bungalow. This type is quite popular for use on two narrow lots, especially when the property is improved for rental purposes.

Both plans have wall beds in the living-rooms, thus making this room suitable for sleeping purposes. An additional wall bed could also be installed for the dining-room of the first plan if desired. These plans might be combined if necessary, using the three-room plan for one side and the four-room for the other.

In Plate 2 the exterior is simple and well handled. The entrances are pleasing and the main roof is broken only by the rather interesting chimney.

Concrete Tanks Used for Water Storage

The test of concrete tanks made of 1:2:4 mixture and used for water storage, undertaken by the Bureau of Standards, Department of Commerce, has been discontinued after 150 days because the day-loss curves have taken the form of a straight line, showing that the daily loss has become constant. It may be of interest to note that these tanks, although showing some actual loss, due to water penetrating the concrete, remained dust dry on the exterior. It would seem from this that although the head of water amounted to 35 feet, the 1:2:4 concrete is sufficiently waterproof for this purpose.

The average small child would probably appreciate a house of its own more than anything that could be suggested. Small boys as well as girls delight in playing



Plate 1



Plate 2

house, especially when the house is a real one.

Plate 1 shows a rather elaborate playhouse built of brick and stucco to match the residence to which it belongs. From a standpoint of "looks" this house is hardly

Playhouses

successful owing to the fact that the details are somewhat out of scale. It gives an impression similar to the result to be expected from attaching a grown person's head, hands and feet to a child's body. In building a miniature house such as this the materials and details should be reduced in scale to fit the small dimensions of the house.

Plate 2 shows a simpler type of playhouse which probably gives its small owner as much pleasure as a more pretentious one would. This playhouse is really a sand box with a roof to protect it from the sun. The floor is formed by a concrete slab to which the corner posts are anchored.

When to Heat Wood Before Gluing

Whether a hide glue joint will be strengthened or weakened by heating the wood before gluing depends on the size of the joint. It is assumed, of course, that the work is being done in a glue room that is warm and not draughty and that the wood itself is at room temperature. Under these conditions, if the joint to be made is of small area, heating the wood is unnecessary. In fact, it may be detrimental, for the warmth of the wood will keep the glue thin, and, when pressure is applied, too much glue may squeeze out, leaving a starved joint. It is very easy to apply too much pressure to a small area.

In making glue joints of large size (several inches each way), heating the wood before gluing is of distinct advantage. Many experiments at the Forest Products Laboratory, Madison, Wis., have proved that when the wood in large joint work is not heated the joints develop full strength only in spots. Weak spots and even joints are too frequently discovered.

Uniform high strength in joints of large size may be secured by heating the wood in a hot-box for 10 or 15 minutes at 120 to 130 degrees Fahrenheit just before gluing. The heat from the wood prevents the glue from chilling and keeps it liquid until pressure is applied.

It should be remembered that heating the wood retards the setting of the glue to some extent. In heavy woods, from which the heat escapes slowly, this retarding effect is more marked than in lighter woods. In all species glued cold at the laboratory the time under pressure required to develop full joint strength was less than 8 hours. When heated wood was used at least 10 hours were required to develop full joint strength in mahogany and more than 12 hours in red oak and maple.

An Architect's Home



Home of Architect H. B. Thomson, Dallas, Texas.
The designer has imparted distinction to this house without stooping to freakishness

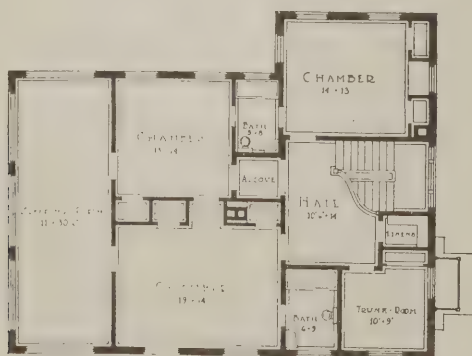
AN architect's home may be expected to be fruitful of ideas. In such a house the individual has free scope to express himself. The sizes and arrangement of rooms, the style of the house, and the materials of which it is to be built are entirely

signer of many beautiful residences, the excellence of which are reflected in his own home.

The exterior of this house is simple and dignified, yet charmingly homelike. The wall construction is of hollow tile with

each door. These panels are of the fan type executed in wood.

The entrance is novel and the balcony window midway up the wall indicates the stairs. The shielding of the small windows beside the entrance with trellis work and



Second Floor Plan



First Floor Plan

subject to his own wishes. Only two restraining influences are likely to be met; one of which is good taste, the other cost.

The accompanying illustrations show the home of an architect, H. B. Thomson of Dallas, Texas. Mr. Thomson is the de-

stucco finish. Much of the attractiveness of this house is due to the intelligent use of trellises and iron work. The treatment around the three French doors at the side is exceptionally well handled. A semi-circular panel is set in the wall just above

the roof indicates the value of simplicity. The introduction of dormers has spoiled the looks of more houses than they ever improved. The chimney at the edge of the roof might have been larger.

The first floor is very interesting and out of the ordinary. The arrangement of the stair is such that it is not visible until one passes into the living-room. At the same time the front door may be reached from the kitchen through the stair hall without passing through the living-room. The toilet in the vestibule is a practical convenience. The large living-room and the dining-room

have French doors leading to the veranda which may also be used as a dining porch. The kitchen has cross ventilation and has a storage pantry as well as a pantry for serving.

The second floor contains three bedrooms, two of which open directly onto the large sleeping porch. One of the bedrooms has a private bath, while a bath in

common serves the other two. The corner bedroom has windows on three sides and wardrobes and a window seat are built across one end. Each of the bedrooms has ample closet space and a large linen closet opens from the main hall. The trunk room is also useful as a sewing room and is provided with a closet in which a sewing machine may be kept.

Colored Concrete

From the Report by Adolph Schilling, Chairman of the Committee on Trimstone and Building Ornaments of the National Conference of Concrete House Construction

TO PRODUCE color effects, we may use gray or white portland cements, either by themselves, or mixed in certain proportions, adding to this, suitable pigments, but in many cases, the natural colored aggregates, sand, silica, pebble grits, marble and granite, will give excellent and more uniform results. It requires great skill and care to properly mix cement and color pigments without reducing the strength of the cement and still obtain uniform color effects.

The importance of mixing the pigment thoroughly with the cement, before adding the aggregates, should be understood by anybody attempting to make concrete in colors successfully on a large scale.

As a very simple method to test the proper amalgamation of the pigment with the cement, take a handful of the dry mixture, and press it under a sheet of stiff paper, this will produce an even surface of the material, and as long as this surface does not show absolute uniformity in color, the mixing is incomplete. If small specks of color show on the surface under this test, these same specks of unassimilated pigment will appear in the concrete. So far a very important factor that can be utilized for coloring concrete or cement has been given little or no attention, while very simple in its primary action, the successful application requires thorough understanding of the principle and medium employed.

The absorptive qualities of concrete during its stage of curing and seasoning offers opportunities for coloring concrete products by capillary action. By this method the color is deposited into the pores of the surface, amalgamating with the concrete into a permanent unit. The possibilities of this treatment are unlimited, based on knowledge of coloring values and good judgment not to impair the strength requirements of concrete. Coloring solution can be made to penetrate the surface of concrete six inches or more, if the object is immersed while in a very green state, but it is rarely necessary to penetrate more than $1/32$ to $3/8$ of an inch. This thor-

oughly fills all pores, gives the desired color effects and is less expensive. Every atom of coloring absorbed by the concrete reduces the strength of the solution; and as some of the coloring matter used is quite expensive, good judgment in allowing only the necessary absorption of coloring matter would be advisable from an economic standpoint. The sulphates of copper and iron are the most suitable to make solutions to color concrete by the capillary method.

The concrete to be colored can be treated after it is a week old. Concrete products used in construction and carrying loads should not be subjected to the coloring bath until the concrete has attained its required strength; as the filling of the pores in the concrete retards the action of curing by the usual methods. Coloring by absorption is effective on surfaces of concrete after it comes out of the mold, or after being treated with tools. Surfaces that have been colored by absorbing mineral or metallic colors, become more weatherproof and the action of the weather on the metallic colors is the same as on real metals, increasing the beauty of coloring by the usual oxidation noticed on bronze and copper. The surfaces of concrete treated by this method become so hard and dense that they will take a polish. I have treated such surfaces in the same manner as marble, granite and metal under polishing or buffing machines.

Our products made by wet cast methods, such as flower pots, vases and boxes, will hold water after the second day of casting and become so hard that when struck with a hammer, they ring like a metal bell; waterproofing compound helps, but is not essential to obtain this result. I consider that the thorough mixing of the proper amount of cement and water with graded aggregates is all important. Extensive tests made during the past three years with commercial waterproof paints, produced excellent results. Common concrete can be made very attractive by one or two coats and applied in stipple fashion, it will not impair the grain or texture, avoiding

the undesirable effect of painted stone. This method is especially to be recommended for dry or semi-dry tamped concrete work, as the porous surface readily absorbs the waterproof liquid, and allows the pigment particles to fill the pores.

The color effect obtained in this manner is the most economical. It is a uniform color but does not give the richness and depth of shading that results by the immersion treatment in a metallic color bath. It has the advantage, however, of being applied where immersion is not practicable. I have obtained two and three-color effects by painting certain parts of an object, before subjecting same to the coloring bath, the parts so colored would not be affected by the color in the bath.

The artistic possibilities of such treatment are only limited by the color sense and taste of the craftsman. Using certain non-absorptive aggregates, their natural color can be retained, while the absorptive parts, especially the cement mortar will assume the desired color. In this treatment precaution must be taken in the use of acids in washing before immersion in the color bath, as the chemical action of the acids is liable to counteract the color values of the bath. Acid should not be employed on concrete treated with colors.

Long practice and tests will give the experience necessary to gain the full benefit of this process; I have spent nearly ten years to obtain the present results.

In the matter of surface finishes, considerable headway has been made, and most of the methods are well known to the progressive concrete man. Any surface treatment is preferable to leaving concrete as it comes from the mold.

Composition Flooring

The Builders' Bulletin of Milwaukee announces that architects are now specifying and allowing the use of composition flooring. Recently a contract for a forty apartment building was let in Milwaukee for which the architects substituted a composition floor throughout.

Interior Doors--By A. Benton Greene

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INTERIOR partitions, particularly of country houses, are almost invariably constructed of 2x4-inch studs. In our discussion of interior doors, therefore, we shall disregard for the time being their presence in block, ribbed lath, or any other but frame partitions. In the latter the studs around the door opening are doubled. However, 3x4-inch studs would serve the same purpose, for doors up to 5 feet in width. Those in excess of this width should have double studs at the sides and top.

The frame to receive the door should be made $1\frac{1}{8}$ inches thick, although $\frac{7}{8}$ -inch jambs are not uncommon. The objections to the use of the thinner jambs are that they are not sufficiently rigid and that they provide inadequate surface for nailing the edges of the casings and for securing the hinges. Jambs which are $1\frac{1}{8}$ inches thick are satisfactory for doors 3 feet wide or less. Doors exceeding this width and those which are fitted with full-size plate glass, should have $1\frac{3}{4}$ -inch jambs.

The frame of a door should be wide enough to extend from face of ground to face of ground, that is, it should be equal to the full thickness of the finished partition. The frame should be set back about three-quarters of an inch from the studs to allow room not only for the inevitable expansion and contraction of the wood, but also for the insertion of wedges.

The grounds referred to in the previous paragraph are $\frac{7}{8}$ x2 inches. Regular furring strips may be used for this purpose. They extend around the door opening, on both sides and across the top, and act as a stop for the plaster. They should be kept back from the edge of the stud, say about $\frac{1}{2}$ inch, so that they will not be disturbed when the wedges are driven in back of the frame to secure it to the wall.

The trim or casings is from 5 to 6 inches in width. It is capable of indefinite treatment. Its purpose is to cover the plaster ground and to conceal the joint between the plaster and the head or jamb. It is set back from the face of the frame about $\frac{1}{4}$ inch to eliminate the possibility of the projecting tongue of the door latch from striking the casing, and also to permit the butt or hinge to be secured in place without cutting through the trim. The thickness of the casing is determined by the thickness of the base of the room, which butts against the casing at each side of the door opening.

Casings are composed of one or more members, as shown in the upper illustrations of the accompanying plate. If they are more than $\frac{7}{8}$ -inch thick, or if they are more than 7 inches high, they should be

built up. Backs of casings are usually plowed out to prevent warping. See (a) Fig. 3.

In the four sections through the heads of doors illustrated (Figs. 3, 4, 5 and 6), as many different ways are shown of providing a stop for the door to strike against. In Fig. 3 the frame is rebated $\frac{1}{2}$ inch, forming a stop for the door. In Fig. 5 the stop is nailed on or is secured by adjustable screws. In Fig. 6 the stop is ploughed into the frame. The stop shown in Fig. 3 is good for heavy doors. The stop shown in Fig. 5 is the one most extensively used. It has this advantage in that the swing of the door can be changed by reversing the stop bead. This can also be accomplished with Fig. 3 by rebating both edges of the frame, as shown in Fig. 4. However, the ploughed-in stop shown in Fig. 6 is the best of all, since it is always fixed and cannot work loose. It is to be found wherever high-class workmanship is specified.

Although valuable, the foregoing has been really preparatory to our main topic of discussion, namely, doors.

In Fig. 1 we have a typical elevation and section of an interior door. Fig. 2 is an isometric perspective of the lower part of the same door, showing very clearly the relation between the different parts and indicating the names of the more common members.

A door is made up of stiles, rails and panels. The stiles vary in width from $4\frac{1}{2}$ to $5\frac{1}{2}$ inches. The rails are also of the same width except the bottom rail, which is about 10 inches, or of the same height as the adjoining base of the room. A distance of 3 feet above the floor for the door knob is a convenient height.

Generally speaking, closet doors are made 2 feet wide. However, when closets are more than 4 feet, a double door should be used, each about 1 foot, 6 inches or 1 foot, 8 inches wide. For bathrooms, 2-feet, 4-inch doors are sufficient, while 2 feet, 6 inches or 2-feet, 8-inches is a common width for communicating doors.

Stock doors vary in height from 6 feet, 6 inches to 7 feet. They are always made in even inches, height as well as width. Furthermore, the height in inches usually corresponds to the width in inches; thus a door 2 feet, 8 inches wide would be made 6 feet, 8 inches high; one 2 feet, 10 inches wide would be made 6 feet, 10 inches high, etc. This, however, is not an iron-clad rule. From the standpoint of design, it is best to keep all doors in the same room of the same height, irrespective of their width.

The thickness of a door varies with its function. Thus a closet door is generally

made $1\frac{1}{8}$ inches; a communicating door $1\frac{3}{8}$ inches; a sliding door, as well as any other door exceeding 3 feet in width and 7 feet in height, $1\frac{3}{4}$ inches.

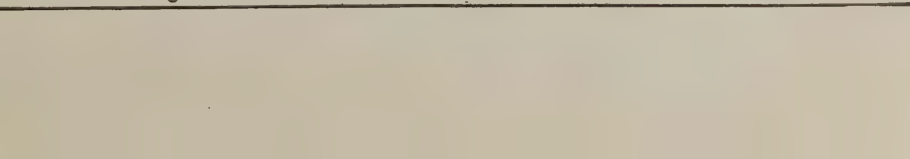
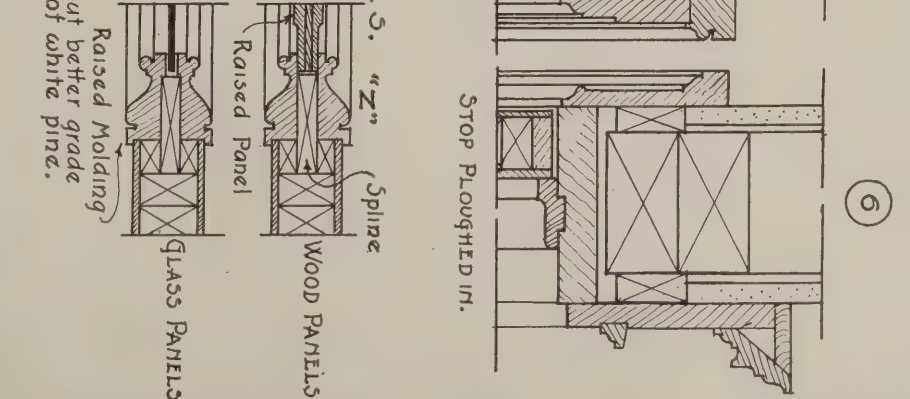
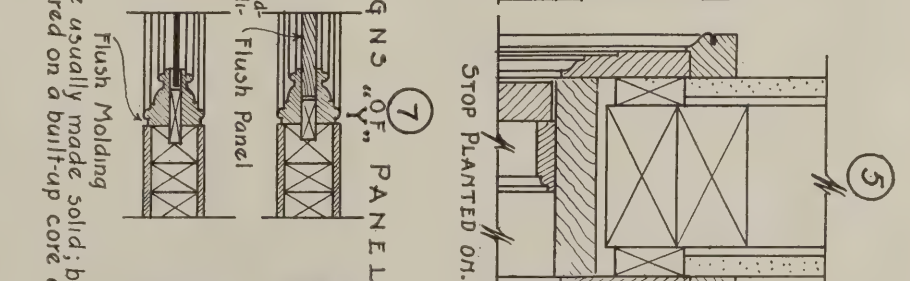
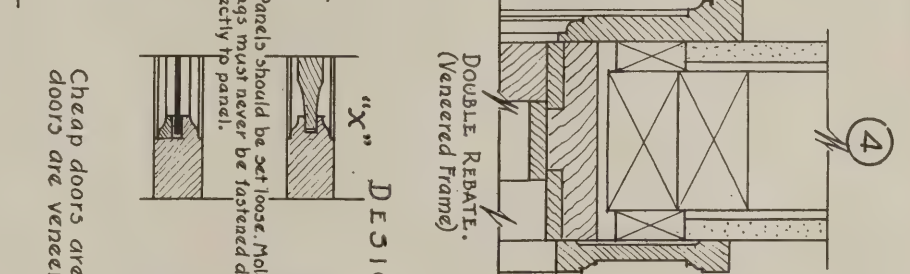
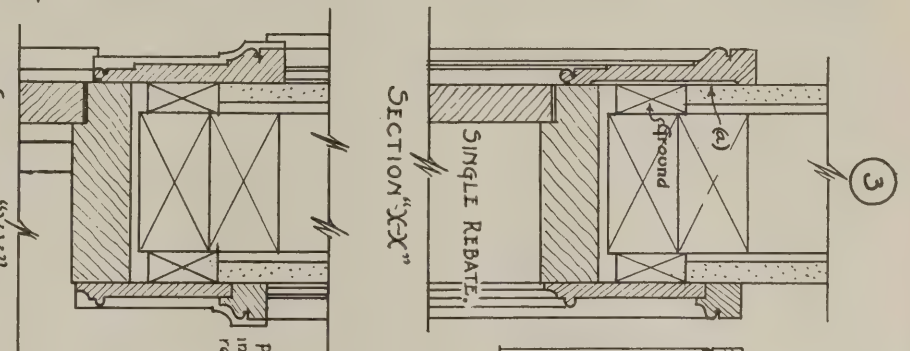
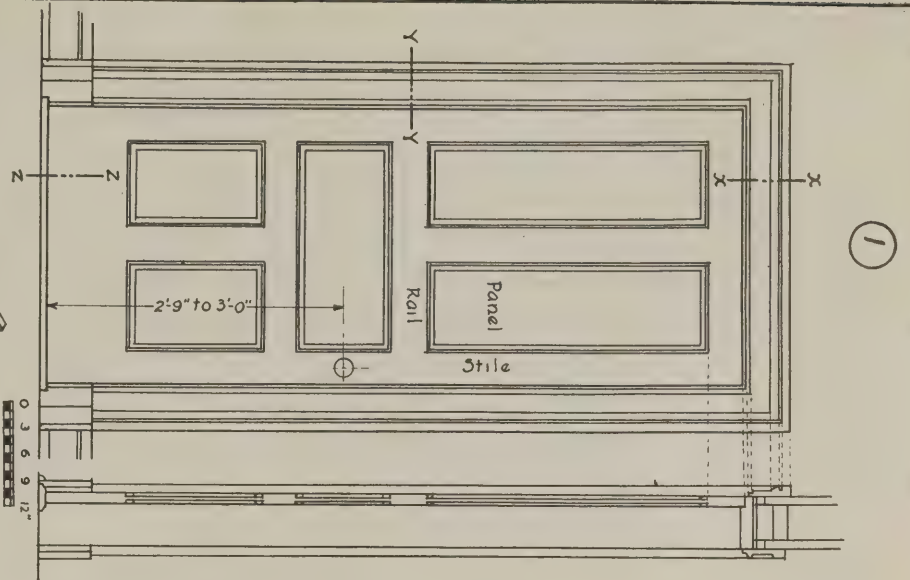
Doors are of two kinds, solid and veneered. Solid doors, Fig. 7x, are used for dressers, china closets and communicating doors of the cheaper grade. Veneered doors, Figs. 6, 7y and 7z, are indicative of high-grade workmanship. Their stiles and rails are built up of $\frac{7}{8}$ -inch strips of white pine, ash or chestnut, glued together, and of a width equal to the thickness of the door less $\frac{1}{2}$ inch. The outer edges are then covered with $\frac{7}{8}$ -inch veneer of the finished hardwood, whatever that may be, and the faces each with $\frac{1}{4}$ -inch veneer of the same finishing wood. The $\frac{7}{8}$ -inch veneer is used for the edges of the door to allow for planing without exposing the core when it is necessary to fit the door into the jamb.

The paneling of a door may be varied to suit the taste of the designer. The more panels a door contains the stronger it will be and the less likelihood of warping. The panels shown in the upper row of Fig. 7 are for wood, while those in the lower row show corresponding panels in glass. Narrow wood panels may be made solid; but very wide ones should be built up and veneered.

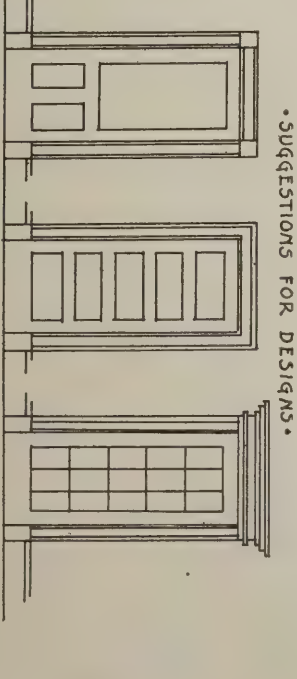
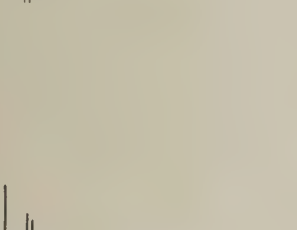
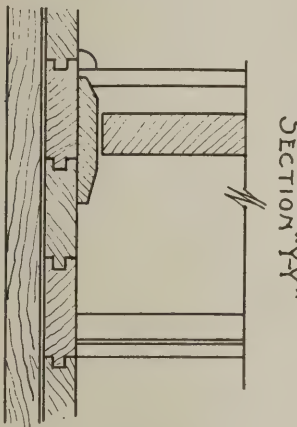
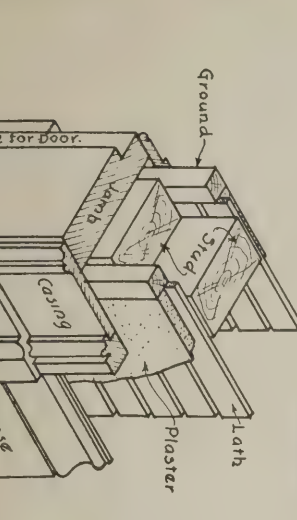
Whether the panels are solid or built up, they should always be inserted so as to allow them to move freely when contraction or expansion takes place. In the stock door shown at Fig. 7x, the wood panel is inserted when the door is assembled. Should the O-G moulding warp, it would no longer hold the panel in place, causing it to become loose and rattle. On the other hand, the panels shown in the other two illustrations are inserted after the door is built. The mouldings are separate, and are glued to the spline and edges of the frame. This method of construction allows the panel to move freely, at the same time always keeping it firmly in place.

If nails are used to hold the moulding in position, care should be taken to drive them into the edges of the frame, and never into the panels; for, if the panel should shrink, it would either pull the moulding away from the frame and leave an ugly crack, or it would crack.

The swing of doors is dictated by common sense. In general, the door leading to a bathroom or bedroom should be so hung that when it is opened, it will hide the greater part of the room. Closet doors and pantry doors should swing in such a way that when opened they will receive the greatest amount of light from windows or lighting fixtures.



• SUGGESTIONS FOR DESIGNS •



NOTES.

THICKNESS - $1\frac{1}{8}$ " for closet doors and from $1\frac{3}{8}$ " to $1\frac{3}{4}$ " for communicating doors.

WIDTH - 2'-0" to 3'-0"

HEIGHT - 6'-6" to 7'-0"

Height and width are always in even inches; e.g., 2'-8" x 6'-8"; 2'-10" x 6'-10" etc.

INTERIOR DOORS

SCALE:
0' 1" 2" 3" 4" 5" 6"

Details



How to Figure--By I. P. Hicks

Estimation of Lumber Quantities and Average Days Work for Carpenter Labor

AMOUNT OF FRAMING LUMBER REQUIRED PER SQUARE OF FRAMING

A square of framing where bridging is required will take 18 lineal feet of bridging, which, reduced to timber or board measure, will be as follows:

For 1x4 cross bridging, 6 feet.

For 2x2 cross bridging, 6 feet.

For 2x4 cross bridging, 12 feet.

Lookouts

Where lookouts are required for the projection of a ceiling, as for a level cornice; these have to be figured according to the number and the dimensions required. In figuring these, about 2 feet has to be added to the width of the cornice for the part that extends inside of the building. Thus, if the cornice projects 2 feet 6 inches you should figure 4 feet 6 inches for the lookout. If the lookouts are set 16 inches on centers, deduct one-fourth from the lineal feet of cornice where lookouts are required. Thus if you have 24 lineal feet of cornice that requires lookouts, deduct one-fourth, which is 6, and you have 18, the number of lookouts required—18 lookouts, $4\frac{1}{2}$ lineal feet each, equals 81 lineal feet. If the lookouts are 4 feet 6 inches long, then 14-foot lengths will cut to the best advantage, cutting 3 lookouts to the piece, and 6 pieces 14-foot long will be required to cut the 18 lookouts. If the lookouts are set 24 inches on centers, then you figure 1 lookout to every 2 lineal feet of cornice; this is just equal to taking one-half the lineal feet of cornice for the number of lookouts required. A few extra should be figured for hips and valleys, and for these figure on cutting two out of a 14-foot length. We are giving these items to remind the estimator of some of the places where timber is used in framing and nearly always forgotten in making the estimate. One of the main reasons for running short on framing lumber is because there are so many pieces used for places where none have been figured.

Square Feet of Lumber per Lineal Foot in Different Sizes of Timbers

Square feet per lineal foot:

4x6 figure	2.
6x6 figure	3.
6x8 figure	4.
8x8 figure	$5\frac{1}{3}$.
8x10 figure	$6\frac{2}{3}$.
10x10 figure	$8\frac{1}{3}$.
10x12 figure	10.
12x12 figure	12.
12x14 figure	14.
12x16 figure	16.

Number of Feet Board Measure in a Square of Framing

Double plates are allowed on all outside walls and partitions, and one extra stud or joist for doubling or headers, and 1x4 for bridging.

Set 16 inches on centers:

2x4 outside walls	88 feet
2x4 partitions	88 feet
2x4 ceilings	64 feet
2x6 outside walls	132 feet
2x6 partitions	132 feet
2x6 ceilings	96 feet
2x8 floor joists	134 feet
2x10 floor joists	166 feet
2x12 floor joists	198 feet
2x14 floor joists	230 feet
2x16 floor joists	262 feet
3x12 floor joists	294 feet
3x14 floor joists	342 feet

Set 12 inches on centers:

2x12 floor joists	246 feet
2x14 floor joists	294 feet
3x12 floor joists	366 feet
3x14 floor joists	426 feet

Set 16 inches on centers:

2x4 rafters	64 feet
2x6 rafters	96 feet
2x8 rafters	128 feet

Set 20 inches on centers:

2x4 rafters	56 feet
2x6 rafters	84 feet
2x8 rafters	112 feet

Set 24 inches on centers:

2x4 rafters	48 feet
2x6 rafters	72 feet
2x8 rafters	96 feet

PORCH FLOOR FRAMING

Double outside joists and double beams of same size over columns:

2x6 joists set 18 in. on centers,	120 ft.
2x8 joists set 18 in. on centers,	160 ft.
2x10 joists set 18 in. on centers,	200 ft.

A Square Is 100 Square Feet

What it takes of different materials for a square, allowing for the matching and 6 per cent waste in cutting up:

	Feet
Common sheathing, 8-inch	110
Common sheathing, 10-inch	108
Common sheathing, 12-inch	106
Shiplap, 8-inch	123
Shiplap, 10-inch	117
Roof sheathing, laid with 2 in. space	100
Roof sheathing, laid tight	110
Shingles laid $4\frac{1}{2}$ inches to the weather,	
plain roofs	900
Same on hip and valley roofs	1,000
Siding, $\frac{1}{2}$ x4-inch, beveled	132
Siding, $\frac{1}{2}$ x6 inch, beveled	120
Siding, 6-inch drop	125

Siding, 8-inch O G lap	120
Siding, 8-inch bungalow	120
Siding, 10-inch stock boards	110
Battens, lineal feet per square	108
Flooring, $1\frac{1}{2}$ -inch face	150
Flooring, 2-inch face	140
Flooring, $2\frac{1}{4}$ -inch face	135
Flooring, $3\frac{1}{4}$ -inch face	125
Flooring, $5\frac{1}{4}$ -inch face	118
Ceiling, $3\frac{1}{4}$ -inch face	125

ESTIMATING CARPENTER LABOR

The average day's work per 8-hour day, unless otherwise stated:

	Feet
Framing studs, joists and common rafters, board measure	500
Complicated roof framing and roof trusses	400
Sheathing floors or roofs, common sheathing	500
Sheathing floors or roofs, 8-inch shiplap	450
Sheathing floors or roofs, 6-inch flooring	400
Sheathing outside walls, common sheathing	500
Sheathing outside walls, 8-inch shiplap	450
Siding, $\frac{1}{2}$ x4-inch beveled siding	250
Siding, $\frac{1}{2}$ x6-inch beveled siding	400
Siding, $\frac{3}{4}$ x6-inch drop siding	350
Siding, $\frac{3}{4}$ x8-inch bungalow siding	450
Siding, 1x10-inch stock barn boards	600
Battens, lineal feet	800
Ceiling, square feet	350
Shingles on plain roofs	2,000
Shingles on hip and valley roofs	1,500
Shingles on outside walls	1,000
Setting frames	16
Outside base with watertable, 2 members, lineal feet	200
With watertable and mold, 3 members, lineal feet	125
Belt course with watertable, 2 members, lineal feet	200
With watertable and mold, 3 members, lineal feet	125
Corner boards with $\frac{1}{4}$ round, 3 members, lineal feet	120
Cornice, plancier, fascia, frieze, crown and bed mold, 5 members, lineal feet	40 to 50
Setting porch columns, average number per day	8 to 10
Setting porch newels, average number per day	10 to 12
Porch rail and balusters, lineal feet, 20 to 24	
Porch steps, average number per hour	$1\frac{1}{2}$ to 2 steps
Lattice panels, square feet	30 feet
Setting gable brackets, average number	8 to 10

Heavy verge boards, lineal feet.....	120 feet
Grounds on frame buildings, lineal feet	350 feet
Grounds on brick and tile work and concrete, lineal feet	150 feet

Carpenter Labor, Inside Finishing

Fitting and hanging cellar sash.....	10
Fitting and hanging cellar doors.....	8
Setting door jambs.....	10 to 12 set
Fitting and hanging windows.....	8 to 10
Casing windows, mission style.....	12
Casing windows, with cap trim mold	8
Casing doors, one side mission head....	15
Casing doors, one side cap trim and mold	10
Fitting and hanging pine doors, including lock	6
Fitting and hanging hardwood doors, including lock	4
Front doors	2
Double-acting doors	2
Sliding doors, double	2
Plain cased openings, same as doors cased one side	10 to 15
Colonnade openings, cased both sides complete	1
Inside base, pine, lineal feet.....	200
Inside base, hardwood, lineal feet.....	120
Room cornice, 3 members, lineal feet	80
Room cornice, 4 members, lineal feet....	60
Beam ceiling, 5 members.....	40
Picture mold, lineal feet	400
Chair rail, lineal feet, 1 member.....	480
Plate rail, lineal feet, 3 members.....	120
Wainscoting with cap and floor mold, square feet	150
Paneling, square feet	30 to 50
Flooring, 1½-inch face	200
Flooring, 2 inch face	225
Flooring, 2¼-inch face	250
Flooring, 3¼-inch face	350
Flooring, 5¼-inch face	400
Scraping finish floor, feet.....	250
Setting up cases with drawers, per day drawers	8
Cupboard with doors, per day, doors..	8
Hook strips, lineal feet.....	250
Pantry and closet shelves, lineal feet....	180
Medicine cabinets, finishing of.....	2 to 3
Front stairs, per step and riser, 2 to 3 hours	
Attic stairs, per step and riser, 1 to 2 hours	
Cellar stairs, per step and riser, ½ to 1 hr.	
Clothes chute, wood, per day.....	20 feet
Linen closet, finishing of.....	1 day
Sideboards, finishing of	1 day
Seats,	1 to 2
Mantel, finishing of	1

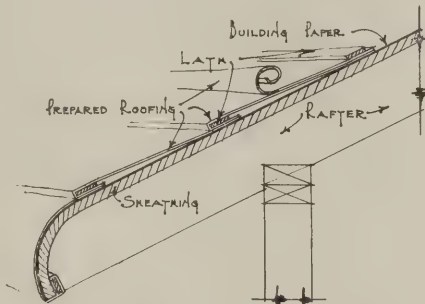
All figures are based on the mill work being furnished by the mill ready to be put in place in the building, with the possible exception of hand smoothing, where the same may be necessary.

Prepared Roofing Detail



Note the pleasing relief caused by the strong horizontal lines

THE most frequent objection to the use of prepared roofing for residences arises from the flat, uninteresting surface that is usually produced. The accompanying illustrations show a method of laying prepared roofing whereby strong horizontal lines are introduced in the roof surface, thus satisfying the demand for an interesting and simple roof treatment.



Prepared roofing detail

Ordinary 36-inch prepared roofing is used and is split down the middle to form two 18-inch strips. In laying, one strip is laid on top of another and the upper edges cemented together. Laths are then tacked along the top of this edge and the upper strip of roofing is folded over the laths, and the process continued until the roof is complete.

Wages in New York

As the standard of living in New York averages as high as elsewhere, the following wage scale, forming part of the agreement between the 33 trade unions and the Building Trades Employers' Association of New York, is of comparative interest.

The working week is 44 hours and an 8-hour day.

Art-glass workers.....	\$7.00
Asbestos workers and insulators.....	8.00
Blue-stone cutters	8.00

Carpenters	8.00
Dock builders, house shorers, sheath pilers	7.50
Cement masons	8.00
Cement and concrete workers (laborers)	(*)
Composition roofers and waterproofers	7.00
Composition roofers and waterproofers (foremen)	7.50
Electrical workers	8.00
Electrical workers' helpers.....	4.50
Elevator constructors	8.00
Elevator constructors' helpers.....	6.00
Granite cutters	8.00
Hoisting engineers, by the week.....	46.75
Hoisting engineers, by the day.....	9.00
Hoisting engineers, running compressors, extra, per week.....	7.00
Housesmiths and bridgemen, Local 40	8.00
Housesmith's finishers, Local No. 52..	8.00
Housesmiths' helpers	6.00
Marble cutters and setters (April 1, 1920)	8.00
Marble carvers (April 1, 1920).....	9.00
Marble polishers, bed rubbers and sawyers (April 1, 1920).....	7.50
Marble cutters' helpers, riggers, crane and derrick men.....	6.00
Mosaic and terrazzo workers.....	7.00
Mosaic and terrazzo workers' helpers..	(*)
Metallic lathers	8.00
Painters and decorators.....	8.00
Plasterers	8.50
Plasterers' laborers	6.00
Plumbers and gas fitters.....	8.00
Roofers and sheet-metal workers.....	8.00
Steam and hot-water fitters.....	8.00
Steam and hot-water fitters' helpers....	6.00
Tile layers	8.00
Tile layers	8.00
Upholsterers	9.25
Wood lathers	8.00

*Being adjusted at time of report.

Open Porches

THE open porch has probably been the most disturbing factor in American home design. In no other country is its use so general as in ours. In fact, in most countries the open porch, as we know it, is almost, if not entirely, unknown. In

designers so much trouble. Even in the Swiss chalet, where exterior porches are somewhat common, they are usually narrow, often uncovered and are really wooden balconies or passageways with stairs running up and down the exterior

and the simplification of the designer's problem.

The bungalow has probably been the chief offender with respect to open porches. The awakening of the general public to artistic consciousness has led the average



Plate 1

southern Europe the interior courts are often surrounded by covered passageways which have the nature of porches, also in some cases small, narrow porches appear on the exterior walls. These latter, however, are usually closely akin to balconies and have but slight relation to the wide covered porch which has given American

walls, giving them a resemblance to modern fire escapes.

Of course in the late years the open porch in our country has largely given way to the glazed or enclosed porch, which offers all of the advantages of the open porch plus the added values of year around usefulness, a certain amount of privacy

man to realize that a porch stretching across the entire front of a house, with a clear span of 25 or 30 feet between supporter is an absurdity, from a standpoint of both logic and good taste.

Generally speaking, our most successful porches are the low, one-story kind found in the New England farmhouse type, the



Plate 2



Plate 3



Plate 4



Plate 5



Plate 6



Plate 7

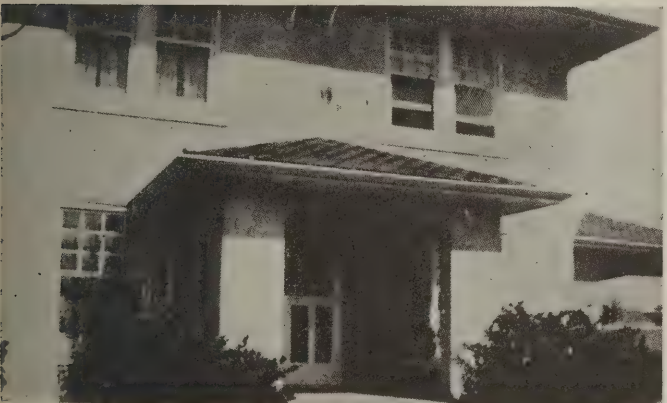


Plate 8



Plate 9

two-story porches of the southern Colonial and the arched cloister-like porches of the Mission or Spanish Colonial. In all of these the supports are set comparatively close together. For one-story porches the clear opening between supports seldom exceeds $1\frac{1}{2}$ times the height, and for two-story porches about half this distance.

With all of its demerits of awkward appearance, lack of privacy and unsuitability for year around use, many persons insist upon having an open porch. In most cases open porches should be kept as small as possible with a leaning toward simplicity.

Plate 1 shows a wooden porch used on a stucco house. The porch is recessed in

the wall which reduces its apparent projection and gives it a sheltered appearance. The floor is of cement and the steps are of cement and red brick. The massed shrubbery adds immensely to its attractiveness.

Plate 2 shows an open porch combined with enclosed porches at each end. The patterns in the railing or parapet above are obtained by means of wooden patterns set in recessed panels in the brickwork.

Plate 3 is somewhat Spanish Colonial in character, with wide stucco arches and brick trimmings. The flower boxes form the railing and are quite effective. The treatment of the steps leading to this porch is an excellent method of veiling the height

of the floor above the grade.

Plate 4 is good as a porch, but its relation to the entrance doorway is unfortunate. The two should be either tied together or more widely separated. As they are, there is a clash for supremacy and it is difficult to decide which is more important.

Plate 5 is somewhat Italian in character. Twin porches such as these are often effective and may become an actual benefit if handled correctly. This composition is a study in contrasts; the dark tone of the house contrasting with the light tone of the porches, and the heavy columns contrasting with the lattice and pergola treatment.



Plate 10



Plate 11



Plate 12

Plate 6 shows a porch that extends along two sides of the house. The end supports are brick piers and the intermediate supports are wooden columns set in pairs with trelliswork between them. The roof forms a flat deck that is accessible from the second floor. This porch is interesting and well handled.

Plate 7 is one in the Southern Colonial manner. The hipped roof is a welcome relief from the pediment which often causes this treatment to appear heavy and somewhat too monumental for use in connection with a home. The handling here is simple and direct and the second story portion of the porch frankly depends upon the columns for its support.

Plate 8 shows a small porch that is about the extreme limit in simplicity. The arch is pleasing in its outline and is easily made. A common fault with supports of this type is to make the reveal faces too thin, thus destroying the substantial effect given by the broad outside faces. Eight or ten inches is about the minimum thickness for such cases and square piers, full width on all sides are better.

Plate 9 is a full width porch the ends of which have a pergola treatment. In this case the pergolas are covered with a metal deck, but in many cases they are left open to insure good light in the adjacent rooms.

Plate 10 shows odd porches in the old quarter of New Orleans. The porch in the background is of cast iron, lacelike in character and beautifully executed. The porch in the foreground might be considered a balcony although its size and covered roof make it essentially a porch. The railing of this porch is of wrought iron

while the ornaments around the hood are cast.

Plate 11 shows a porch built into a corner. This location usually gives more satisfactory results than if the porch projects boldly from a straight wall. This porch has stucco piers with stained woodwork above. The pierced railing is inter-

esting. The porch has a metal deck which may be reached from the second story.

Plate 12 shows a simple porch for a Colonial house. The square columns are a trifle heavy for wood. Porches that are removed from the main entrance as this one is, offer more privacy than front porches do.

Exposed Hollow Tile



Hollow tile chapel at Luling, Texas

The accompanying illustration shows the chapel of the Belle Haven Orphanage at Luling, Texas. The walls are of hollow tile without any finish applied to the surface. This gives an interesting treatment that is capable of development.

In this example the copings and the lintels are formed of brickwork. Note that the tile and brick buttress in the foreground is more pleasing than the others, which are solid brick. The result of these small effects are worthy of careful study.

Ornamental Steps

EXTERIOR steps have probably received less consideration than any other detail of the average house. In view of the fact that all houses, great or small, pretentious or otherwise, require steps at or near the entrances, it seems logical to assume that more care in the design and construction of this important feature will result in giving a more favorable impression of the house as a whole.

The materials of which the house is constructed usually may be depended on to govern the materials of which the steps are constructed. It may be said, however, that in late years wooden steps have grown in disfavor on account of a lack of durability. Stone has largely given way to concrete. In fact, concrete, either alone or in combination with other materials, is generally used for steps throughout the

country, and is an avenue of special study. The first essential of steps is a good foundation. Carelessness in this respect results in dilapidated steps that are not only an eyesore in themselves, but transmit their run-down appearance to the house itself. Step foundations should go well below frost line and should be well drained and supported against settlement. In building brick steps a concrete core should be built



Plate 1



Plate 2



Plate 3



Plate 4



Plate 5



Plate 6

and the brickwork laid on this foundation. Ordinarily the concrete core is formed with rough steps to receive the brickwork, but in some cores it consists of an inclined slab with metal lugs inserted to bond the cinder concrete of which the rough steps are built. The latter construction is used to reduce the weight of long flights of steps which do not rest on an earth fill. When filling

is used it should be well tamped to provide against settlement.

Plate 1 shows the steps for a house having a high basement. The steps are in two flights and end with a platform or stoop at the top. The iron railing is simple and appropriate.

Plate 2 shows new steps applied to an

old house. The arrangement is quite similar to those of Plate 1, but the treatment is more decorative.

Plate 3 shows a treatment for a long flight of steps in which a terrace is formed midway to break the apparent height. This is a good scheme for conditions of this kind.

Two Types of Successful Builders

IT IS encouraging to know that so many roads are open to success in building. There is no prescribed route.

In Stamford, Conn., two of the most prominent builders have adopted meth-

same calibre as his own. Most of his men have been with him many years and take pride in working on jobs they know will excite favorable comment.

Mr. X is a contractor, purely and

There is an old saying to the effect that it is not wise to "put all your eggs in one basket," but this does not always hold true in the building game. The owner often likes to have only one man



Two buildings erected by a contractor whose ideas are outlined in these pages

ods that are in some respects exactly opposed to one another. Yet both men are doing business on a large scale.

On a prominent street a large building is going up. There is nothing to indicate the name of the builder, although a sign here would be seen by thousands. This man is opposed to any kind of printed advertising—sign boards, newspapers, blotters, or any of the usual types of publicity used by other builders to help in securing contracts. He would not even allow his name to appear in this article, so we must refer to him as Mr. X.

He maintains that advertising of this nature would have a tendency to "cheapen" his reputation as a builder. "If anyone is sufficiently interested when he sees my work he will take the trouble to investigate and find the name of the builder," he says, "and if not, then it is simply a case of curiosity. My work is my only advertising—and I have found it to be good."

The two elements that have contributed mostly to his success, Mr. X says, are close association with his men and in taking only a high grade of work. Nor will he compete against contractors who are not accustomed to doing work of the

simply, working always from architect's plans and specifications. The fact that after thirty-eight years in the contracting game he has not had \$100 in bad debts, all told, speaks well for his business methods. He always makes sure of his client's financial standing at the start. He says it is simpler and much less bother than spending time in courts.

The illustrations show the character of work Mr. X is accustomed to handling and the clean-cut type of workmen in his employ.

On the other hand, it is a common sight around Stamford to see the name of Harold A. Parsons on a job. It may be a job of surveying or laying out a driveway or grounds or the erection of a palatial suburban home. It is spoken of as "another Parsons job." He believes in advertising.

Mr. Parsons has built up a firm that can handle a building project "from the deed to the front door key." He contracts for surveying, engineering, architectural designing, constructing, landscape gardening and decorating. Or, his firm is so organized that it can do any part of the work if the owner sees fit to let some parts to other contractors.



Cheerful workers



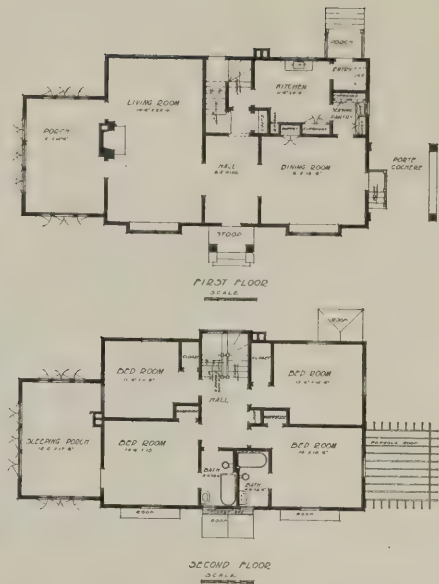
Edward B. Stratton, Architect; Harold A. Parsons, Builder

to hold responsible for the satisfactory progress of the work. Then there can be no "passing the buck."

Mr. Parsons emphasizes the selling value of such an arrangement. Securing the contract for one part of the work

building it generally follows that his firm does all the construction work, too.

There are several reasons why such an arrangement should prove satisfactory. There can be no misinterpreting the intent of the plans and specifications;



N. E. Emmons, Architect; Harold A. Parsons, Builder

gives him an inside track on the rest of it. When commissioned to design the

less duplication of labor and equipment; and no dependence on other contractors getting on the job at the right time.

A filing system has been put into successful operation that could be used by

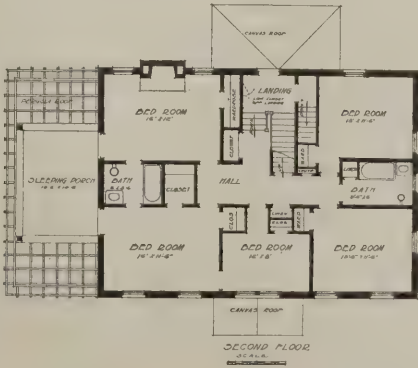
other builders for filing plans and specifications. In this case it is used by Mr. Parsons' engineering department.

Notes taken on the field are entered directly in a memorandum book. The maps are numbered consecutively as soon as they are drawn and are filed in numerical order. The same is true of the filing and recording of the traverses. Filing numerically instead of alphabetically keeps them in chronological order. For quick reference a card index, as illustrated, arranged alphabetically under

Owner	Book	Page	Map No.	Traverse
Property				
Location				

Index card used in connection with filing system described in this article and used by Harold A. Parsons, C.E.

the client's name, is used. On it are noted the outstanding features of the job; the number and page of the memorandum book in which the field notes are entered; the map number and traverse number. This completes a simple numerical, chronological and alphabetical record.



BULLETINS ON LIME, MORTAR, CEMENT AND CONCRETE

Announcement is made that the following bulletins are now available for distribution by the Construction Department of the National Lime Association, Washington, District of Columbia:

- No. 300—Ideal Brick Mortar.
- No. 301—Watertight Concrete.
- No. 302—Improving Cement Products.
- No. 303—Test Data on Lime in Concrete and Mortar.

Those who are following the constantly increasing use of lime in all classes of concrete work will find something of interest in these bulletins which will be mailed upon request. Address the National Lime Association at Washington, D. C.

Scaffolds

MANY states have laws which are designed to safeguard workmen and mechanics at their work. Aside from any responsibility before the law, every employer should realize his moral responsibility for the safety and protection of his employees,



Plate 1—An ingenious scaffold support made of steel and providing a support for a 2 by 4 guard rail.



Plate 2—This scaffold is rendered highly dangerous on account of the litter of loose planks, some of which contain bare nails.

and should provide such safeguards as the nature of the work requires or will permit.

The following suggestions for scaffolding are largely drawn from the rules of the Industrial Commission of Wisconsin, which body is empowered to issue orders regulating safeguards for building construction work; their orders having the force and effect of law within that state.

The lumber used for scaffolding should be pine or equal. The unsupported span of two-inch scaffold planks should not exceed eight feet, but for painting, paper hanging, or other light work the span between supports may exceed eight feet, provided that the strength of the planks has been tested by the application of a load at least three times as great as the planks are to withstand. It should be remembered that sometimes several men go onto a scaffold that is intended to support one man only, thus causing the collapse of the overloaded scaffold. For this reason it is considered safer to limit the maximum span of all scaffold planks to eight feet. If one-inch boards are used, it is recommended that they be at least ten inches wide and limited to a span of four feet.

The ends of scaffold planks or boards

should project at least one foot beyond the supports, or be securely nailed to the supports, or have suitable cleats or drop bolts at the ends to prevent slipping. One-inch boards should not be used as cantilevers. Two-inch planks should not cantilever more than two feet and should be securely anchored to prevent tipping.

The uprights for pole scaffolds for masons' use or other heavy work should be not less than 4 by 4 inches in size and the cross pieces or putlogs should be not less than 4 by 4 for spans less than five feet and 4 by 6 for spans exceeding five feet. All materials used for scaffolds should be amply strong and free from large knots, splits, rot and other defects affecting their



Plate 3—A three-deck plasterer's scaffold showing the diagonal support at the corner.

strength and safety. Scaffolds should be well braced and secured in position. The lower ends of uprights should rest on plank or stone footings or else be driven to a firm and substantial bearing. Uprights resting directly on earth are likely to sink, thus wrecking the scaffold. This is especially true after a rain or during a thaw, when the soil has a tendency to become soft.

Substantial guard rails should be provided on the open sides of all swinging scaffolds; masons' and plasterers' scaffolds more than ten feet high, and carpenters' scaffolds used

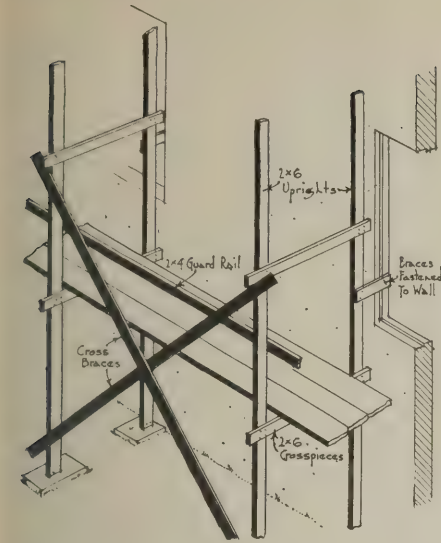


Plate 4—Detail of scaffold showing method of construction and bracing.

in wrecking or similar operations. The guard rails should be at least 34 inches high and well secured against failure.

Guard rails should also be provided where wall openings extend more than five feet above scaffolds and also along the sides of scaffolds adjoining floor openings. It is recommended that a railing or rope be provided on all four sides of swinging scaffolds used in cleaning and pointing walls or similar work. It is also recommended that toe boards (of say 1 by 10 plank) be provided along the outside edge of the floor of scaffolds where falling bricks, etc., are likely to injure men below.

In addition to guard rails, some builders stretch wire mesh or poultry netting between the railing and the scaffold floor so that there will be no likelihood of men slipping through this opening. This will also prevent materials from falling over the edge of the scaffold floor, with the attendant possibility of injury to men below.

Other builders omit the netting but place a 1 by 10 inch plank at the outside edge of the scaffold floor. Others use a combination of toe-plank and netting.

Plasterers' scaffolds more than 12 feet high, if used for ceiling work, and all scaffolds over machinery in motion or where similar dangerous conditions exist, should extend over the entire working area and be floored with planks placed not more than two inches apart.

The practice of piling or dumping materials or debris around scaffold supports should be avoided, as there is considerable danger that the supports will be broken or displaced. Trucks and wagons should not be driven close to scaffolds for the same reason. It should be remembered that the mere cautioning of workmen is often not sufficient to relieve the builder of responsibility, but he must actually enforce his orders and rules.

Moving Houses With Motor Trucks

A stranger in Long Beach, Cal., naturally wonders if all the houses in that town are playing a game of "Pussy wants a corner," as he notices the unusual number of structures that are on

formance was a ladder roped fast to the roof, on which the workmen ascended and descended to the street as the house moved on to its new location. Evidently, it had been necessary to move this

household goods draped with personal effects, and huddled together as if in a panic, the onlooker naturally speculated as to whether the family was given fair warning of the flitting or whether they found themselves on the move when they awoke that morning.

"A body ain't safe in his bed in this town," remarked one of them, as he gaped after the procession.

And he will gape again when in a few hours, or days at most, he sees the same house all welded together again, sitting snugly on its old foundations, and looking as if it had never taken a journey in its life.—*Delphia Phillips.*



Moving houses with motor trucks

rollers on its streets. But he, along with everybody else, opened his eyes with surprise at the sight of one of the movings that took place not long since.

In the beginning, the house to be moved was neatly carved into two sections, which is often done nowadays, and the two portions hauled by two motor trucks. The foundation stones of the house were loaded on the trucks, and a trailer followed back of the sections, bringing odds and ends, such as parts of the roof that had to be removed, and some of the timbers.

But the most unique part of the per-

house in a hurry, for the men were still at work on the roof, a half dozen of them, removing such portions as were likely to interfere with telephone wires. With great unconcern, the men traveled up and down the ladder, carrying down materials to place on the trucks.

It is the boast of house movers these days that it is not necessary to remove a stick of furniture, and when the family desires to follow the house to its new location, the functions of housekeeping is but little disturbed. Seeing this house on the move so early in the morning, the sliced open sections giving a view of



Work is continued while moving

Roof Framing

Compiled from the Contributions of a Number of the Leading Writers on the Subject—Continued from the March National Builder

HIP FRAMING

The upper sketch, Figure 1, shows the typical framing plan of a hip roof, giving center of rafters and outside of plate.

The lower sketch in this figure shows a simplified method which has some advantages over the usual type. It saves time and material and still retains the strength. With the new method, instead

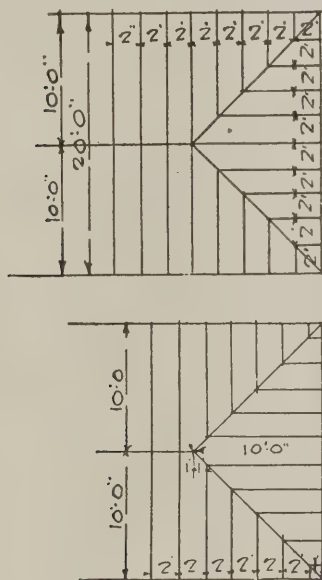


Fig. 1
Hip framing

of five rafters meeting in a bunch, only two hips frame into the ridge at this point, as shown by the detail drawing (Figure 2). For the length of jacks, 1 foot back on a level line will give the length of the longest jack. Then each shorter jack will be 2 feet shorter than the next one, measured on the level (or stepped back).

All good framers well know that there is always a slight variation in the length of hip rafters. Roofs or plates are often out of square on account of the variation of 12—12 inches and 17 inches on the square, and the larger the roof the longer the hip and the more variation. Allow the variations, if any, to come in the sides and not in the hips. Cut the ridge a few inches long at either end. Then put up as many main or side rafters as will be required to hold the ridge in place. Then put up the hip rafters, tack them just right, mark the edge of ridge, withdraw the nails, cut off the ridge ends, then nail the hip rafters back securely and firmly in place (Figure 3).

BACKING FOR HIPPS

To obtain the "backing" for any hip, take any point on top edge of hip, as H (Figure 1). Produce a level line on side of hip and equal in length to one-half the thickness of hip. Now gauge a line through this point and parallel with the top of the hip rafter. This line gives the correct amount of chamfer to form the backing.

In Figure 1 the hip is 2 inches thick, so the amount laid off on the level line is one inch. If the hip were 3 inches thick, $1\frac{1}{2}$ inches would be laid off on the level.

HIP ROOFS OUT OF SQUARE

Until recently it has been the universal custom to set jack rafters parallel with side plates where building is not square. (See Figure 1.)

There are many reasons why such a custom is faulty.

If you make the jacks on sides and ends of such roofs meet together on

hips, they will be much nearer on one hip than on the other. See dotted lines (Figure 1).

Besides, jack rafters will all be different lengths and bevels, and each one must be separately fitted.

But in Figure 2 each pair will be of the same length and bevel and same distance apart, and will all meet together on hips and roof boards will all cut square.

The side bevels for these jack rafters against hips will be found the same as for roofs with two pitches, which is the easiest way of getting bevel cuts of jacks that are not set at right angles to hips.

A Warning Note

The Builders' Bulletin, of Milwaukee, announces that work has been suspended on the wholesale building program of the General Motors Company, at Janesville, Wisconsin. There has been more

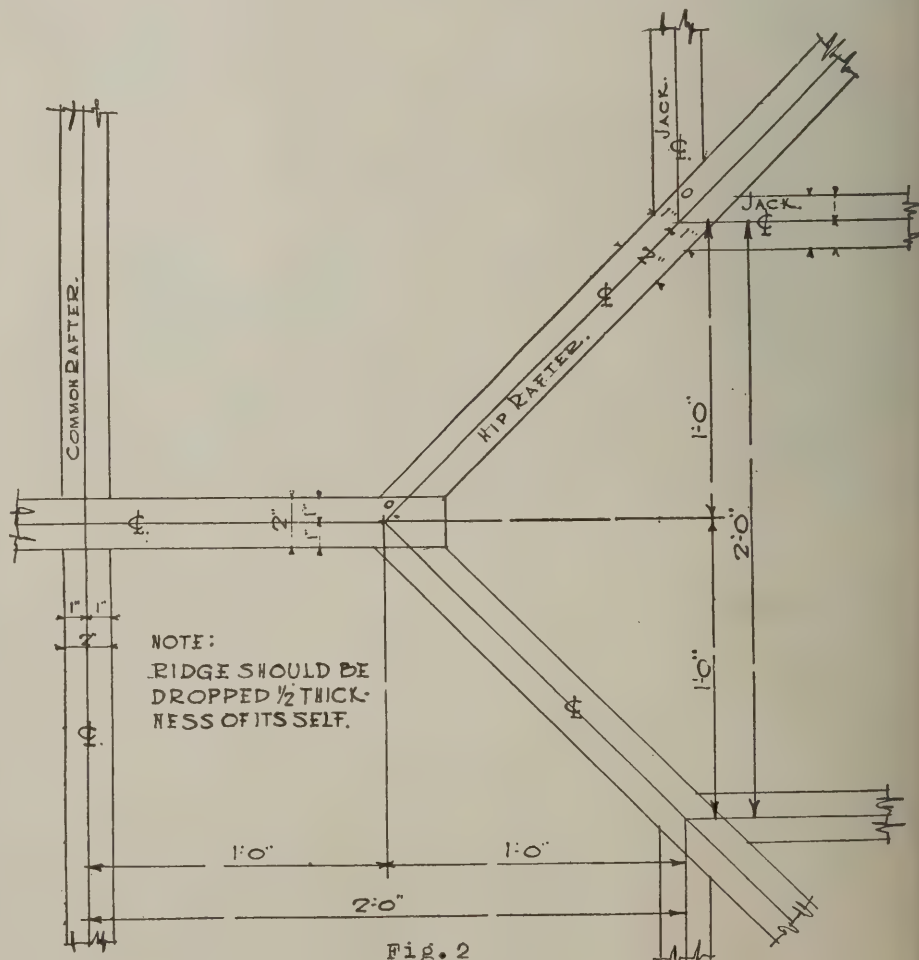


Fig. 2
Hip framing

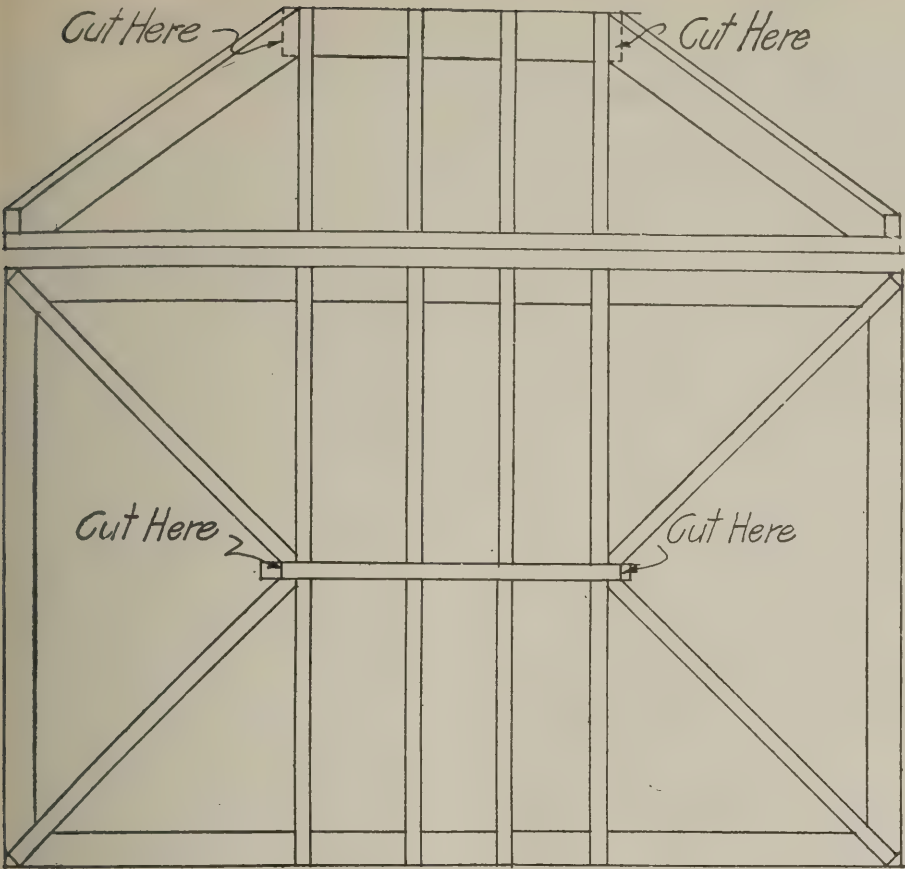


Fig. 3
Hip framing

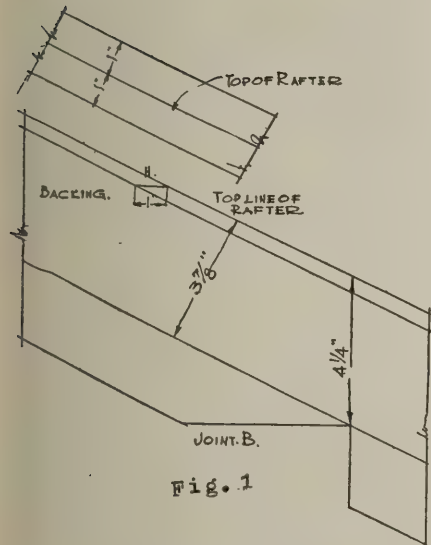


Fig. 1
Backing for hips

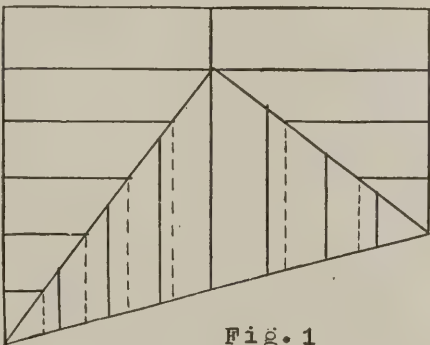


Fig. 1

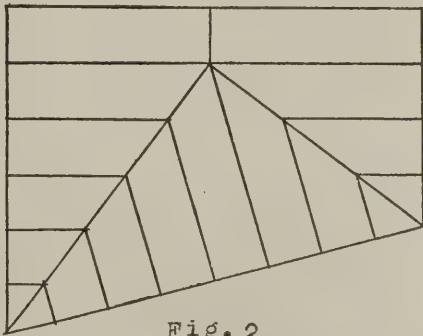


Fig. 2

Hip roofs out of square

or less labor trouble, which has caused the company to determine to build houses only as needed. For example, plumbers have just struck, demanding \$10 a day for 8 hours' work. The company has been erecting the enormous new plant of the Sampson Tractor Works at Janesville, in the construction of which over 700 bricklayers, carpenters, laborers and many other kinds of building trades mechanics were employed, but early in March gave orders to stop at once all

work on these buildings and to lay off all hands for an indefinite period, probably for five or six months, by which time it is hoped prices for materials and labor will again have found a normal, sensible level.

Size of Brick Standardized

The second annual convention of the Common Brick Manufacturers' Association of America, held last February at Columbus, Ohio, was one of the most enthusiastic and successful meetings of brickmen ever held.

For a young organization—the Association is only one year old—its strength is remarkable, its members now comprising all of the most up-to-date brick manufacturers of the United States. The total output of brick of its members borders on four billion yearly.

One of the first questions decided by the convention was that of the standard size of brick. A paper was read by one of the officers of the Association recommending the adoption of the American face brick size ($2\frac{1}{4} \times 8 \times 3\frac{3}{4}$). Arguments were presented showing the advantages to the architect, the contractor, and the brickmaker himself, which would follow the universal adoption of this standard.

Letters were also read from Prof. A. V. Bleining and Warren E. Emley of the U. S. Bureau of Standards, expressing themselves favorably toward the adoption of a uniform standard size for brick.

Committee C-3 of the A. S. T. M. convened in Columbus the following day and changed their tentative size to meet the size adopted by the Common Brick Manufacturers' Association.

The standard sizes of the A. S. T. M., the American Face Brick Association, the Common Brick Manufacturers' Association of America, and the National Brick Manufacturers' Association are now exactly the same— $2\frac{1}{4} \times 3\frac{3}{4} \times 8$ inches.

Thomas R. Preece, the vice-president of the International Bricklayers' Union, gave a talk on "How the Brick Manufacturer and Bricklayer May Co-operate." In the course of his remarks Mr. Preece deplored the tendency of the average contractor in refusing to employ apprentices. Mr. Preece stated that twenty-five thousand more apprentices would be in process of training even now if contractors would employ them.

Warren S. Griffiss of Baltimore followed with a paper on "The Beauty of Common Brick." Mr. D. Knickerbocker Boyd, F. A. I. A., of Philadelphia, followed with a paper on "The Architect and the Industry—the Vast Possibilities of Common Brick."

Strong Mastic Cement

To twenty parts of sifted, sharp sand (not sea-sand), thoroughly washed, add two parts of litharge and one of fresh-burnt and slaked quick-lime in fine, dry powder. Make into a putty with linseed oil. This cement sets in a few hours, and is very useful in repairing broken stonework, as in steps, or in restoring chipped mouldings, etc., as it has the appearance of light-colored stone. — *Building*, Sydney, Australia.

Questions and Answers

"Kinks" that Experience has Proved to Make Better, Quicker and More Economical Construction are Shown in this Department. As Announced, \$5.00 Will be Paid for Each "Kink" Printed. Answers to Questions of General Interest Will Also be Paid for at the Minimum of \$5.00 and at a Higher Rate, According to their Character

WATER TANK CONSTRUCTION

F. K. asks for construction data for a water tank 16 ft. in diameter and 20 ft. high.

The accompanying sketches show the most important details for a tank of this size.

Round hoops are preferable to flat ones, as they are more durable. The hoops should not be spliced with welds and the ends should be secured with standard lugs. Wrought iron hoops are considered more durable than steel ones. The ends of the hoops should not be upset and the lugs should not be placed in a vertical line.

The tank should be supported entirely on its bottom and no weight should come on the bottom of the staves. The side batter for tanks should be between $\frac{1}{4}$ and $\frac{1}{2}$ in. per foot of height.

For this tank the staves and bottom should be made of 3-in. lumber dressed

to about $3\frac{3}{4}$ in. thick. Bottom planks should have the edges bored for $\frac{5}{8}$ -in. dowels about 3 ft. apart. The staves should be doweled about 5 ft. from the top to hold them in position during the erection.

The drawings show the spacing for the hoops and a detail of the croze at the bottom.

SAVING TREES

B. H. asks for information about grading around trees that are to be saved.

Four feet is about the limit of height for grading around trees. The soil should



Vines and moss planted about the trunk will soon hide any unsightly features

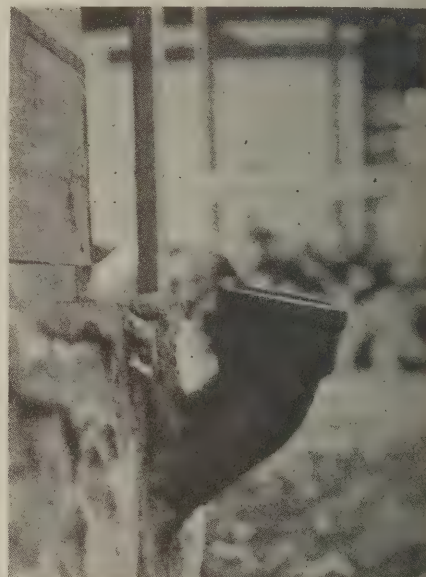
be held back from the surface of the tree trunk by a dry wall, as shown in the photograph. The distance of the dry wall from the trunk should equal the height of the fill. That is, if the grade is raised two feet, the face of the wall should be two feet from the tree on all sides. Vines and moss planted around the trunk will soon hide any unsightly features.

It is not safe to lower the grade within 15 feet of a tree, although when the grade is to be lowered on one side only it may be lowered somewhat nearer than this.

Trees that are to be left standing near

new buildings should have the trunks wrapped with burlap or be surrounded by a wooden guard box to prevent barking or other injury during construction.

RAIN LEADER CONNECTIONS



Cast iron ell in place to receive sheet metal leader

Some builders connect rain leaders to the house drain inside of the basement. They consider that the cost of this method is less than outside connections when excavating is considered. In fact, in some communities the law requires that rain leaders must be connected to the house drain inside of the basement.

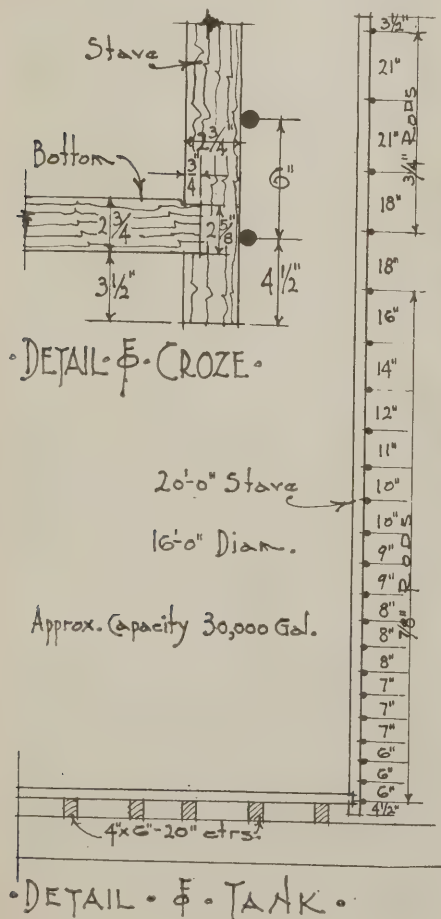
ADVICE ON WOODWORKING SHOP

C. H. W. owns a shop 30x60 ft. in size which he desires to utilize as a small plant for making special frames, sash, pergolas, etc.

He is anxious to obtain the advice of experienced men as to the proper equipment, arrangement and management of such a plant.

CAMP GROUNDS

S. D. W., a western architect, asks for information about the planning and equipment of camp grounds for automobile tourists.



STUCCO COLUMNS

J. E. G. wants to know how the cores are made for stucco columns similar to those in Plate 1.

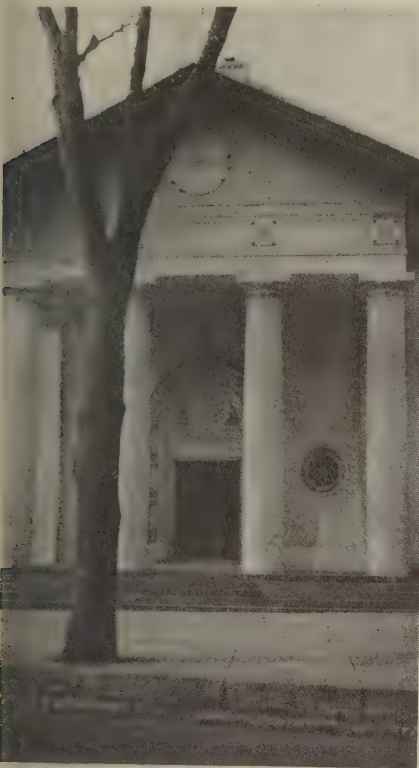


Plate 1

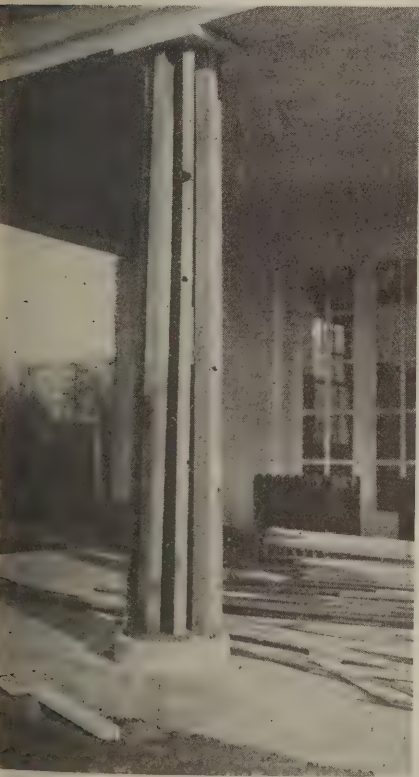


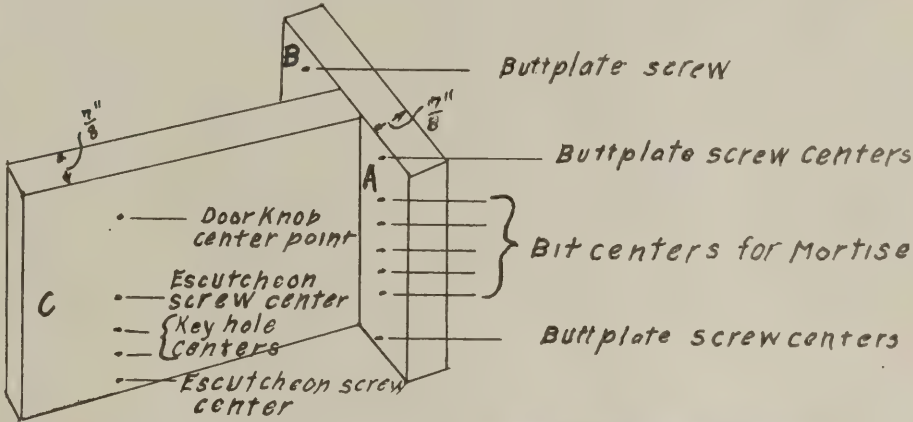
Plate 2

In Plate 2 is shown a method of making such cores. In this example the columns are comparatively short, but the principle

remains the same for either short or long columns. The base, if one is used, is usually formed of solid concrete, and a post is set up in the middle of the column to support the weight from above. Then the rough outline of the column is formed of two by fours as shown in Plate 2. Metal lath is then stretched around the core and tacked in place, and the stucco is applied in the usual manner.

IN APPLYING HARDWARE

When a large amount of hardware of the same pattern is to be applied on a job, the use of a templet, or "deacon," as it is



called in the trade, is a great time-saver, as it makes it possible to locate all screw holes and other points of the piece of hardware to be applied in about two seconds. For illustration, take an ordinary mortise lock. First, cut in one lock complete. Then remove it completely. Now all the center points of the knob hole, screw holes, etc., are to be transferred to the deacon. The drawing herewith illustrates the deacon. It is built of two pieces of scrap board nailed together at right angles. The sides A and B are exactly the same, having nail points protruding about 1/32 of an inch corresponding to the different center points shown. To apply the deacon, measure the height of the knob from the floor. Place the knob center point level with this mark. Press the points of A or B, as the case may be, into the butt of the door. Then press the points on C against the face of the door. Now place the points of B into those made by points on A and mark the opposite side of the door.

If the first lock is right, all the locks will be right. Deacons can be made for other pieces of hardware, such as sash lifts and fasts, drawer pulls. They will make a more uniform job when used.

Another little trick an old carpenter showed me is the use of shims or thin wedges to bring butt joints of flooring flush when one of the butts drops a 32nd of an inch or more below the other. Labor will be saved when scraping the floor, and scraping the floor is the devil's own job. A smoother floor will be the result also.—Arlo R. Lougee, Laconia, N. H.

ESTIMATING ORNAMENTAL PLASTER

E. R. U. is anxious to obtain information on how to arrive at the cost of ornamental plaster work, such as running cornices, modeling ornaments, casting and placing ornamental plaster work, and so forth.

A STORM VESTIBULE

A very serviceable and neat storm vestibule may be made out of three doors. Two of the doors are stationary while the other is hinged to open. If the porch ceiling is higher than the



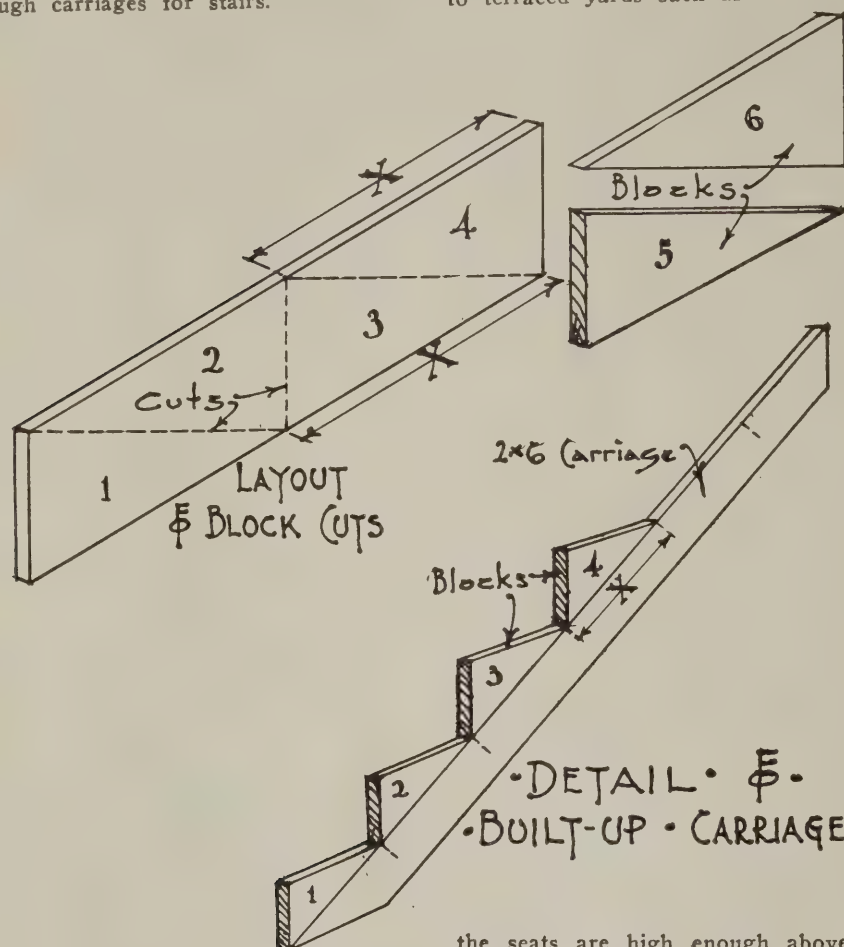
A storm vestibule made of doors

doors, a ceiling may be put in the vestibule, or a base and frieze may be run around the bottom and tops of the doors to fill the space. If the doors to be used are old ones and are not glazed, two or three panels may be removed and the space filled with glass. In any event it will usually be found cheaper to use stock doors for this purpose than it will be to build an ordinary storm vestibule out of lumber.

BUILT-UP STAIR CARRIAGES

This sketch shows a "kink" that I have used for several years in getting out rough carriages for stairs.

Plate 2 shows a more elaborate yard entrance of the arbor type. This arbor with its comfortable seats is well suited to terraced yards such as this one, as



Instead of using 2 by 12 planks and getting out the carriages in one piece, I use a built-up carriage made of two planks.

I cut one of the planks into blocks to suit the rise and tread and nail the blocks onto the edge of the other plank, as shown in the sketch. Note in the sketch that the solid member is laid off to suit the dimension "X" of the blocks. This insures accuracy when nailing the blocks in place.

The solid member may be of 2 by 4 or 2 by 6, according to the span. The blocks may usually be got out of a 2 by 6.

By using this method I consider that I save both time and material, as there is no waste in cutting.—Ira A. Wright, South Dakota.

YARD ENTRANCES

Although gates and fences are seldom used except on large grounds, many owners prefer to have the street entrances marked in some way.

Plate 1 shows a simple pergola treatment, composed of two brick piers with a small pergola across the top. Each pier contains an electric light which shines through metal grilles placed in the small openings.

the seats are high enough above the street to be assured an air of privacy.



Plate 1



Plate 2

KEEP THE CEMENT SACKS AT WORK

One empty sack at the cement mill is worth any number of them lying idle in dealers' or users' hands all over the country in so far as shipment of cement is concerned. Like many other kinds of cotton goods, cement sacks are scarce. If every idle cement sack in the country were returned to the plant which sent it out, there would be considerable relief of the present shortage both of cement and sacks.

Besides, cement sacks cost you money—money which is not working for you as long as you keep the sacks in your possession and thus make it impossible for the manufacturer to buy them back. Sooner or later some sacks are certain to be lost through neglect or because put to improper use and thereby permanently kept from being again used as cement containers. No one knows exactly what becomes of them, but if lost while in your possession, it means money lost to you.

Remember, cloth cement sacks represent an outlay of money by you until you have returned them for credit.

Take care of cement sacks.

Keep them at work.

Return them promptly so the cement manufacturer can ship the cement you want.

GRANDFATHER CLOCKS

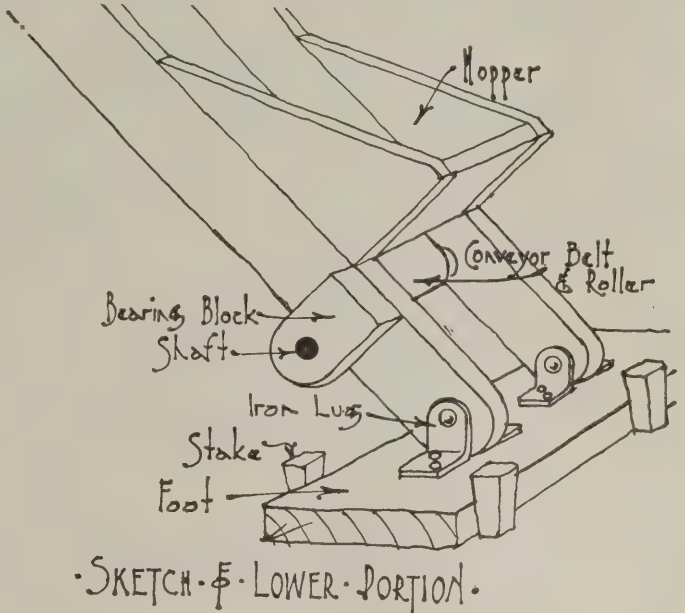
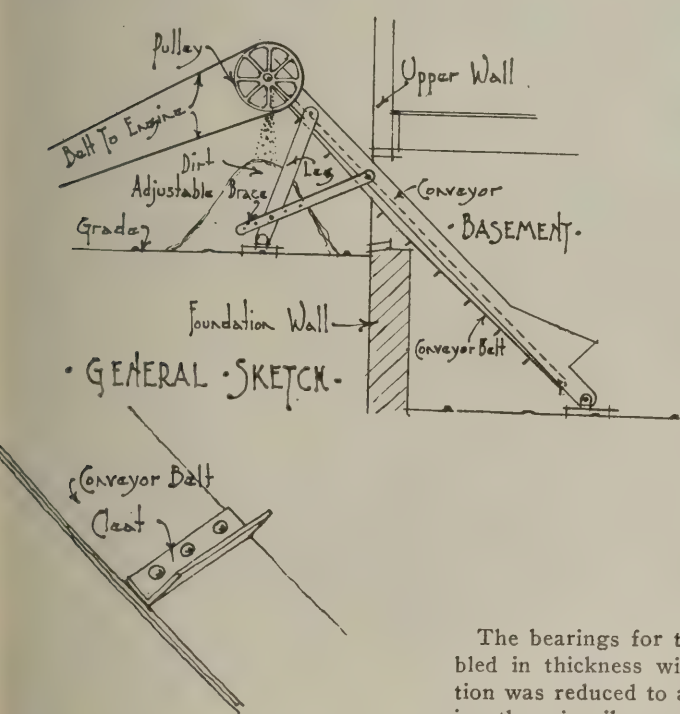
S. L. J. wants drawings for the cases of grandfather clocks. He also desires to know where the works may be obtained.

A HOMEMADE DIRT EXCAVATOR

A neighbor's house was built without a basement, and after two or three years it became necessary to excavate for one. The usual method is either to throw all the earth out of the windows or to remove a portion of the foundation and, after the excavation is started, take out most of the dirt with a team and scraper. In the one instance it is a slow job, and in the other a lot of

The elevator belt was made of double-ply canvas that was slightly narrower than the width of the chute and long enough to reach round the two rollers. At intervals of 16 inches, galvanized iron cleats, bent as shown and punched for rivets, were riveted to the belt. Large washers were used on the under side to prevent the rivets from pulling out. This belt, when made ready, was slipped over the rollers and laced tight.

possible they can fill. American buyers have bid prices up from 15 to 25 per cent in the last three months. That the cost of building a brick house is now about the same as that of a house of equal size built with lumber, and that another rise in lumber costs would make brick construction cheaper is the opinion of R. G. Graham of the Alsip Brick & Tile Co., Winnipeg. Mr. Graham said that in figuring out the



work has to be done over again, such as building up the foundation and straightening the walls.

So the neighbor built an excavator to work on the simple conveyor principle. It saved two men and did not require tearing down any of the foundation.

The accompanying sketch shows the elements of the excavator. A trough was made of two-inch material, with six-inch planks for side and a 2x10 for the bottom. At either end on a line with the center of the thickness of the bottom, two rollers were made of hardwood turned down, and with a shaft made of pipe. The rollers were three inches in diameter. The upper roller shaft was made fast to a large pulley wheel, as shown, to which was connected a three-horsepower engine by a belt. An adjustable leg support was fastened by a bolt to the upper end in order to adjust the height of the end of the elevator, and a foot block was attached to the lower end of the two by sixes. This attachment was made adjustable by means of iron legs as shown. The upper legs might also have a similar foot block. A hopper made, as shown, was slipped onto the lower part of the conveyor to make it easier to load the dirt.

The bearings for the shafts were doubled in thickness with blocks, and friction was reduced to a minimum by soaking them in oil. The rollers were coated with a little molasses to prevent slipping. The upper end of the chute was, of course, left open, and the earth was dumped into a pile, there to be carted off.

This method worked very well. Two men were kept busy digging and loading the elevator, and the engine had no difficulty in carrying up the loosened earth as fast as they filled the hopper.

This excavator has been used on some other jobs, and has paid for itself several times.—F. H. Sweet.

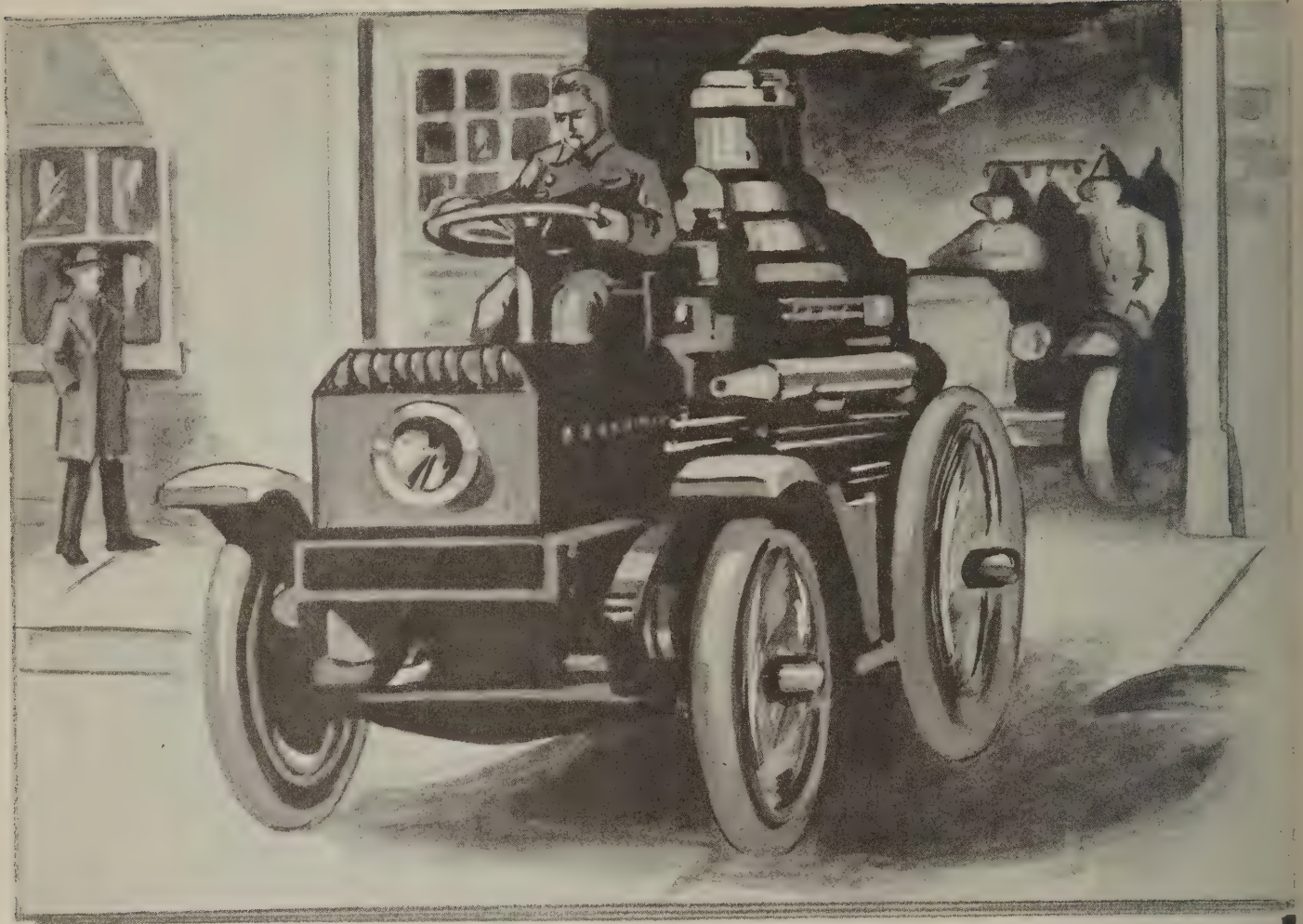
COST OF BRICK AND LUMBER BUILDINGS

From computations made by the Winnipeg Building Exchange, says the Western Canada Contractor, the cost of building with brick, as compared with lumber, is from 12 to 13 per cent greater, but in view of the fact that lumber is likely to be scarce and continues to advance in price, contractors are of opinion that brick will be used extensively next summer. Coast mills and loggers, according to Vancouver dispatches, already have sold all lumber from a cut of 300,000,000 feet of logs and are besieged with orders from the prairie provinces, which it is hardly

cost of a \$5,000 residence in April last the brick building would have cost \$188 more than the frame, he declared, and since then lumber prices have advanced from 15 to 25 per cent. There is hardly any increase in the price of brick, according to Mr. Graham, while lumber prices are likely to go higher, and it is doubtful if sufficient lumber for requirements will be forthcoming because of the export demand.

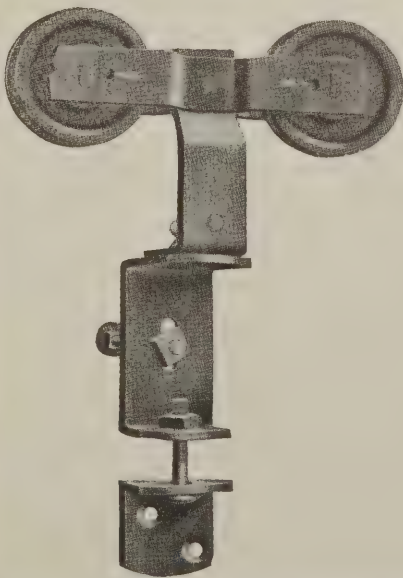
A MORE EQUITABLE DISTRIBUTION OF LUMBER

Announcement is made of the formation of the American Lumber Association, composed of leading wholesale lumber dealers of the United States, with headquarters in Chicago. L. Germain, Jr., is president and L. R. Putman of New Orleans, manager. In the official announcement the purposes of the association are stated to be to standardize the buying and distribution of the enormous volume of wholesale lumber business; to enforce a rigid code of business ethics among lumber wholesalers; to systematize distribution so that no part of the market shall be crying vainly for lumber, while other parts of the market are glutted, and to devise means for eliminating the present enormous wastage in the lumber business. The American Lumber Association will have nothing to do with the naming of prices on lumber.



Doors That Must Open Quick!

When Fire Engines respond to an alarm, there is no time to waste over slow-opening, sticking doors. Many a Garage Owner considers the quick opening of his doors as important as a Fire Department's. For instance, take the Doctor and his midnight call, or the trips to make trains, or hundreds of other times, the Garage Hanger that delivers dependable service is the one that is in big demand, and this is in nine cases out of ten—

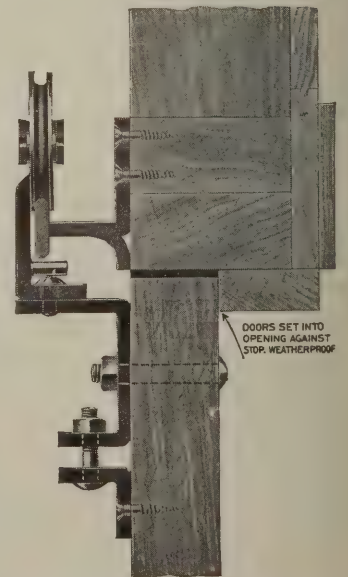


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NATIONAL BUILDER

Vol. 63

Chicago, May, 1920

Number 5

LUMBER and building materials according to the Bureau of Labor Statistics, April 21, show an increase in wholesale prices for March of $8\frac{1}{3}$ per cent above February prices.

Although there has been much talk of construction being held up on account of high prices, high wages, and shortage of material, the total amount of contracts awarded during March in the territory east of the Missouri and north of the Ohio rivers, according to statistics compiled by the F. W. Dodge Company, showed a great increase over the figures for January and February, and was, in fact, greater than the figure for any month in 1919. The total amount for March was \$327,897,000, as against \$235,848,000 for January, and \$216,663,000 for February.

These figures give \$780,408,000 as the total for the first quarter of 1920. Normally the first three months of the year account for about 20% of the year's total of work started. In the first quarter of 1919 contracts awarded amounted to \$275,555,000. Of the total for the first three months of the year, 267,193,000, or 34%, was for industrial buildings; \$150,651,000, or 19%, was for residential buildings; and \$146,973,000, or 19%, for public works and utilities. This shows that the work which has been held up is in the residential group that is the smaller building operations. Normally, this group accounts for about 30% of the total, and at the present time, in view of existing needs, it should be about 40% of the total.

Although contracts have been awarded to the amount of 780 millions of dollars there is still a vast amount of work being held up for more favorable conditions. In the first quarter of 1920, contemplated and projected work of all kinds was reported to the amount of \$1,700,000,000. Of the contemplated work, public works and utilities amount to \$363,802,000 or 21% of the total; industrial buildings amount to \$355,073,000, or 21% of the total; and residential buildings amount to \$343,173,000, or 20% of the total.

New England

Building contracts awarded in March in the New England States amounted to \$42,584,000, a figure greater than the combined totals of January and February.

The total amount of contracts awarded for the first quarter of 1920 was \$82,260,000, compared with \$22,220,000 for the same period in 1919. The total for the first quarter included the following items: \$29,772,000, or 36%, for industrial buildings; \$19,059,000, or 23%, for residential buildings;

and \$15,200,000, or 18, for business buildings.

Contemplated projects reported in the first quarter of the year amounted to \$193,804,000, including \$46,291,000 for industrial buildings, \$38,317,000 for residential buildings, and \$32,071,000 for business buildings. New York State and Northern New Jersey

In New York State and Northern New Jersey contract awards in March amounted to \$66,623,000, compared with \$79,570,000 in January, and \$36,375,000 in February. The temporary slump in February doubtless reflected the unfavorable conditions of the weather and in the labor and material markets.

The total of contracts awarded for the first quarter amounted to \$182,568,000, as against \$50,208,000 for the first quarter of 1919. In the figures for the first three months of 1920 were included \$62,308,000, or 34%, for industrial buildings, \$39,513,000, or 22%, for public works and utilities, \$33,286,000, or 18%, for business buildings, and \$25,174,000, or 14% for residential buildings. The low figure for the residential group is a matter of serious concern, as it is probable that the housing shortage is more acute in this territory than anywhere else.

Contemplated projects amounting to \$303,270,000 were reported in the first three months, the total including \$77,264,000 for public works and utilities, \$74,153,000 for residential buildings, \$62,075,000 for business buildings, and \$56,142,000 for industrial buildings.

Philadelphia, Baltimore and Washington

March building activity in eastern Pennsylvania, Southern New Jersey, Maryland, Delaware, the District of Columbia, and Virginia, as measured in contract awards, amounted to \$50,036,000, compared with \$26,190,000 in January, and \$31,854,000 in February.

These figures combined give as the total for the first quarter of this year \$108,080,000, as against \$47,624,000 for the first quarter of 1919. The total for the first quarter included \$42,929,000, or 40%, for industrial buildings, and \$30,326,000, or 28%, for residential buildings.

Contemplated work reported in the first quarter amounted to \$296,721,000, including \$69,040,000 for public works and utilities, \$66,943,000 for residential buildings, and \$57,169,000 for industrial buildings.

Pittsburgh District

Building contracts let during March in western Pennsylvania, West Virginia, and Ohio amounted to \$67,888,000, as compared with \$43,556,000 in January, and \$42,520,000 in February. The total for the three

months was \$163,965,000, or more than three times the figure for the first quarter of 1919, which was \$40,567,000.

Of the first quarter of 1920 total, \$56,394,000, or 38%, was for industrial buildings, \$33,160,000, or 22%, for public works and utilities; and \$28,733,000, or 19%, for residential buildings.

Contemplated work was reported in the first quarter to the amount of \$180,514,000. This figure included \$53,765,000 for industrial buildings, \$47,781,000 for residential buildings, and \$26,762,000 for business buildings.

The Central West

Building contracts in the Central West (comprising Illinois, Indiana, Iowa, Wisconsin, Michigan, and portions of Missouri, Nebraska, and Kansas) in March amounted to \$89,727,000. There has been a steady increase in this district since the beginning of the year, January having shown a total of \$61,423,000, and February, \$78,082,000. The total for the quarter was \$229,233,000, about double the amount for the same period last year, which was \$110,164,000.

The quarterly total contained the following important items: \$72,545,000, or 32%, of the whole, for industrial buildings; \$49,018,000, or 21%, for public works and utilities; \$44,611,000, or 19%, for business buildings; and \$40,352,000, or 18%, for residential buildings.

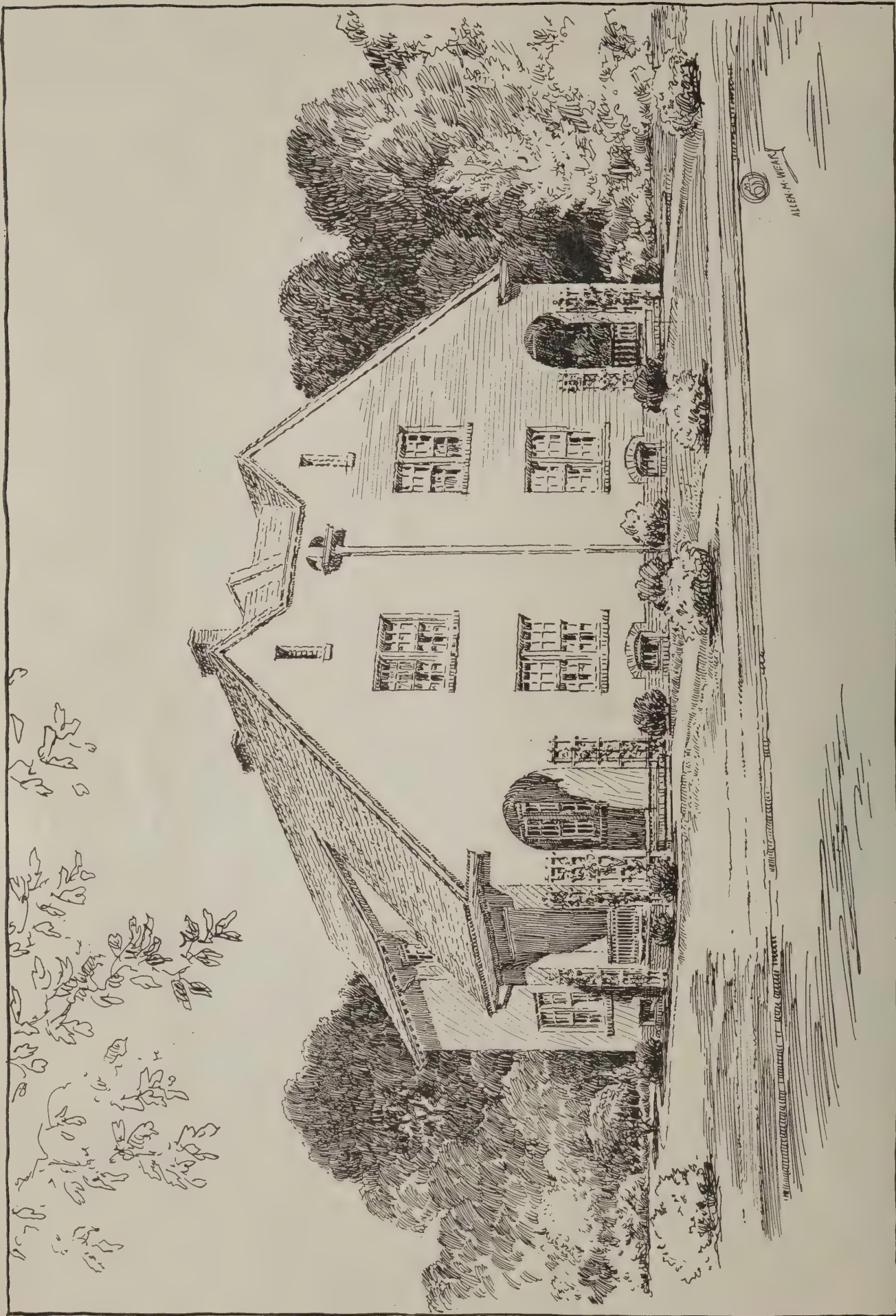
Contemplated work reported in the first quarter amounted to \$681,032,000, including \$155,002,000 for public works and utilities, \$138,241,000 for social and recreational projects (the hundred million dollar Chicago lake front parkway project is included in this group), \$137,622,000 for industrial plants, and \$107,937,000 for residential buildings.

The Northwest

March building contracts in Minnesota and North and South Dakota, amounted to \$11,038,000, as compared with \$7,246,000 for January and \$6,017,000 for February. The combined total for the three months was \$24,302,000, or more than five times the figure for the first quarter of 1919, which was \$4,772,000.

Included in the total figure for the first quarter were the following items: \$7,008,000, or 29%, for residential buildings; \$4,714,000, or 19%, for educational buildings; and \$4,064,000, or 18%, for public works and utilities.

Contemplated work to the amount of \$44,244,000 was reported in the three months, including \$12,021,000 for public works and utilities, \$8,964,000 for business buildings, and \$8,042,000 for residential buildings.



A DOUBLE HOUSE—CHARLES S. FROST, ARCHITECT

Designed for the development by the Chicago Housing Association at Eighty-seventh and State Streets, Chicago

See description, elevations, plans and details on following pages

A Double House

THE drawing on the preceding page shows one of the types of houses that are being erected by the Chicago Housing Association to assist in overcoming the serious house shortage which prevails in that city.

The Chicago Housing Association is a non-profit organization formed by leading citizens of Chicago for the purpose of building homes for workers. The houses are to be sold at actual cost, the payments

for an attractive photograph of the houses to be made. For this reason a perspective drawing of the double house has been prepared.

The exterior finish of the house is of stucco with brick trimmings. The cornices, including the gutters, are of wood. The roofs are of composition shingles; the flat roofs, however, are of tin. The exterior wall construction is of hollow tile resting on a concrete foundation wall.

to the other. The common method of stopping the party wall just under the roofing is almost as effective and certainly is more desirable from a standpoint of both economy and appearance.

The use of two chimneys in the party wall is not so easily explained. Even though it were considered necessary to provide flues for the possible use of coal ranges in kitchens and for heating stoves in living rooms, it seems likely that the flues could



Homeseekers on a Sunday tour of inspection on one of the streets of the housing development by the Chicago Housing Association at Eighty-seventh and State streets, Chicago. The arrow mark in the photograph indicates one of the double houses

on which are to be extended over long periods of time.

An article to appear later will describe the organization and activities of the association more thoroughly. It may be added, however, that the present work involves the erection of about 200 dwellings, and it is said that if the present project proves to be a successful one, stimulating a genuine demand for similar activities, the association will within the near future undertake to build and place on the market 8,000 new homes. All of these homes to be sold at actual cost. The present actual shortage of dwellings in Chicago is estimated to be around 40,000.

From the fact that a double house is the subject of this article, it should not be understood that all of the association's houses are doubles. There are seven other types, all of which are detached or single houses.

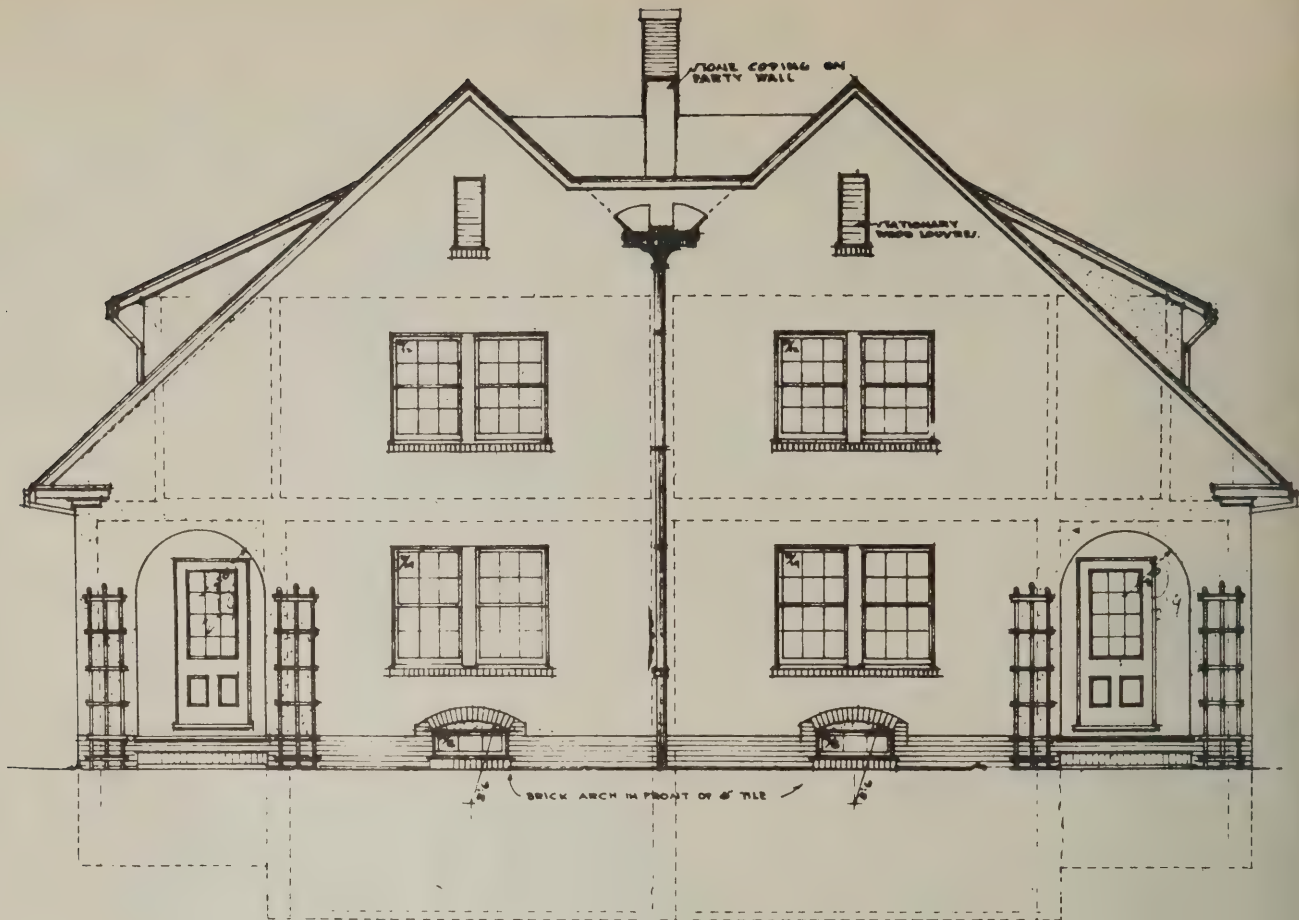
A glance at the photograph will show that the project is not far enough advanced

It will be noted that the advantages of a double house are partly defeated in this house by the two separate chimneys and two soil pipes in the party wall. The Chicago Building Code is responsible for the use of two soil pipes, as one of its requirements is that every building shall have separate lines to the sewer. One soil pipe in this house would, of course, be ample, but a broad interpretation of the code makes each dwelling in a double house the equivalent of a separate building. The extremely drastic nature of some of the requirements of this code is further illustrated by the 12-inch walls which are used in the first story of this building. An 8-inch hollow tile wall is ample for a building of this type and size. The parapet wall formed on top of the party wall is also a requirement of the code. Its actual necessity for a building of this kind is questionable, as it would probably have but slight effect in case of a hot fire, which, if not otherwise hindered, would likely pass from one roof

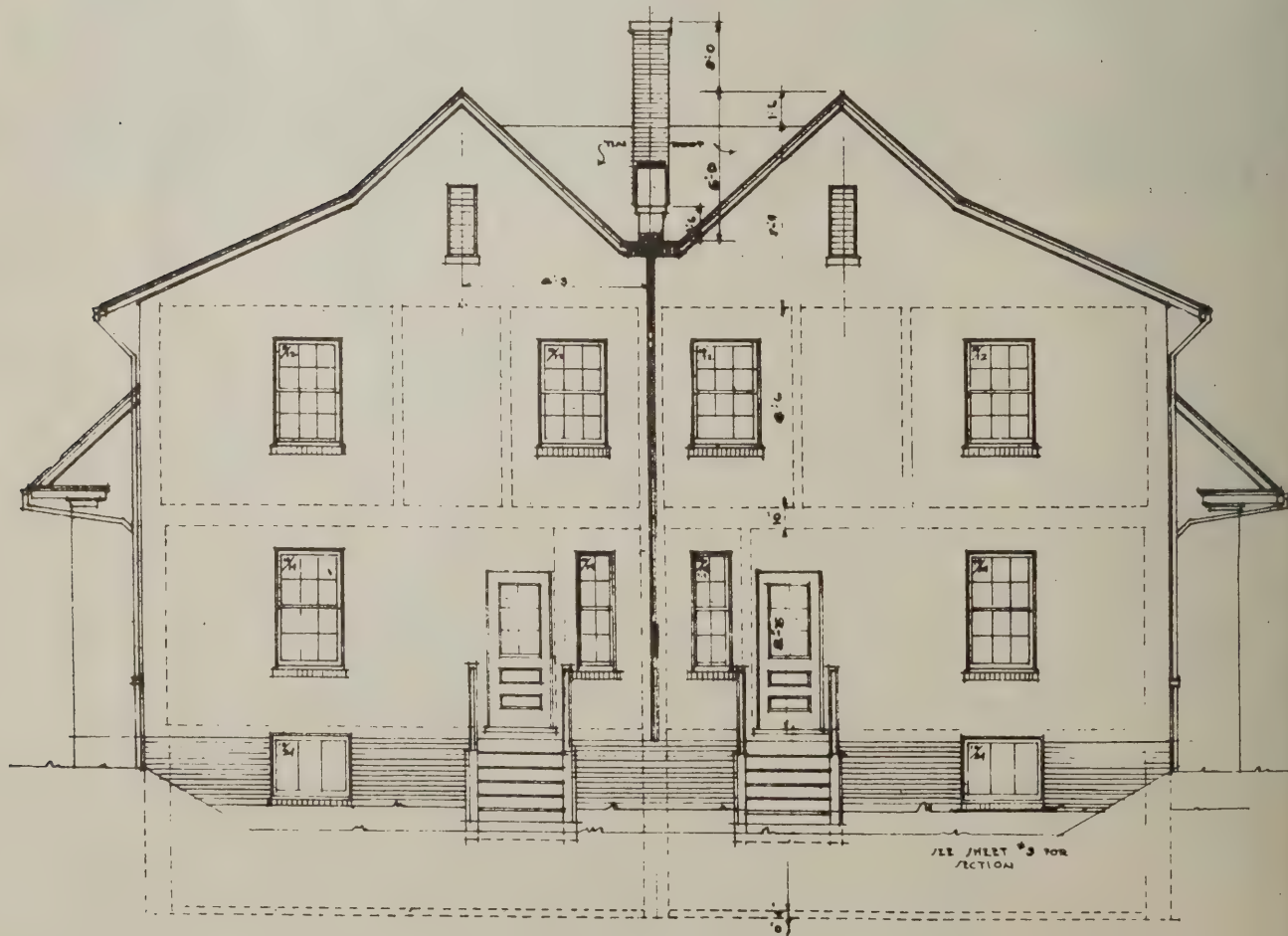
be grouped to form a single chimney near the middle of the wall. A rearrangement of the stair, increasing the length of the first run, would allow sufficient headroom for the smoke pipes from both the kitchen and the living-room to pass under the landings and into the chimney.

The combination kitchen and dining-room is an excellent feature, as is the entrance hall which acts as a wind break between the outside door and the principal rooms. In houses of this type, however, it might be better to cut down the size of the entrance hall, possibly rearranging or eliminating it entirely, throwing the extra space into the dining-room and kitchen so that an owner could put a partition between these rooms if he desired.

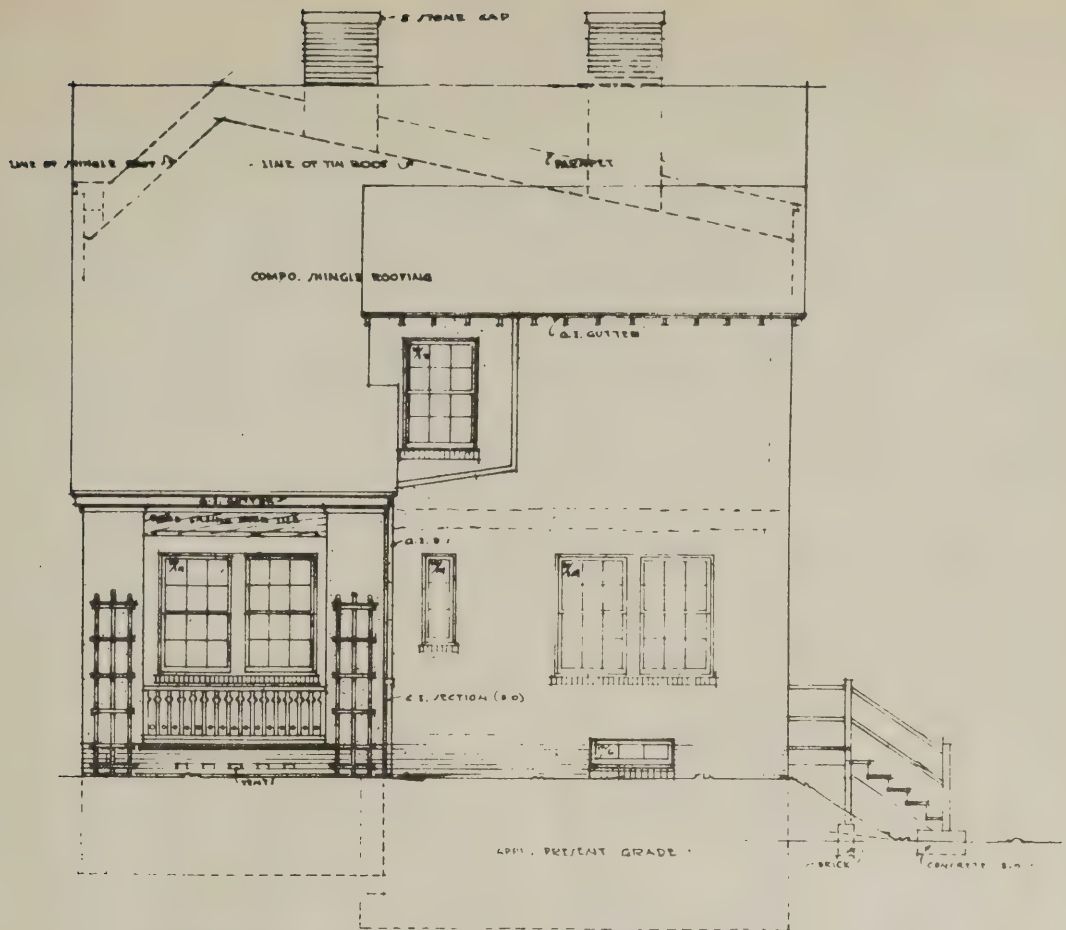
The second floors contain three bed rooms and a bath. Two of the bed rooms have large closets and a large linen closet opens from the hall. One bed room has no closet and none of the bed rooms has cross ventilation.



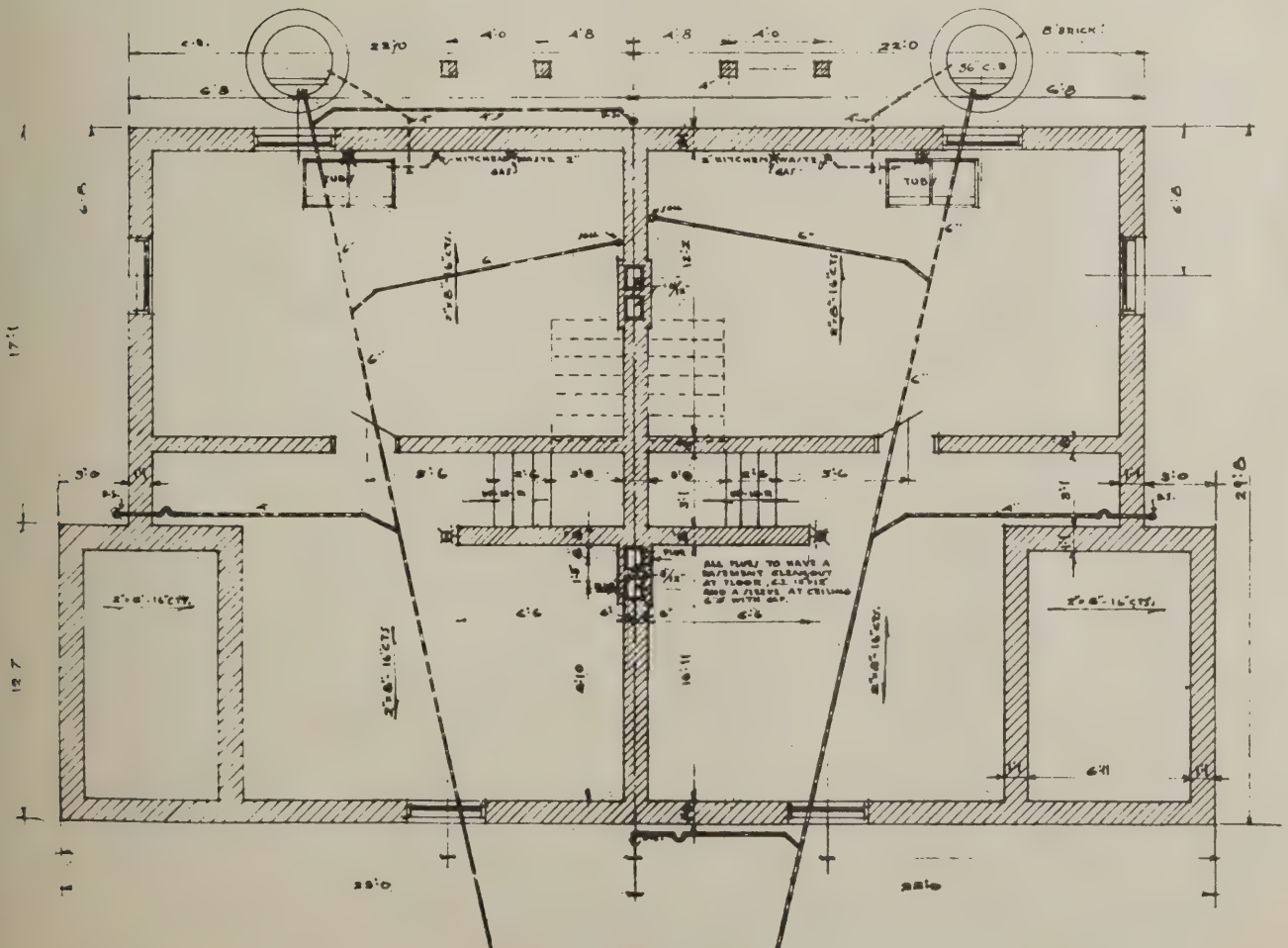
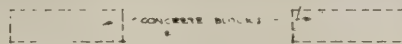
FRONT ELEVATION



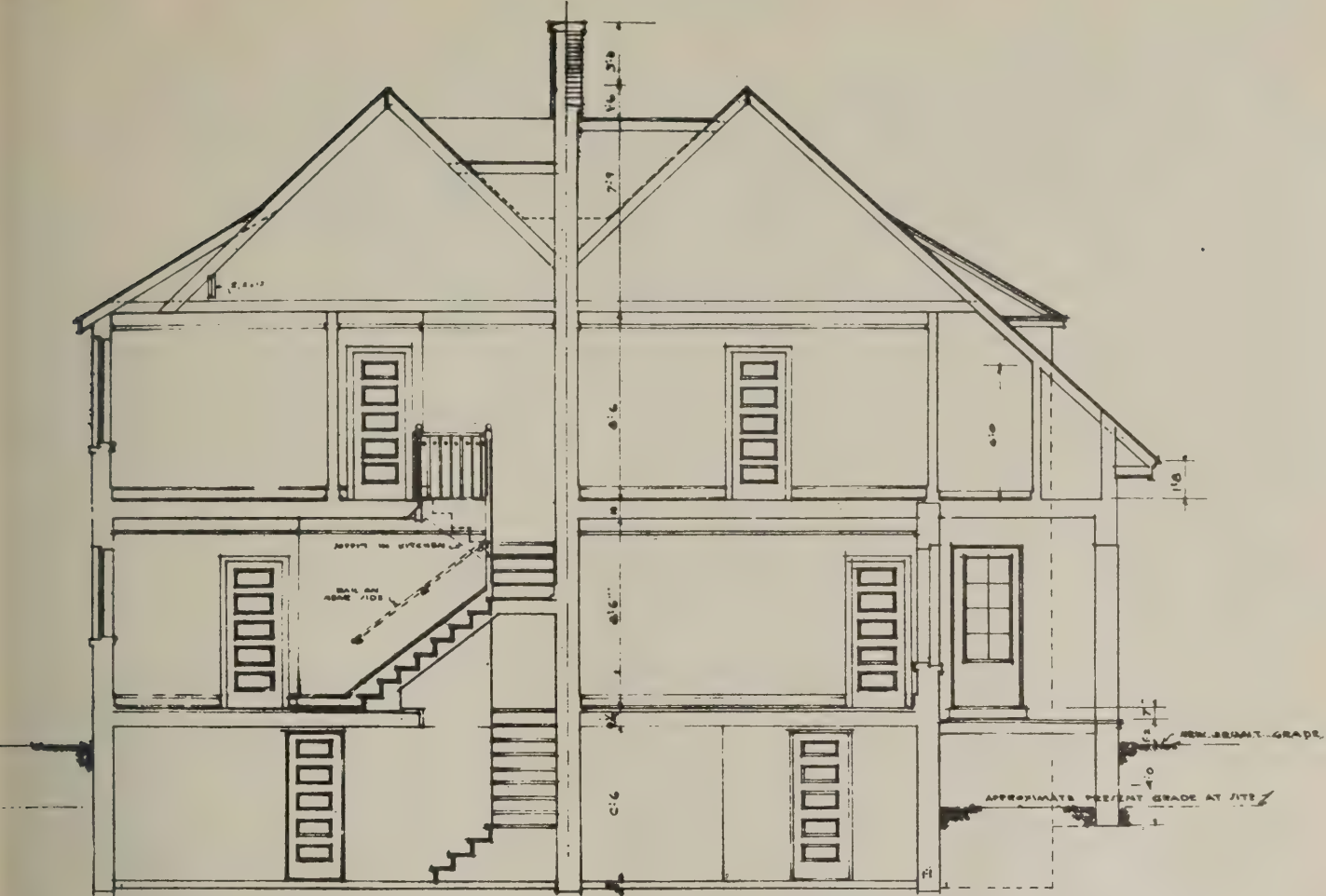
REAR ELEVATION



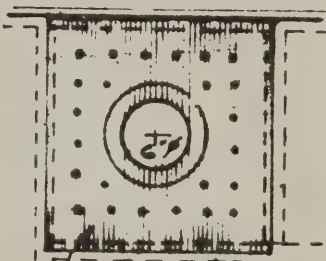
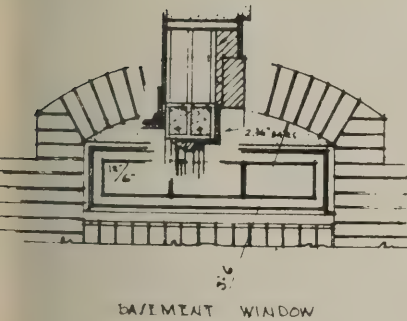
Side elevation (opposite side similar—reversed)



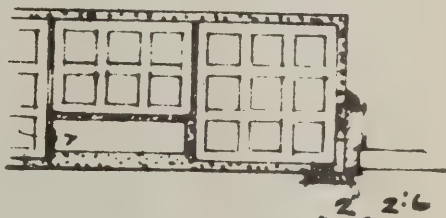
Basement plan



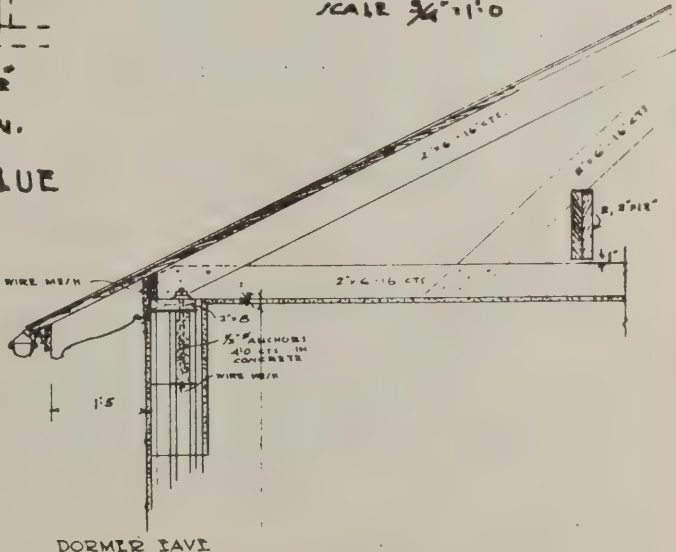
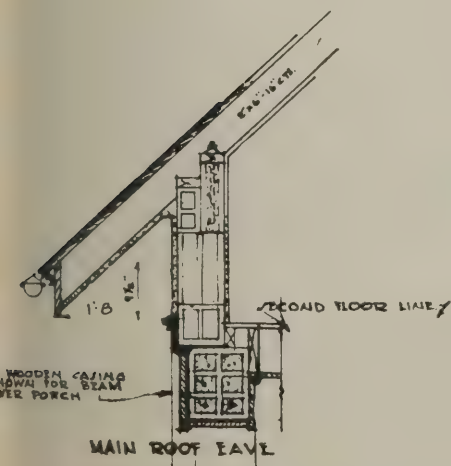
CROSS SECTION /A-A



Pipe /Pace



DOOR JAMB
SCALE 3/4"=1'-0"



DETAILS OF DOUBLE HOUSE FOR CHICAGO HOUSING ASSOCIATION
Charles S. Frost, Architect

Successful Apartment Buildings Which Attract Tenants

By Charles E. White, Jr.

IN PLANNING and designing apartment buildings for profit, for, indeed, profit is practically the chief consideration when building apartments (though many ill-designed apartments would indicate otherwise) the first thought should be: What do tenants want?

Some of the failures in apartment building design which have occurred in the past can be traced to lack of appreciation of tenants' needs. Architects and builders living in homes and never having had the experience of dwelling in flat buildings are

frequently unable to put themselves in the tenant's place to look at things from his point of view. That is why, often, when a new building has been completed and filled with tenants, after a year's lease they move out and go into some other new building which more fittingly meets their needs.

Some of the biggest failures in the flat building line were designed to conform to the whims of their owners instead of the requirements of the average renting class. And when thinking of "renting

class" we must define just what particular class of renters we mean. That is one of the first things to consider when planning apartments—what class are we going after?—for, of course, all renters are not alike and their requirements will not be the same.

Planning for Young Married Couples

In the first place, there are the young married couples with no family, seeking small apartments at moderate rents. An apartment building for them is a special proposition and its arrangements might not



A corner apartment building of the highest grade built for tenants who can afford to pay for the best of everything. Pressed brick trimmed with Bedford stone makes a decided appeal to tenants. This roof is of tile; considerably more expensive than a flat roof, but it often pays to put a better roof on a high grade building because of its architectural effect, to say nothing of its greater durability. This building has small wall-bed apartments with large living rooms

appeal to any other class to any extent. What are the requirements of this large class of people, a class which includes a very considerable proportion of the renting public and which can be depended upon to make the right kind of an apartment building profitable?

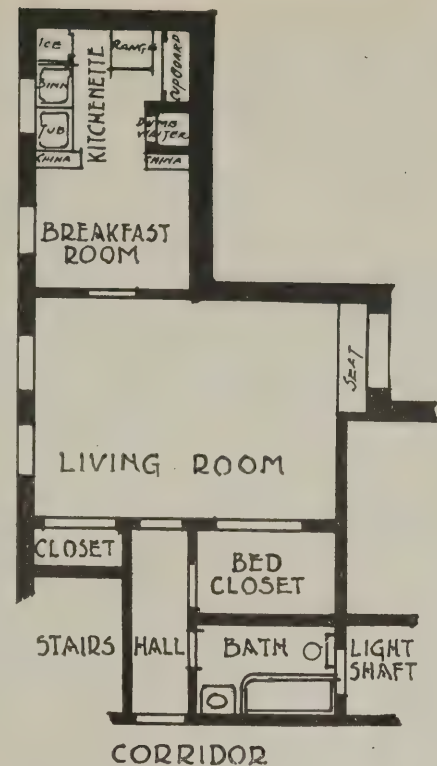
Put yourself in their place for a few minutes and ask yourself what sort of housekeeping arrangements would most appeal to you if you were looking for a home for a bride. They must be moderate in cost, of course, for most young couples start out with a rather minimum share of this world's goods. Then the new home must be situated where the wage earner can get to his work quickly so as not to add further weariness to the daily grind. If he depends upon street car transportation, the difference between a 5-cent fare and a 10-cent fare will make a difference to him; no fare at all would, of course, make a bigger hit with his wife and himself.

Newly married couples like things a little bit more ornate than older people, as a rule, so you must cater to this taste by making your building especially attractive as to details. Use stone or terra cotta trimmings and have the entrances smartly finished with marble or tile wainscoting and good looking staircases.

It is an actual fact that apartments for young people within walking distance of a first-class picture show usually rent more readily than buildings farther removed from this modern unit of every-day existence.

The "Two-Room" Apartment

The "two-room" apartment makes a special appeal to young people without families and it is not strange that this is so. The



Floor plan of a small "two-room" apartment such as appeals to young married couples. A wall bed is built into the living room and the bathroom and combined breakfast room-kitchenette complete the apartment

young bride, looking forward toward the responsibilities of her new life hesitates to plunge immediately into the worries of housekeeping on a more lavish scale. She just wants to be alone with her man in a cozy flat in which the work during a very little period each day is quickly accomplished, leaving her free from drudgery.

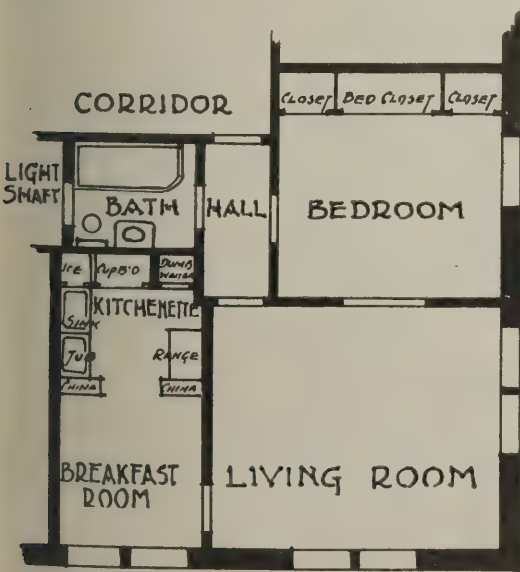
These little apartments should be cheerfully painted with enamel paint throughout or the hardwood trim can be stained mahogany or walnut. Frequently a pretty effect is obtained by staining the woodwork mahogany and painting the back-band with white enamel. The wall bed is, of course, included with the apartment and in many of the most successful small apartments the rooms are furnished, complete, in every respect, except bed and table linen. In this case the living room would have a table, an easy chair, a rocking chair and two or three side chairs. Pictures are hanging on the wall and there is a rug on the floor. In the kitchenette is a gas range, refrigerator, table sink and stool, with a cute little table and chairs in the breakfast porch end of the room. The cupboards are stocked with dishes and sufficient pots and pans are provided to start right in with housekeeping.

Thus the young couple is not obliged to purchase furniture at the beginning of their housekeeping, a very difficult thing for some of them to do.

To the owner of the apartment building the including of furniture and equipment with his apartment is profitable as he makes a good profit, not only upon the building itself, but upon its equipment as well. At the same time this building makes an appeal to young couples which can be capitalized in increased earnings.

What Do Older People Require?

Older people have taste somewhat different from young people and this difference in temperament and ideals should be recognized by the expert designer who seeks to provide a building which shall be popular enough to prove a good renting medium. Apartment buildings are not built



The plan at the left is that of an apartment which provides a regular bedroom in addition to the living room. In many of these there is an extra wall bed in the living room, thus providing two beds. Apartments like this are very popular with older tenants, who often prefer the extra bedroom. The plan at the right is for a "three-room" apartment in which the extra room is a dining room instead of a bedroom. In many of these there is a wall bed in the living room and another in the dining room. This apartment, when properly decorated and if located in a fine building, is considered quite luxurious and will usually develop a high rental value. The entrance hall is an added attraction not usually found in small apartments



A building in which architectural features are reduced to the minimum such as would be practicable in a neighborhood where rents are moderate. These apartments are four and five rooms for larger families, there being twelve apartments in the building. In buildings like this where many families have children, use hardwood trim, stained and varnished; eliminate white enamel as much as possible

merely as architectural monuments to the skill of their designers. They must yield an income to the owners, not merely a 6 or 7 per cent proposition such as can be obtained by ordinary stocks and bonds, but a greater yield in profit commensurate with the greater problem involved. A man who uses his mental faculties in selecting stocks and bonds for investment does not deserve as much profit as a man who, putting his brains keenly to work, constructs a building which is to be the comfortable home of many families for long years to come.

In the latter case the owner is contributing a real benefit upon mankind because he has made the world a better and more comfortable place in which to reside. So, to make his building properly profitable, the owner must plan wisely for the class of tenants he expects to secure.

Older people usually prefer a building with a little more lavish use of luxury. Where young people require small rooms at the lowest possible rental, older people, usually having a larger income, like larger rooms and are willing to pay for them. The interior finish of apartments for older people should be of finest quality and a

more expensive decorative scheme in each apartment is usually advisable.

People of this class are flocking in large numbers to "apartment hotels" in which they can obtain maid service when required. They also appreciate the apartment hotel dining room in which they can get any or all of their meals. A garage, either part of the building or in a separate building close at hand will prove of great value in attracting and holding tenants.

In buildings upwards of four stories in height elevators must be provided, of course. The tendency seems to be for older people to choose the many-storied apartment building in preference to smaller buildings, probably because of the elevators in the former.

In apartment buildings for older people it is not quite so necessary to entirely furnish each apartment. Older people, as a rule, having kept house for a number of years, have enough furniture to furnish an apartment. To young married couples, however, the furnished apartments are very popular. Indeed, in many cases young couples could not marry if required to put down immediately the initial amounts

now required for the complete furnishing of a home.

The Influence of Picture Shows

Mention has been made of desirability of picture shows near an apartment building. In connection with this let me call attention to a little known fact: that picture shows are influencing the taste of our entire population, especially in interior furnishings and decoration.

An architect told me recently that one of the tenants of a new apartment building demanded that silk cords and tassels be attached to the electric bells so that they could be rung "the way I saw them in the picture show." In the show mentioned, of course, the cord was used for an old-fashioned pull bell, but that made no difference to my lady. She liked the romantic effect of pulling a silk cord instead of pushing a button.

I would advise all designers of apartment building as well as owners and builders to study the wonderful stage settings depicted in films of the better class. Artists, the best in the world, design these stage settings and your patrons, the apartment renters, see them and note their charm. When they

walk into a new apartment and note some of the pretty effects they have seen on the film stage, that apartment is practically half sold to them at once.

Some of these effects may be merely a wall decoration or the pretty moldings around doors and windows. Perhaps it is a window seat or a beamed ceiling, or it may be a table, a few chairs and some lighting fixtures, but it is little details like these, in perfect taste, that attract tenants of the higher class.

You will usually find that classifying your tenants and specializing in a building particularly for a certain class will produce a structure which will demand and receive the highest rents. This is merely another kind of merchandising. Most storekeepers specialize in goods for particular classes. Cheap stores carry cheap goods, displayed in a cheap way for people with small incomes. Stores and shops catering to a class with more means must carry a totally different stock and display it in an individual manner. Their clerks, delivery

service and financial arrangements are all built into the big idea—that of attracting the well-to-do.

A Few Rules

Apartment building owners and builders should learn this lesson:

First, select the kind of people you want to do business with.

Second, study their needs.

Third, build solely with these needs in view.

In this way your building will appeal automatically to the class for which it is built and you will have a long waiting list of families eager to move out of their present quarters into your more practicable, more comfortable and more attractive building.

Money in Good Design

The story of a builder who followed the beaten track of building houses in rows, all alike, and who failed because his houses

were such slow sellers, eating up his profits in the interest, is given point in the way he came back through giving more attention to design and more care to planning, the charm of the individual design and convenience of plans selling his houses before he had them completed. Materials and their physical properties are the builder's province; design in materials and their slightly properties are the architect's province—but these provinces merge in individual architects and builders of the many-sided kind. The builder of usual ability who works without an architect may get away with it after a fashion, but he may lose as much or more than he saves not only immediately from defective planning, but in continuous loss due to uninteresting designing. So it cost the builder in the story the price of several failures to educate himself so that he could find his money in good design. Why would it not have been cheaper to get a good architect in the first place? What experiences have you, reader, along these lines?



A modern apartment hotel of the highest grade in which most of the apartments are of the "two-room" variety; wall beds, of course. In a building of this nature it is wise to have connecting doors between several of the apartments, so that larger families can occupy two or three apartments forming a single suite. This building is conducted like a hotel, with maid service and dining room for those who wish it. There are parlors, billiard room and smoking room on the ground floor for tenants and their guests. Usually there is a hall or solarium on the roof for social gatherings of tenants.

An Efficient Organization

SOME of the buildings lately designed and built by the Russell Brown Company of Houston and Dallas, Texas, are shown herewith.

executed under the direction of architects.

As the Russell Brown Company's preparation of plans and designs sometimes brings it into direct competition with

work for leading architects, thus affording another interesting example of the influence that a permanently established building organization has on an architect's



Plate 1—Residence of Russell Brown, Houston, Texas

Mr. Brown entered the building field some fifteen years ago. The company which he now leads has a capital stock of \$100,000 and operates extensively throughout the Southwest. Its building work is not confined solely to its own plans or designs, but also includes considerable work

architects, it may seem peculiar that these architects should favor the company with construction work. However, the company apparently enjoys considerable prestige from the quality of the work performed by its skilled force of mechanics, and is therefore often called upon to execute



Plate 3—Stucco on hollow tile. Note the red brick window sills

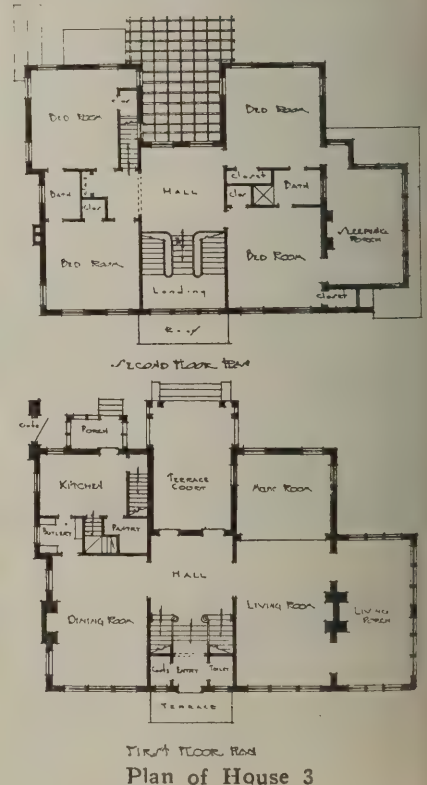
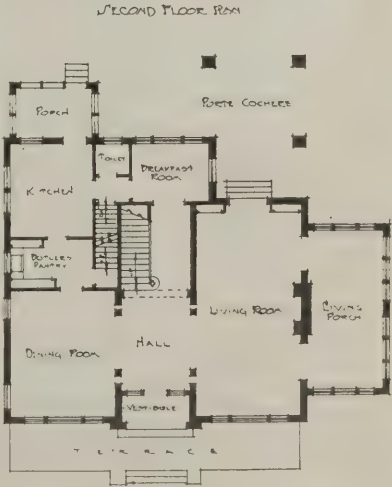




Plate 2—A brick residence somewhat Colonial in style

selection. A few years ago it was almost a universal rule to let a job to the lowest bidder. Nowadays, however, the tendency seems to be to award contracts largely on the basis of the efficiency and experience of the contractor's organization. If a con-

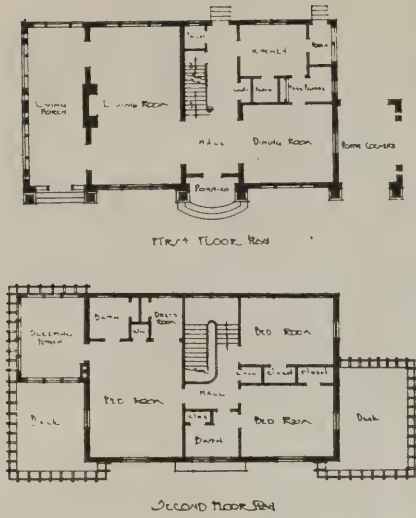
tractor can assure a full force of skilled mechanics, the architect will often give him preference, even though the contractor and the architect have personal differences of opinion on other matters. House 1 is Mr. Brown's home. It is a



Plan of House 4



Plate 4—A brick residence in which brick panelling is interestingly featured



Plan of House 5

modified English type in brick with wide, white mortar joints. The flower box around the porch deck and those under the windows add a decorative touch that is very pleasing. The roof is of stained shingles laid with alternate wide and narrow courses and with roll edges at the gables.

House 2 is also of brick and is somewhat Colonial in style. The brick treatment around the windows is simple and effective. The roof is of tile with shingled dormers. The stone belt course at the second story window level divides the front into pleasing proportions. Belt courses are often placed too low, dividing a wall surface into two nearly equal spaces, thereby giving a topheavy effect. The entrance is of wood. Although it is partly recessed its projection is a trifle too great. The



Plate 5—This house suggests the Italian order and is built of stucco on hollow tile

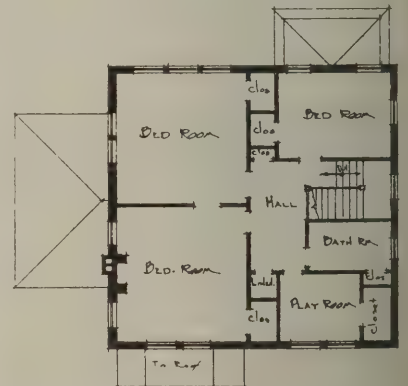
iron balcony railing adds grace to the composition.

House 3 is of stucco on hollow tile. The general lines of this house are good, but the entrance is rather tame and the doorway appears out of scale. The roof is shingled in a manner similar to that of House 1. Red brick window sills contrast with the white stucco. The height of the first floor above grade is masked by replacing the front steps with a short stair from the entry to the hall. The main stair rises in two flights—one on each side of the hall—to the landing and from there is continued in a single flight. Both the

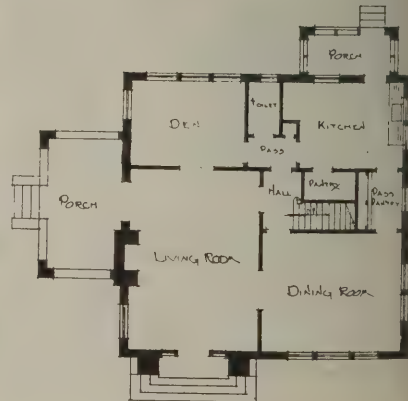
upper and lower halls are large and form important features of the plan. The lower hall opens through French doors on a terrace court, which is partly contained within the walls of the house. The vista from the entry, through the hall and onto the terrace gives a feeling of spaciousness that is very attractive to many people. The music room at one end of



Plate 6—This house is of the square or "secession art" type, its angularity relieved by the trellis work and color spots introduced by the red brick trimmings on the white stucco walls



SECOND FLOOR PLAN



FIRST FLOOR PLAN

Plan of House 6

the living room is another feature. A rearrangement of the two flights of stairs in the kitchen, placing the basement stair under the back stair, would add more space in the storage pantry. The second floor contains four well ventilated bed rooms, two baths and a sleeping porch. The lighting and ventilating of one of the bath rooms from the sleeping porch is questionable. Another sleeping porch might be provided above the terrace court, if desired.

House 4 is a clean-cut piece of brickwork. The brick paneling is interesting and well handled, considering that a detail of this kind is easily overdone. The first floor plan of this house is somewhat similar to that of House 1, but here the plan is larger and a breakfast room is added at the end of the hall. The second floor contains four well ventilated bed rooms, each of which has a private sleeping porch. Each pair of bed rooms has a bath between them. The second story bal-

cony above the entrance is an attractive feature.

House 5 is also of stucco on hollow tile. This house is suggestive of the Italian style, and a tile roof would make the resemblance more pronounced. It will be noted that this house, in common with several of the others illustrated in this article, has a porte cochere. The porte cochere throughout most sections of the country has become somewhat obsolete, but it still retains its popularity in the South and is found on many houses, large and small, throughout that section. The plan of House 4 is a simple rectangle. The entrance is recessed and opens into a central hall. The large living porch; the toilet under the main stair, and the storage pantry in the kitchen are practical features that increase the efficiency and comfort of a household. The second floor contains three bed rooms, one of which is quite large and has a sleeping porch, a private

bath, and a dressing room attached. A bath is also provided for the other bed rooms. The small number of bed rooms in this house may be explained by the fact that house servants in the South usually sleep at home, or in separate sleeping quarters that are often built above the garage. This is an idea that might be more widely copied.

House 6 is of the square type. The use of trelliswork around the porch and for the fence is attractive, as is the use of red brick trimmings on the white stucco walls. The entrance is directly into the living room and stair hall is in the middle of the building. The arrangement is very compact throughout this floor. The second story contains three bed rooms, all of which have ample closets. A play room, such as this house has, is becoming a popular feature even for small houses. The ample closet for toys is a wise provision.

Notable Group of Business Buildings



Plate 1—A combination hotel and store building

THE accompanying illustrations show one of the most interesting groups of small business buildings in America. In these buildings the architect, William Leslie Welton, has achieved something different without infringing on practical features. In fact, an examination of the illustrations discloses that in the essentials these buildings are exactly similar to the average business buildings with which we are ac-

quainted. The only difference lies in the method of handling the surfaces.

These buildings are located in Fairfield, Ala., an industrial town, and are grouped at one end of a plaza. As the needs of the town grow it is intended to entirely surround the plaza with buildings designed along lines similar to these. At present the group consists of four buildings—two sets of twins. Figure 1 shows a combi-

nation hotel and store building. Across the plaza is another building having exactly the same lines, but used as a bank and office building. Across the street from these are the two buildings shown in Figure 2. Each of these two have stores below and 18 offices above.

The extraordinary effect of these buildings is almost entirely due to the use of two different tones of brickwork in form-



Plate 2—Store and office buildings



Plate 3—A "close-up" of the building shown at the right in Plate 2

ing the patterns. In Figure 2 all of the decoration is of brickwork excepting the stucco panels of the first floor lintels. In Figure 1 a few colored tiles are used, mostly in the walls of the penthouse or clerestory above the front portion. The stucco and brick panels and the columns give additional interest to this building.

TAKE CARE OF THE CATALOGS

BETTER file your catalogs carefully, for the time is coming when they will be hard to get.

Central Refrigeration

The idea of a central heating plant is not so old but that even comparatively young men can remember when such installations were a novelty. Now the refrigerating machine is making headway, and the time is close at hand when it will be as difficult to rent or sell a building without a central refrigerating plant as it would be to rent or sell a stove heated building. The advantage of the refrigerating machine, however, in the matter of installation is that

it can be readily installed in almost any building, though where intelligent provision is made for its place in the plans there is greater certainty of making a compact and easily accessible and controllable installation. Machines are now made that will be profitable to the user of even as small a quantity of ice as ten pounds a day, taking every factor into consideration. There are now sufficient users of such machines with experiences covering several years to satisfy the prospective buyer.

Stone Trimmings for Brickwork

By John Y. Dunlop

IN THE oldest types of brick and stone buildings which are still standing we find that the early craftsmen failed to economize on material. In those days the walls usually consisted of two faces with a rough core in the middle. The later builders, however, found it desirable to diminish the thickness of the walls and to adopt a form of construction more homogeneous.

This resulted in the type of walls which are used all over England today. Walls in which the general thickness for the wayside cottage of stone is 18 inches and for the school and public building increasing to 24 inches. With brickwork the minimum thickness is 9 inches. For hollow walls, $4\frac{1}{2}$ inches of brick; for the outer skur, a $2\frac{1}{4}$ -inch air space and, as a rule, 9 inches of brick for the inner part of the wall.

Brick buildings are very common all over England and in districts where the conditions are especially suited for brick making one could walk for days without seeing anything but brick houses and buildings. In the principal towns in such districts many of the public buildings are put up with terra cotta blocks. But in the most of cases the outstanding buildings are usually brick with stone trimmings.

It cannot be disputed that a well designed brick building trimmed with stone is most impressive, not only because of the color or tone contrasts, but also for the reason that a great amount of variety and contrast can be obtained in the jointing and texture of the materials. The selection of stone which will harmonize with the brick and proper distribution to add interest to the masses are very important features.

In the line drawing which is shown, the triple window projects past the line of wall of the brick gable. The projecting walls at the side also have windows formed in them with the result that the bay thus formed is built of stone from the level of the sill upwards.

The lower part of the bay is built of 9-inch brickwork, as shown in the section, and immediately on top is bedded the 10-inch by 6-inch stone sill. The sill is laid in five pieces, that is, one for each window, and each of those portions are weathered and stopped to form a level seat for the mullions.

In cutting a stone sill of this kind the rough block would be roughed 10 inches broad and made 6 inches thick and would be dressed for bedding on both the lower and upper side. The stone would then be jointed on both ends and cut to such a length as would bring the joint in line with the middle of the mullions. The seats for the mullions would be left level and the

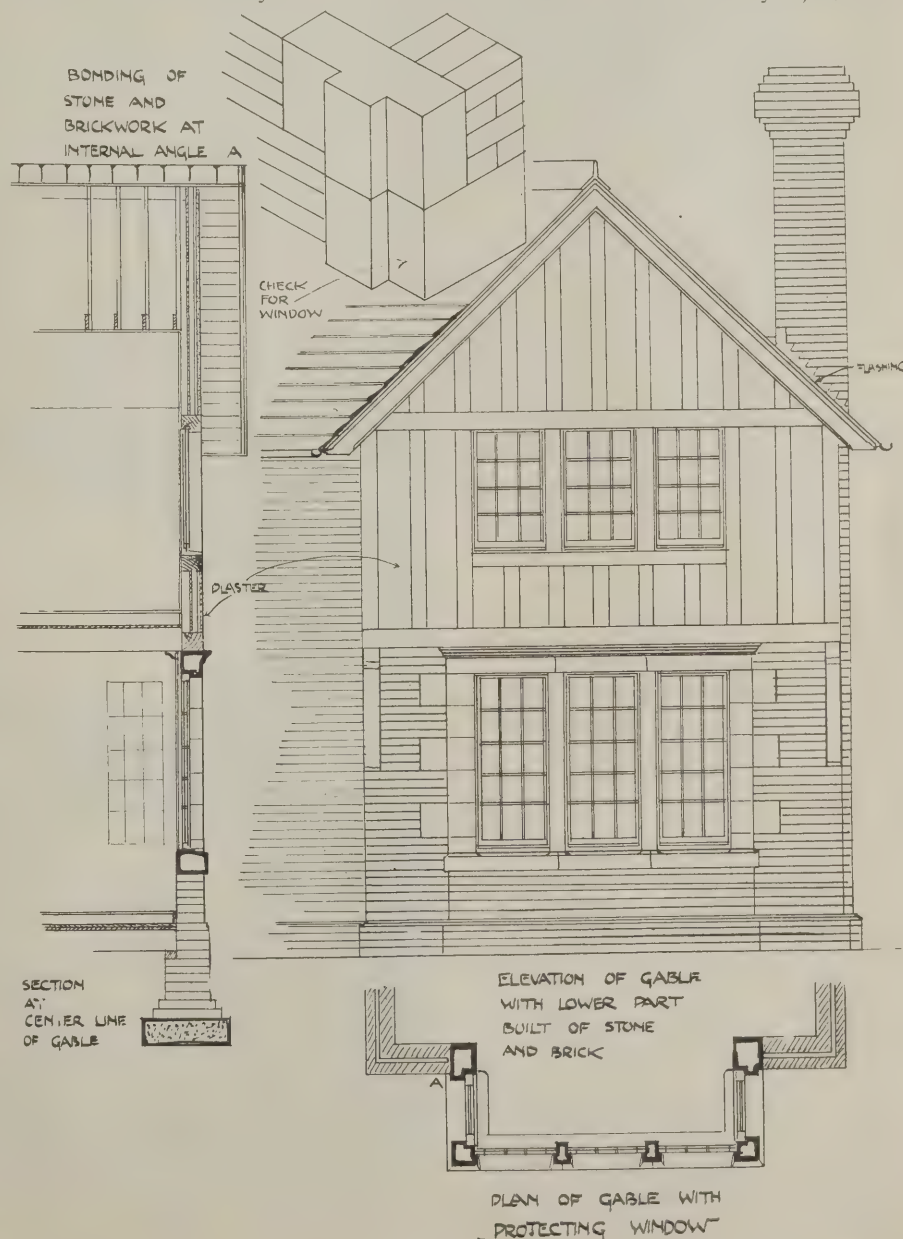
spaces between cut with a slope extending from the line of the front of the window frame to the outer edge of the stone. The depth of the slope of the sill is usually one inch. The slopes at the mullions are at a much steeper angle, being cut just to touch the edges of the mullion seats. At the side of the mullion seat the angle of the slopes is the same as the front part and as this part of the sill is being cut on the top of a weathered surface the splay at the side becomes gradually less until it reaches nothing at the line of the window frame.

The mullions in this class of work are usually in one piece, but they vary very much in size. Often they are to be found

6 inches by 6 inches when the window frame runs behind them. In this example they are 8 inches on the face and 10 inches deep with a check on each side to receive the casement windows.

The corner mullions of the bay are built of blocks 10 inches by 10 inches on the bed, and the heights are arranged to register with the heights of the brick courses. The stone trimmings around the opening in the main wall have the stones bedded at the same levels as the joints in the corner mullions.

In this example the wall is built hollow with a $4\frac{1}{2}$ -inch thickness of brick outside, a $2\frac{1}{4}$ -inch air space and a 9-inch brick wall inside. The outband rybat, as shown





Grammar School, Stockport, England. General view of building showing how stone courses and trimmings may be laid to enhance the appearance of the brickwork

in the sketch, is made sufficiently thick to receive the outer skin of the wall and the air space, while the inbands extend through the full thickness of the wall.

In all the horizontal joints or beds the stones are carefully bedded throughout and in the case of the bed joints at the lower end of the mullions small vertical slate dowels are cut into the sill and mullions.

At the top, the lintel which is built in position in several pieces, is merely set on the corner and intermediate mullions, with the joints well bedded. The vertical joints of the lintels are usually fixed together with small metal cramps which are grouted with cement.

In this way the bay is made ready for the timber beam onto which the timber framing of the upper story is built.

Stone in brickwork is very popular in public buildings and in schools, and because of the many advantages in its use in this class of work, three views of a very fine example of this type of work in a school building are included in the illustrations.

The general view of the school shows not only stone built into brickwork around door and window openings, but also shows how stone bonding courses may be introduced to strengthen the wall and at the same time break up the large, plain brick masses which would otherwise be dull and uninteresting. Stone bonding courses are usually 9 inches broad on the bed and are cut to build even with a convenient number of brick courses.

In some cases the stone dressings around a door or window opening are built of an equal breadth on the face. This equal breadth of stonework gives a uniform size of surround as far as the outside

appearance is concerned, but in reality each alternate stone is longer than the next one, which is the means adopted for bonding the stonework to the brick wall.

This arrangement is carried out to a certain extent in the building of the assembly hall windows of the Stockport Grammar School. In the brick wall below the windows the usual outband and inband arrangement may be seen in the illustration

referred to, but the length of the outband on the face is only $4\frac{1}{2}$ inches longer than the inband. This arrangement is adopted to prevent as far as possible the cutting of bricks on the face of the wall.

Of course the stone sill which is in one piece extends over the rybats and on the top of that the window rybats are set. These are cut to show the same length on the face but every alternate window stone



Covered passage at the side of quad, Stockport Grammar School. Showing monolithic stone columns with semicircular stone arch fitted on the spandrels with brickwork



View of quad, Stockport Grammar School, showing the stone treatment around the assembly hall windows

goes through the full thickness of the wall while the stone underneath and the one above are only half that length.

Above the cornice the parapet is built in much the same way as the lower part under the window sill. The cornice bed extends in the full thickness of the wall.

A close examination of the photographs will disclose many pleasing stone and brick details in this building. In the general view are shown two interesting oriel windows. The many picturesque gables and the combination of stone and brick in the blank walls also add interest. The stone columns shown in the photograph of the covered passage or cloister are cut in one piece and the arch stones are just of sufficient size on the ends to allow them to rest on the top of the abacus of the capitals.

Work of this kind does not stop with the cutting and laying of the material, for just as important is the pointing. At this stage of the work the whole nature of the building can be changed and the result made disappointing or successful.

The original mortar for all classes of

work was lime mortar made from hydraulic lime which had been slaked to bring it into powder form and mixed with clean sand.

But things have changed vastly and modern English work requires cement mortar, both for building in the rough and for pointing. Cement mortar is considered necessary not only for its strength, but for its quicker setting action, an important requirement where work is to be carried out smartly.

Pointing mortar is usually applied with a small trowel and is "struck" or "weathered," as is desired. Of course, there are two ways in which pointing may be done. One is to point the work as it is being built. The other way is to wait until the roof of the building is on and start at the top, raking out the joints and pointing on the way down.

The latter method is usually adopted for the better class of work because it allows the pointing not only to be done when the work is set, but the wall can be washed down and any putlog or scaffolding holes filled in all at the one operation.

Profit in Conveniences

Never before has so many varied conveniences to lighten labor, to make the home more sanitary, to reduce running expenses and to reduce first cost, been offered to the consideration of the contractor and builder, the architect and the prospective home builder or building investor as at present—and the list of opportunities is steadily growing. It should be obvious that the time has come when the careful reader of building trade literature, particularly those readers engaged in the building industries, who make themselves conversant with the merits of these conveniences and apply them intelligently in their buildings will assure a continuous tenancy for these buildings and also a ready sale. A building is like any article of merchandise in that the more it satisfies and the more people it satisfies the more it is in demand and the more permanent and far-reaching is that demand.

So when you build do so with a pretty full idea of the conveniences that are in the market.

A Country Club

IT SEEMS that Americans have only lately discovered an ability for outdoor play. That this is true is evidenced by the large number of country clubs that have lately been established. Of course, certain groups in the larger cities have long maintained country clubs, membership in which

the recent formation of many country clubs in the smaller communities. Many are also the outgrowth of tennis and gun clubs and of summer camps or colonies near cities. The value of an active and popular country club as an agent for promoting wholesome social activities and healthful recre-

pects were Favrot & Livaudais of New Orleans.

The building is located on rising ground overlooking the lake on one side and the golf course on the other. At present the site appears to be rather barren, but the planting of trees and shrubbery is under-

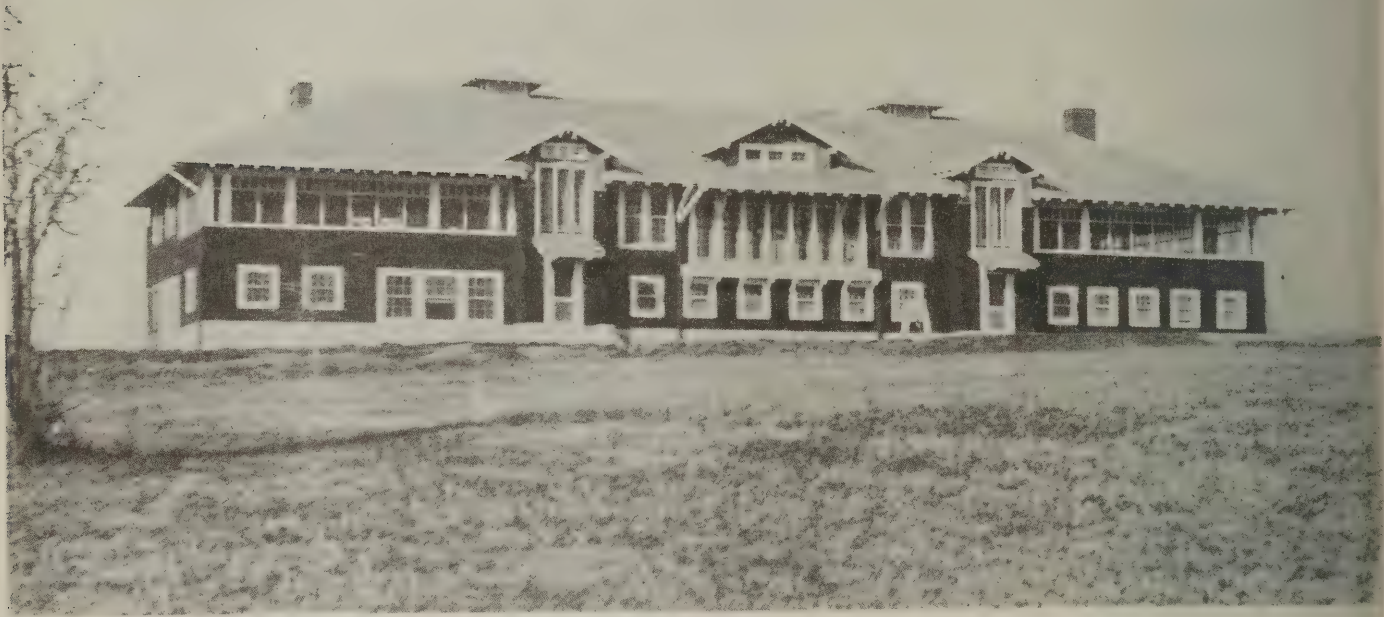


Plate 1—The club house from the golf course

was popularly supposed to be limited to the leisure class. In fact, the most of us held that we were too busy or too poor to engage in recreation of this character.

Prohibition and the growing popularity of golf are no doubt largely responsible for

ation is well proved by their general acceptance and growing popularity.

The club building which illustrates this article is located at Prien Lake, near Lake Charles, Louisiana, and was built for the Lake Charles Country Club. The archi-

way and will soon overcome this impression.

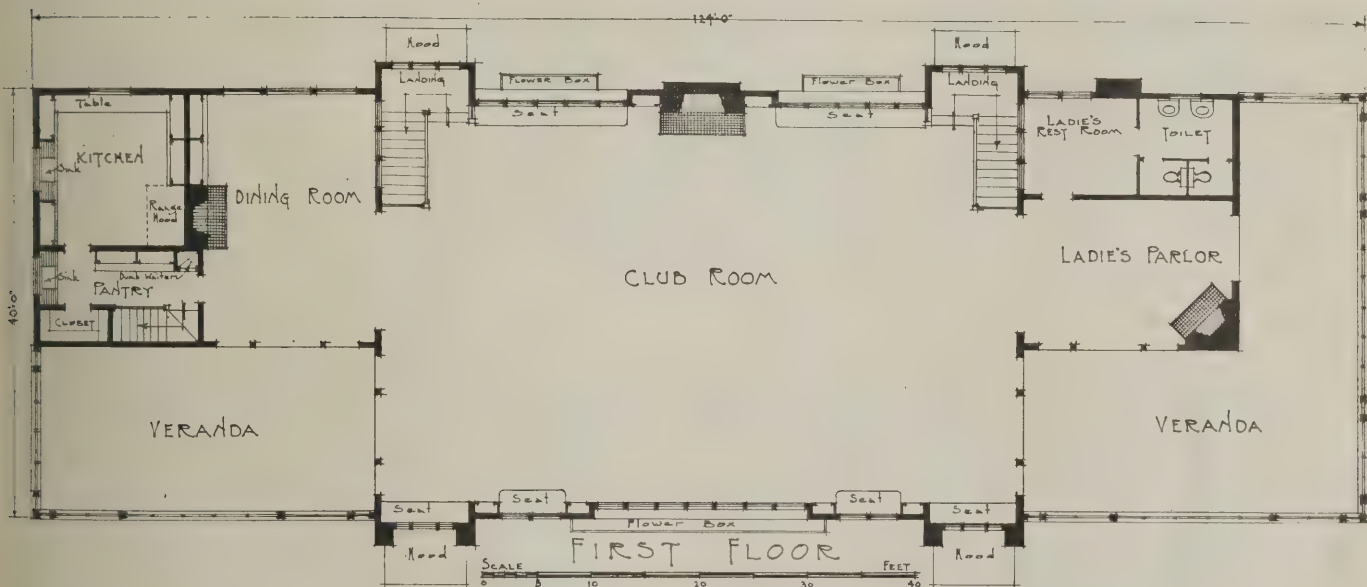
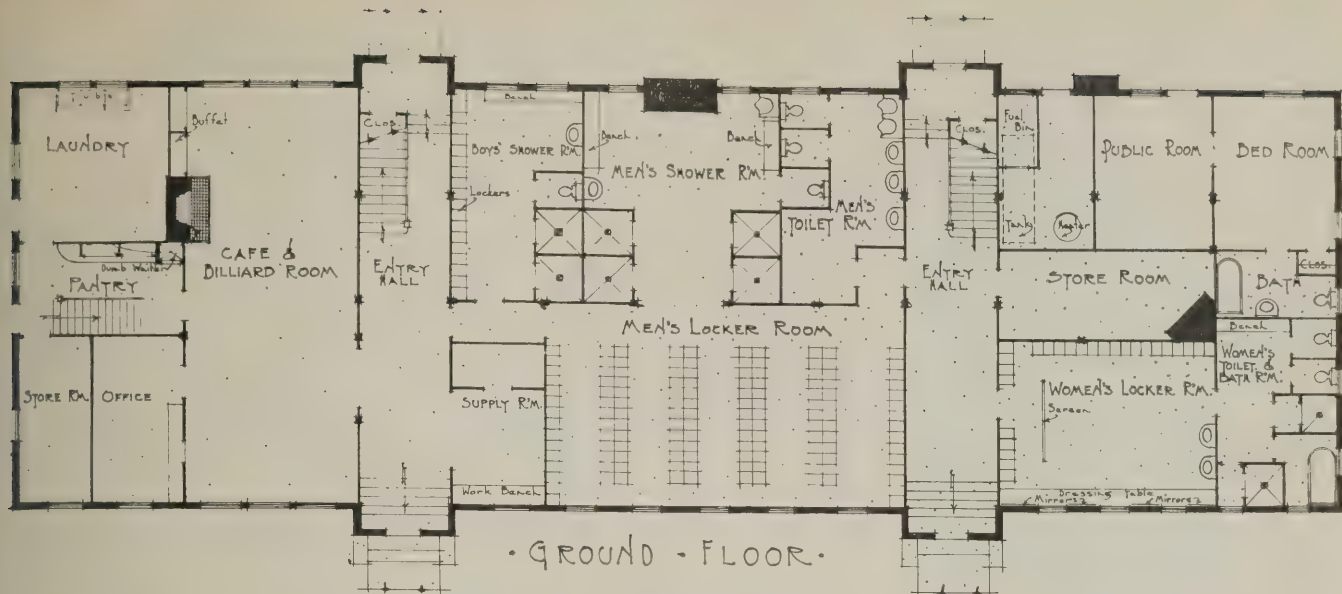
Economy, as usual, was an important element of the design. In a choice between a simple treatment—which would permit the erection of a comparatively large building extending its benefits to many people—or a more ornate small building which would be available for but a few, it was wisely held that the large, simply-treated building is to be preferred.

The building is 40 feet wide by 124 long. The construction is of frame, with a concrete floor throughout the basement or ground floor. The construction is unique, in fact, might be called a semi-mill type from the fact that with the exception of the exterior walls, heavy wooden posts or columns are used throughout the basement to support the girders which carry the first floor. The partitions in the basement are run between the posts and are made of ceiling material, thus acting as curtain walls without load-bearing capacity.

The exterior of the building is finished with siding laid with alternate wide and narrow boarding, stained and with white



Plate 2—A view showing one end and the side toward the lake



trim. The roof is of asphalt shingles and has two large wooden ventilators at the ridge.

There are four principal entrances to the building; two on the lake side near the drive, and two opening on the golf course. The entrances on each side of the building are connected by two wide halls which also contain the stairs to the first floor. Between the halls are located the shower, locker and toilet rooms for men and boys. The generous space allotted to the locker room is due to the fact that lake bathing as well as golf and tennis, attracts many members. The provision of separate shower rooms for men and for boys is a good idea. A supply room for towels and other toilet supplies is located between the men's locker room and one of the halls.

Across this hall is the cafe and billiard room, which contains a large built-in buffet and a fireplace. The cafe is served



Plate 3—Detail of one of the entrances

from a pantry, which is connected to the kitchen pantry above by a dumb waiter. A service stair leads from the cafe pantry to the kitchen pantry. Opening from the cafe pantry at one side is the club laundry, which has an outside door, and at the other side is the store room for kitchen supplies and the steward's office which has a counter-steward's office which has a storage cabinet under.

The women's locker room is located in the other end of the building and opens into a women's toilet and bath room. The lockers are arranged around the walls and two lavatories are provided. A dressing table is built-in under the windows along one wall and is provided with a mirror back. The women's toilet and bath room contains two showers and a tub bath, each with dressing compartments. A room for general storage also opens off the hall at this end of the building. Also at this end of the building are located two rooms com-

plete with bath, which are available for the use of the steward or the golf professional. These living quarters have wooden floors laid on the concrete. Between these rooms and the hall are the water heater and tank which supply hot water for the building. Both the living quarters and the heater room have exterior doors. All of the finished rooms in the basement have walls and ceilings of tongue and groove stuff in natural finish.

The two main stairs lead from the lower halls to the club room on the first floor. The club room is approximately 40 by 60 feet and is largely used for dancing. Its numerous windows give views of the lake from one side and the golf course from the other. At one side is a large fireplace, and seats and cabinets are built in below the windows. The roof over the club room is sheathed with T. & G. stuff and is carried on wooden trusses which are left exposed and stained. All of the rooms on this floor have board and batten walls, stained, and T. & G. ceilings in natural finish. The kitchen and pantry, however, have T. & G. walls as well as ceiling.

At each end of the club room wide cased openings let into the dining room and the ladies' parlor and French doors open on the verandas. The dining room has a large fireplace and a built-in buffet. Its windows overlook the lake and here also French doors open on a veranda which overlooks the golf course and may be used as a dining porch. The serving pantry opens from the dining room and contains a large closet, sink and a built-in cabinet. The dumb waiter and the service stair to the basement floor are also located in the serving pantry. The kitchen is situated in a corner of the building, thus insuring cross ventilation and lighting. It is well equipped with built-in cabinets, a work table and sink and the range hood is connected to a vent flue in the chimney.

At the other end of the building is the ladies' parlor which contains a fireplace. The ladies' rest room and toilet room are conveniently located. French doors open from the ladies' parlor on the large veranda which overlooks the golf course and the tennis courts. The lake may also be seen from this veranda.

The building is provided with its own lighting and water systems.

The Lesson in Borrowing
You will find when you attempt to borrow money for your building project that the kind of construction material you proopse to use will have a good deal to do with the amount you can borrow. It may be all right to say that you can build without borrowing, but go and try to borrow anyway, and if you find that the banker does not think the security good enough you may well give more careful thought to your project, for if it is not good enough for the banker, why should it be good enough for you. Play safe with yourself.

Estimating Materials

By I. P. Hicks

SINCE many materials are now bought and sold by the ton (2,000 lbs.) and by the 100 lbs., instead of by the cubic yard and cubic foot, it becomes necessary to have a basis for figuring quantities of material by the ton and by the 100 pounds.

As many parts of concrete and cement construction are figured by the cubic yard, cubic foot and square foot of surface for given thicknesses, there is much need of a ready method to determine the weight and quantity of materials required for the work.

To meet this demand we have arranged the following data, which will enable the

contractor to readily determine the quantities required for the different kinds of work as described. In the mixtures of materials, cement is figured 100 lbs. per cubic foot; sand, 100 lbs.; broken stone, average size 1-inch diameter, 88 lbs. Cement to be portland cement. In the mixing of materials the quantities are to be taken by volume unless otherwise stated. In most cases the proportion of mixing materials is by volume, but in the estimating for buying, it is often necessary to know the weight of the quantities required in order to buy intelligently.

Materials Required for One Cubic Yard of Concrete				
Mixture	Proportions	Sacks Cement	Sand, Tons	Stone, Tons
1:2	:3	6⅓	.63	0.95
1:2	:4	5½	.54	1.08
1:2½	:5	4½	.56	1.11
1:3	:5	4⅓	.63	1.05

Materials Required for 100 Square Feet Cement Floor—Base Coat				
Thickness, Inches	Mixture Proportions	Sacks Cement	Sand, Tons	Stone, Tons
2	1:2:3	4	.40	.60
2	1:2:4	3¾	.34	.68
2	1:3:5	2¾	.40	.66
2½	1:2:3	5	.50	.75
2½	1:2:4	4½	.43	.85
2½	1:2:5	3½	.50	.82
3	1:2:3	6	.60	.90
3	1:2:4	5½	.51	1.02
3	1:3:5	4⅓	.60	.99
3½	1:2:3	7	.70	1.05
3½	1:2:4	6⅓	.60	1.19
3½	1:3:5	5	.70	1.15

Materials Required for 100 Square Feet Cement Floor—Finish Coat				
Thickness, Inches	Mixture Proportions	Cement, Sacks	Sand, Tons	
½	1 to 1	3½	.16	
¾	1 to 1	5¼	.24	
1	1 to 1	7	.32	
½	1 to 1½	2¾	.19	
¾	1 to 1½	4⅓	.29	
1	1 to 1½	5½	.38	
½	1 to 2	2¼	.22	
¾	1 to 2	2⅓	.33	
1	1 to 2	4½	.44	
½	1 to 3	1¾	.24	
¾	1 to 3	2⅓	.36	
1	1 to 3	3½	.48	

Materials for 100 Square Yards Plastering, Sanded 2 to 1				
Materials	On Wood Lath	On Metal Lath	On Sacket Plaster Board	On Brick and Tile Walls
Plaster, Sacks	9 to 11	17 to 20	8 to 9	14 to 17
Sand, Pounds	1800 to 2200	3400 to 4000	1600 to 1800	2800 to 3400

Wood lath required, 1,500 4-foot lath per 100 square yards.
Lump lime for white coat, 90 pounds.
Finish plaster, 100 pounds.
Hydrated lime in place of the lump lime, 100 pounds.

Kellastone and Kragstone Stucco Materials for 100 Square Yards			
Thickness not less than ¼ inch	Stucco, pounds	Oil, gallons	
Scratch coat, ¼ inch	1600	56	
Finish coat, ¼ inch	1600	56	
Dash rock	1000	—	

Cement Stucco Materials Required for 100 Square Yards			
Mixture Proportions	Thickness	Cement, Sacks	Sand, Tons
1 to 2	½ inch	20	1.98
1 to 2	¾ inch	30	2.97
1 to 3	½ inch	16	2.16
1 to 3	¾ inch	24	3.24
Dash rock per 100 square yards			
			.50

Materials to Lay 1,000 Brick, 1 to 2 Lime Putty and Sand Mortar
1¼ barrels lump lime and 1,700 pounds sand.
Lime, sand and cement mortar: 2 parts lime putty; 4 parts sand and ½ sack of cement. 1 barrel lump lime, 1600 pounds sand and 2 sacks cement.

Using hydrated lime, proportions 1:1:6: 2½ sacks cement, 2½ cubic feet hydrated lime, and 1,500 pounds of sand. Hydrated lime weighs approximately 40 lbs. per cubic foot. A sack of portland cement weighs approximately 100 lbs.

Cement Mortar, mixture, 1 to 3 portland cement: Portland cement, 5 sacks; sand, 1,500 lbs.

The sizes of hollow tile mostly used in the construction of buildings are 4x5x12 and 8x5x12, with these, one can build an 8-inch wall or a 12-inch wall.

Materials Required to Lay 1,000 Pieces Hollow Tile

Size of Tile	Thickness of wall	Cement	Sand	Hydrated Lime	Lump Lime Putty	Lime Required to Make Putty
8x5x12	8 in.	12 sacks	1.82 tons	100 lbs.	2.50 cu. ft.	75 lbs.
4x5x12	12 in.	21½ sacks	3.25 tons	173 lbs.	4.35 cu. ft.	135 lbs.
8x5x12						

One 4x5x12-inch tile equals about 2½ brick and one 8x5x12-inch tile equals about 5 brick.

Mortar Colors per 1,000 Brick—Approximate

Red, windsor, terra cotta, amber, seal, fern, green and salmon, 50 to 75 lbs.
Buff, brown, colonial drab and french grey, 40 to 60 lbs.
Black, 30 to 50 lbs.

Leaks in Profits

CARELESSNESS in one respect implies carelessness in others. The builder who permits rubbish and materials to clutter the ground about his jobs, not only causes the passerby (who may be a prospective client), to question his capabilities, but also sets a bad example before the workmen. A careful workman working in a careless environment soon relaxes.

Many architects realize the effect of the surroundings on the morale of the workmen, and specify that the job shall be kept reasonably clean at all times.

The ill effects do not end here, however, materials that are dumped indiscriminately are the source of much wasted effort and constant danger from accidents.



Plate 6—Although small, this job is ship shape. There were not a half dozen loose pieces on the entire lot

Rubbish is the cause of most nail punctures and falls, and many serious fires originate in the loose papers, sticks, etc.

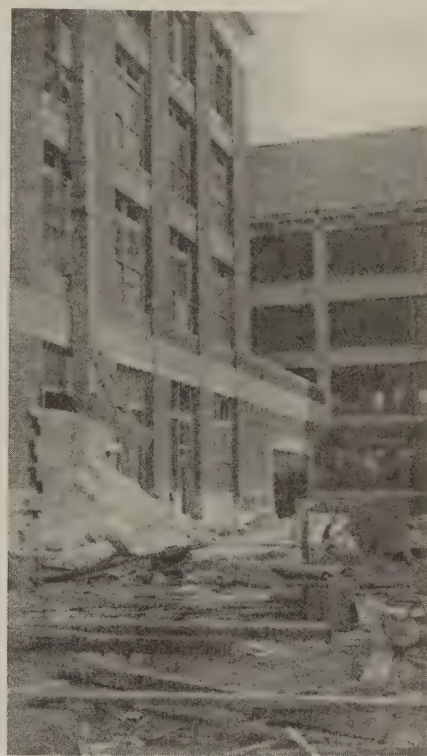


Plate 5—A hit or miss job. A truck or trailer standing under the chute would have saved double handling of sweepings



Plate 1—A lumber pile like this invites infection from fungus which may in time cause rot throughout the building



Plate 2—Lumber, hollow tile and lath piled in an orderly manner on a large housing development



Plate 3—A small job with enough confusion for a dozen large jobs



Plate 4—On most jobs the brick piles are neatly built while the lumber is allowed to shift for itself

Home Building in Canada

Nearly 2,000 Houses Built Under the Ontario Housing Act
at an Average Cost of \$3,100

By C. H. Brooks

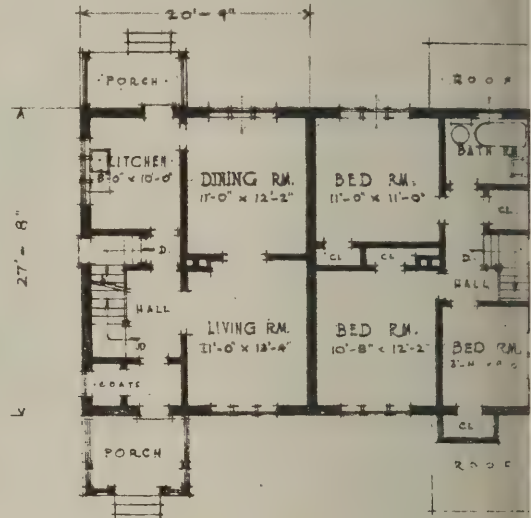
THE Ontario Provincial Report on Housing has just been issued. Nearly 2,000 houses have been built in Ontario at an average cost of only \$3,100. The report covers the work done under the Ontario

Housing Act which was assented to on March 20, 1919. The actual construction of houses under this act did not commence until August last. Yet, nearly 2,000 houses have been built, approval has been granted

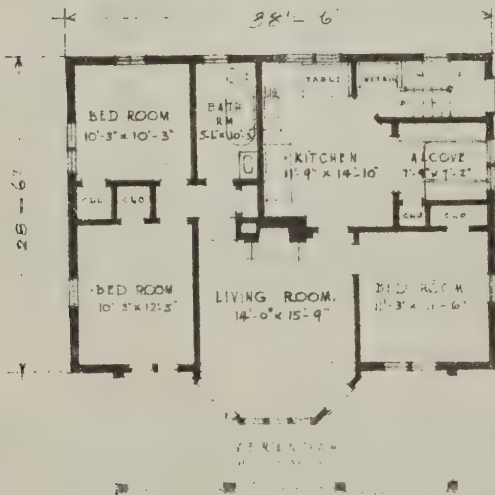
for several hundred more not yet built, and there has been gathered for the information of the public of Ontario a most complete set of facts and figures on the housing problem.



New Toronto "Pi" double house, Brick and hollow tile. Cost of each house, \$3,050



Second floor



Port Credit "El"—Solid brick. Cost \$3,900; loan, \$3,500



COMMENTS BY THE COMMISSION'S ARCHITECTURAL DEPARTMENT

NEW TORONTO, "Pi"—New Toronto Housing Commission six-roomed semi-detached type. Engineers and Architects, James, Loudon & Hertzberg. Solid brick first story, hollow tile and stucco finish second story. Cost of each house, \$3,050. This illustrates the typical six-roomed square planned type of house, and has the necessary front vestibule and coat space, as well as the side grade entrance door giving access to the kitchen and to cellar from the outside. If extra wall space is required in the kitchen for fittings, the rear door and porch could be omitted.

PORT CREDIT, "El"—Owner, D. C. Richardson. Architect, W. F. Sparling Co. Solid brick. Cost, \$3,900. Loan, \$3,500. This plan shows quite a number of good features which are as follows: The two bedrooms on the left hand side of the house open off a small separate hall which is also common to the bathroom and a small linen closet. The bathroom and the kitchen are immediately adjoining which would tend to simplify the plumbing layout. The flues for the furnace, living-room fireplace, and kitchen stove can be run up in the one chimney stack. The

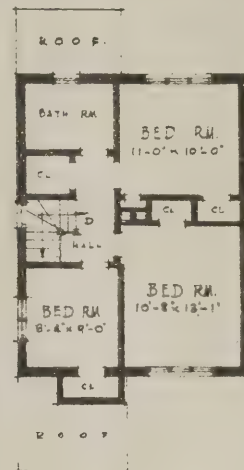
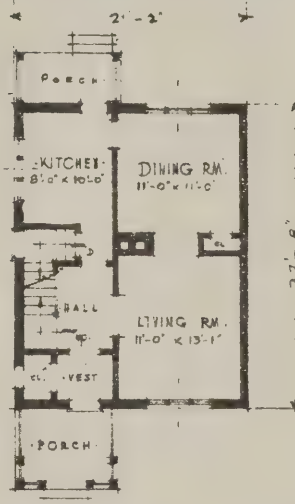
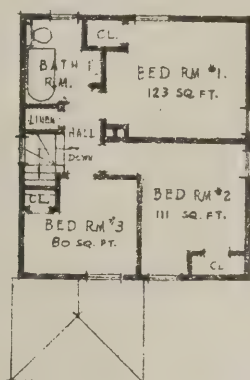
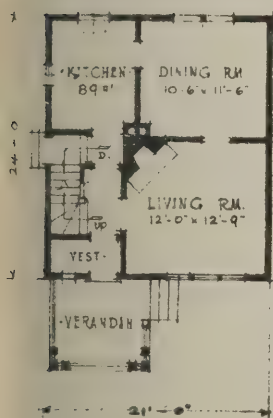
small dining alcove off the kitchen is excellent. Means have been provided to get to and from the cellar from the outside without passing through the kitchen. Cross ventilation has been provided for all bedrooms. A rather unfortunate point in this plan is the fact that the verandah practical shuts all sunlight out of the living-room. This could easily be overcome by keeping the verandah roof down as low as possible and raising a louvered dormer above, which would let sunlight direct into living-room. This would not add much to the cost and might be made a very attractive feature of the room.



Design "A"—Stock design. See note at foot of page



New Toronto "O1"—Solid brick and hollow tile and stucco



Nearly 100 municipalities of the Province are most enthusiastic over the results obtained by them under the Housing Act. The question as to whether the Housing Act will be continued promises to be a thoroughly debated one.

Toronto does not come under the Housing Act. Toronto's Housing Commission has operated on its own authority. But under the Provincial Act, directed by the Bureau of Municipal affairs, under Mr. J. A. Ellis, have come 19 cities, 49 towns, 17 villages, and 14 townships.

Each municipality which came under the act appointed a local Housing Commission which organized its own local staff. All

requests for loans of money were then forwarded with full particulars as to land, plans, etc., to the Director of Housing, Mr. Ellis. In addition to studying cases and recommending loans, the Provincial Housing Department has rendered valuable assistance to the municipalities through its staff of architects, engineers, town-planners, building inspectors and other experts. The centralization of all housing effort has resulted in the analysis of a great mass of experience and in economy both in buying materials and in making and executing plans.

Total Advances, \$3,677,974

The total amount of money advanced by the government for these houses built was \$3,677,974. The total amount appropriated to municipalities by the Province in 1919 was \$10,629,000. If all applications now on hand for 1920 building are to be met, the Province will have to appropriate a further \$8,000,000. But so far, only \$2,807,721 has been actually paid out by the Province on these loans.

In the report Mr. Ellis says that the cost of housing construction has increased 25 per cent since March last, when the Act

COMMENTS BY THE COMMISSION'S ARCHITECTURAL DEPARTMENT

DESIGN "A"—Estimated Cost: Frame, clap-board or stucco finish, \$2,850; brick veneer, \$3,200; solid brick, \$3,450. This is the Department's stock design containing six rooms and a bath and is laid out with the intention of showing the approximate minimum size of plan into which six rooms and a bathroom can be worked, adhering to the floor areas as set out in the Act. This plan has not been constructed and it is therefore impossible to give an accurate price for which it could be built, particularly in view of the fact that the cost of building varies to such an extent in the different municipalities. Other plans almost similar, and with some slight modifications have been carried out and the estimates above are based on this data, which applies to the past year.

This design has the following advantages from the standpoint of low cost with the maximum amount of convenience:

(1) Veranda of ample size without obstructing the main window light of the living-room.

(2) Front vestibule containing ample space for

hanging coats, or any other similar purpose desired.

(3) Front hall with waste space reduced to minimum.

(4) The fireplace in the corner of the living-room leaves ample wall space for furniture, and in the event of the house being built of frame, the fact that the kitchen and furnace flues are built up together with the fireplace brick work makes for simpler construction and provides flues in such a position that they will draw much better than if placed on outside wall.

(5) The position of the door leading from the kitchen to the grade entrance or to the cellar leaves the maximum amount of wall space for kitchen fittings, etc.

(6) The grade entrance door at the side keeps dirty traffic to and from the cellar out of the kitchen.

(7) The upstairs hall area has been cut down to a minimum so much so that only enough wall space has been left to provide openings of the required size to the bedrooms, bathroom, linen closet and stairway.

NEW TORONTO, "O1"—New Toronto Housing Commission. Engineers and Architects, James, Loudon & Hertzberg. Solid brick first story, hollow tile and stucco finish second story. Cost, \$3,200.

This is practically the same plan as "P1" except that it is detached.

(8) Side windows in bedrooms No. 1 and No. 2 gives cross ventilation in these rooms.

(9) Bedroom and linen closets are of ample size.

(10) Bathroom, kitchen and laundry plumbing fixtures can be economically connected to one soil stack with short branches, and space is available in bathroom for hot water tank, which would help to heat the room.

(11) The position of the roof shown on the front elevation would mean that a small portion of sloping ceiling would show on the upper floor, continuing from front to rear on both sides of the plan.



Brantford Twp. "C"—Hollow tile and stucco. Cost \$4,000.
Loan, \$3,000



Port Arthur "D"—Frame, stucco finish. Cost \$3,000.
Loan, \$3,000



was assented to. The cost has increased 125 per cent since 1914. But in Great Britain the cost has increased 300 per cent.

"My estimate of the shortage of small houses in the Province," says Mr. Ellis, referring other than to Toronto, "is 20,000."

Over 62 per cent of the houses built have been either of solid construction or brick veneer. Of the total, 1,160 houses are detached and the balance semi-detached. An analysis showing Ontario's taste in houses follows. It will be seen that the six-room solid construction house is the favorite:

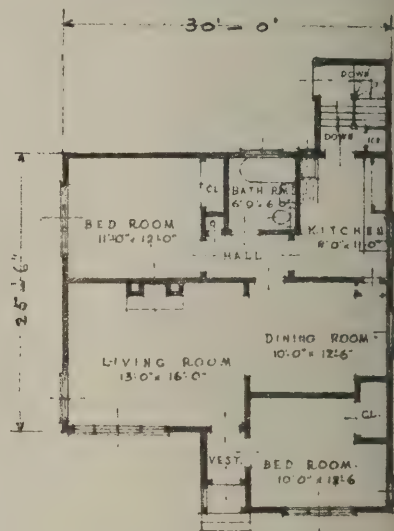
No. of Houses	Description	Av. Loan per House
14	4-rm., frame	\$1,978.57
3	3-rm. solid const.	2,525.00
43	5-rm., frame	2,685.79
26	5-rm., frame, stucco	2,963.46
23	5-rm., brick veneer	2,924.78
44	5-rm., solid const.	2,832.50
237	6-rm., frame	2,794.09

88	6-rm., frame, stucco	2,923.57
230	6-rm., brick veneer	2,948.82
332	6-rm., solid const.	3,569.28
13	Over 6-rm., frame	2,854.61
27	Over 5-rm., frame, stucco	3,000.00
23	Over 6-rm., brick veneer	2,464.13
81	Over 6-rm., solid const.	3,712.16

About two-thirds of the houses have been erected by persons who owned their own lots in advance, and a large majority of these made their own contracts for construction. This is not the ideal system. Group or commission building, with full use of standardized parts and material would reduce the cost. The cheapest house was \$1,978, and the average cost was \$3,106.

Payments Less Than Rentals

"In nearly every municipality where houses have been erected the monthly payments for principal and interest, including taxes and insurance, are less than the rentals for similar houses in the same municipalities.



"Small and narrow lots have been discouraged. In Toronto and vicinity all land is much more expensive than in other parts of the Province. In my opinion, land values in that locality are unreasonably high as compared with such values elsewhere. There have been only two arbitrations over land purchase for housing purposes, but the very existence of the provisions for expropriation of land under the Act has enabled the commission to purchase land at very reasonable prices where otherwise this might not have been the case.

"As a rule, except in the vicinities in Toronto and Windsor, the lots used for housing purposes have been not less than 40 feet frontage by 100 feet in depth."

The average price paid for land was

COMMENTS BY THE COMMISSION'S ARCHITECTURAL DEPARTMENT

BRANTFORD TOWNSHIP, "C"—Owner and Architect, F. W. Nicholls. Hollow tile and stucco. Cost, \$4,000. Loan, \$3,000. This is a house containing six rooms, sleeping porch and bathroom, planned by an architect for his own use, and is a very striking example of making a house which is really quite small in plan appear large in elevation by using the same materials for the porch as for the main building and continuing the structural lines. The dormer effect obtained in the sleeping porch over is excellent when compared with the excrescences so often stuck on to small houses.

Some improvements to this plan might be considered as follows, viz.:

- (a) Front vestibule and coat room.
- (b) The upstairs hall, which is shown running through to the back wall, could have been shortened, providing an additional closet off the back

room and a linen room off the hall. This would have left the closet shown opening off the hall for the use of the occupants of the small front bedroom.

(c) Cross ventilation for bedrooms.

PORT ARTHUR, "D"—Owner and Architect, Capt. H. E. Lloyd Owen. Frame, stucco finish. Cost, \$3,000 and owner paid \$300 for extras. Loan, \$3,000. A one-story bungalow containing five rooms and a bathroom. This would make a very attractive house for a couple with no family and the position of the front bedroom off the vestibule would make it possible for separate rental if so desired.

If the question of taking in a lodger was not considered, the door to the front bedroom would be better if made to open directly into the living room.

By arranging the front entrance door at the side of the vestibule it would have been possible to provide some coat hanging space.

In an ideal plan of this type, of course, both bedrooms and the bathroom should be off a common hall.

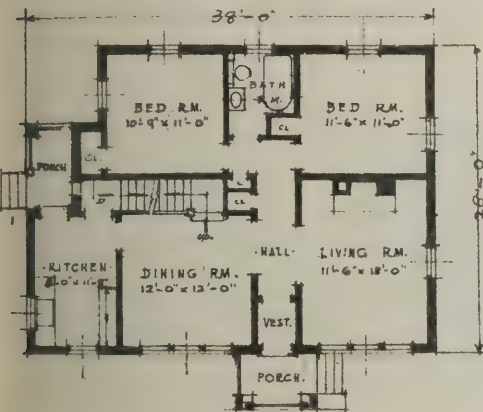
An improvement could also have been made to this plan by shifting the stair enclosure at the back so that another window could be worked in at the end of the kitchen to permit cross ventilation.

A small window in the rear of the back bedroom would improve the ventilation.

In this case the owner has wisely refrained from imagining that his house was being built in California, and has not used the loan for a porch which can only be used for a very short time each year in his district.



Windsor "F"—Hollow tile and stucco. Cost \$4,000. Loan \$4,000



\$377.59 per lot, or less than \$10 per foot frontage.

The greatest advantage of the central governmental control of house building has been the power to insist upon the best standards of house building being observed. Time and again commissions have favored plans that, while meeting the present emergency, would ultimately become burdens, if not slums, in the community. Dwellers in Toronto apartment houses and flats will regard with interest these figures as to the minimum size of rooms.

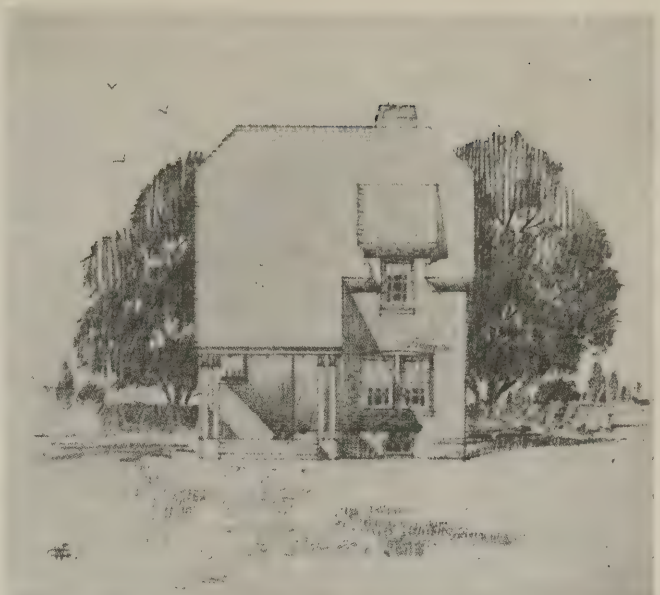
Living room, 144 sq. ft., narrowest dimension, 11 ft.

Dining room, 120 sq. ft., narrowest dimension, 10 ft.

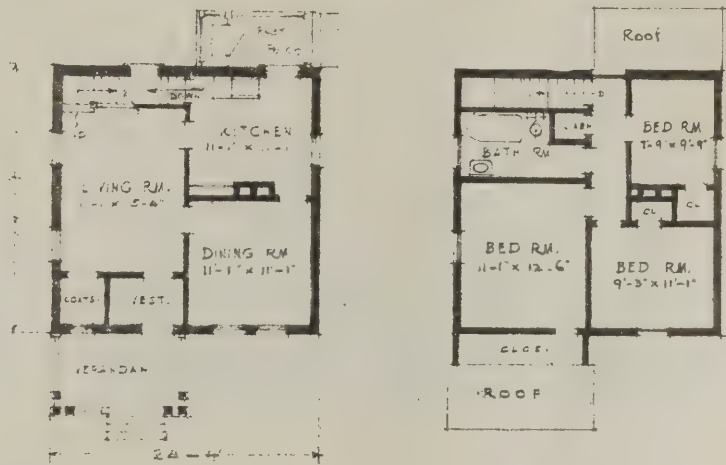
Kitchen, 80 sq. ft., narrowest dimension, 8 ft.

Kitchenette, 50 sq. ft., narrowest dimension, 6 ft.

WINDSOR "F"—Owner, Mitchell. Architect, Beaton. Hollow tile and stucco. Cost, \$4,000. Loan, \$4,000. This, unlike most of the one-story bungalow plans, shows a hall through the center of the house, the dining-room on one side and living-room on the other. A stairway has been shown leading to the attic, which will provide for future extension in the way of bedrooms. The kitchen and both the bedrooms are in a good position to get cross ventilation, which has been provided as shown. Means could have been pro-



Hawksbury "J1"—Solid brick. Cost, \$4,198. Loan 85%



Bedroom No. 1, 120 sq. ft., narrowest dimension, 9 ft.

Bedroom No. 2, 100 sq. ft., narrowest dimension, 8 ft.

Bedroom No. 3, 75 sq. ft., narrowest dimension, 7 ft.

Bathroom, 35 sq. ft., narrowest dimension, 5 ft.

Improvement in Plans

The chief architect of the housing department, Mr. James Govan, remarks in the report the steady improvement, month by month, in the quality of plans received. Great educational work has been done throughout the Province in the matter of houses.

"Splendid results have been obtained," he says, "by many applicants who have

carried out a great deal of the work on their own houses. This should be encouraged for at least two reasons—to develop craftsmanship and to keep down the amounts required for loans."

One remarkable feature of the past season's experience has been that bungalows with cellars are less expensive than ordinary two-story houses; although materials are more expensive for bungalows, the labor is much cheaper.

"Low cost housing can only be obtained by eliminating every foot of waste space," says the architect. "This has the inevitable effect of restricting the size of the kitchen. As this is the workroom of the house, much greater attention should be given to reducing halls, etc., rather than

COMMENTS BY THE COMMISSION'S ARCHITECTURAL DEPARTMENT

vided to get to and from the cellar from the outside without passing through the kitchen, and additional wall space in kitchen obtained by doing so. If a gas, coal or wood burning stove is desired in the kitchen, a flue should be provided. This house stands on a corner lot and particular attention has been given to the sunlight provisions in the principal rooms in winter time.

HAWKESBURY, "J1"—Owners, Riordan Annex Housing Co. Architect, H. R. Dowswell.

Solid brick. Cost, \$4,198. Loan, 85 per cent of cost. This plan is somewhat different from the common type of square house, as the main stairway is located at the back of the house with the grade entrance to the cellar and the kitchen under it. The living-room, located as shown, would mean that ample space would have to be left between the side wall and the adjoining house. A side window in the small front bedroom and a rear window in the rear bedroom could have been provided to give cross ventilation.

kitchens. The cost of a house varies with its cubical contents. Therefore the old-fashioned, high airy rooms is no longer economically possible. It follows that far more attention to the ventilation of modern houses must now be given. There is also a tendency nowadays to devote special attention to supposedly ornamental ex-

ternal features, and so-called trim, and not enough to such essentials as furnaces and drainage."

The town planners of the Province, Messrs. W. E. Harris and A. V. Hall, in their reports refer to the unfortunate experiences of certain municipalities which enthusiastically purchased "farm lands"

for housing development, it being cheaper than subdivided and developed municipal land. But New Toronto, Mimico, Oshawa and Sudbury have discovered that the cost of developing these "farm" lands for housing purposes is more costly than that purchased in developed subdivisions, with roads, grading and no need of resurfacing."

New Types of Approved Construction in English Housing Schemes

By John Y. Dunlop

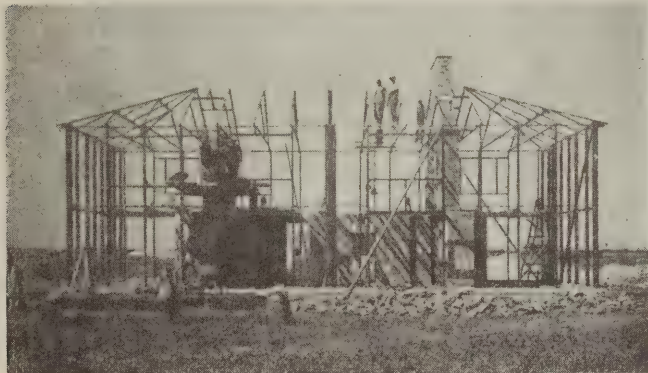
SO GREAT is the demand for housing throughout England today that many of the local authorities who have charge of the government schemes of housing are inviting inventors and designers of new methods of building construction to send in their proposals for official consideration.

conditions by affording a means of reducing the abnormal demand for the more ordinary kinds of building material.

Apart from wood the bulk of substitutes which are being put on the English market are formed of cement. One of the most eminent systems with which housing work

Woodcrete has been subject to exhaustive laboratory tests which have been so satisfactory in results that the material has been patented and since used in construction.

Woodcrete walls are very simple in design. The material is cast in angles and



The illustration at the left shows workmen erecting the steel frame of a house; the right illustration shows the same house with roof and window frames

What is wanted is some form of rapid and durable construction at a fair price. As a matter of fact nothing would please the minister of health better than that some genius should send along a practical plan for turning out a decent cottage for about £400, equivalent to \$1,920.

The extent to which the invitation has been accepted by the inventors is not known, but the cases in which the construction committee of the government has so far signified its approval amounts to about a score.

Most of the systems use either concrete or wood as a material, and it will be a very rash rural authority who will refuse to permit a trial of one of the approved systems anywhere except in a street or possibly where it would clash with other buildings.

These building substitutes are sure to be in great demand, because we are at a point where the scarcity of building material is admittedly causing great anxiety. Architects and contractors will be compelled to consider the new forms of construction and become acquainted with them, because they are likely to ameliorate the present adverse

may be carried out without either employing brick or timber is woodcrete.

Woodcrete is composed of Portland cement, prepared wood dust and a mixture

Building is being carried on in England under government supervision, contractors being paid a subsidy for each house erected within a given time on plans approved by the Ministry of Health. Under this plan it is expected that 100,000 houses will be built in from 12 to 15 months.

mainly consisting of waste product which has been found to possess the very valuable property of insolubility in acids and water.

intermediate blocks, into which are fitted a double thickness of 2-in. slabs separated by a 2-in. air space. The inner slabs being to some extent porous condensation is to some extent prevented.

Very little skill is required for handling the blocks or slabs, and they can be erected with considerable speed, and although the surface can be rendered with cement stucco or painted as the architect desires, the natural surface can be left untouched. The unit height of each cement course is 12 in. and the intermediate blocks project 1½ in. past the line of the face of the slabs.

Woodcrete floors consist of a continuous series of woodcrete beams of inverted tee section 6 in. deep and laid side by side and touching one another. The width of the flange is 12 in. and the material throughout is 2 in. thick. A steel wire reinforcement ¾ in. in diameter is inserted in the bottom of the web for beams up to 10 ft. span and two ⅝ in. reinforcement bars, one above the other, where the span is more than 10 ft. Concrete fills the space between the webs but is not directly supported on the flanges, but by the sheet iron segmental centering resting on their top surface, as

shown in the sketch. By this raising the filling material is saved, the floor is lightened and the arch provides space for pipes or electric light wires. A ½-in. layer of woodcrete flooring covering material completes the floor, making it capable of taking on a fine polish.

In answer to the question of cost, it may be said that the company has recently quoted for fifty cottages at a sum 17½ per cent cheaper than for the same buildings in brick.

The Doric system of construction is also a very simple and pleasing method of building a small house.

The foundation in this system is of a

As the sheets are made in story heights, a string course, either of moulded concrete or of brick or terra cotta is interposed between them, and all external vertical joints are covered with overlay strips which improve the appearance of the building.

The cottages which have been recently built with this system of construction cost less by 20 per cent than those of brick.

In the Waller system the walls are also formed of two slabs with a cavity between them and these slabs are connected to columns set at intervals.

Between the slabs at the ceiling level wall plates are formed which carry the joists of the first floor. The outer slab is

rough casting, pebble dashing, bush hammering or distempering.

The inventor claims for the system that the houses are everlasting and the upkeep is reduced to a minimum.

Over and above the number of private firms which are putting on the market rapid construction material for house building there are many of our large industrial companies devoting a good deal of attention to the housing of their workers.

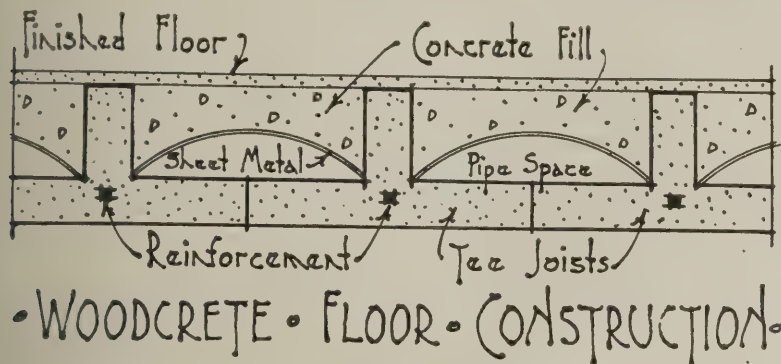
One firm in England with which I am particularly acquainted has invented an entirely new system of steel frame construction. The houses are built with steel frame manufactured in their own works. On the steel frame is built an outer and inner wall with a cavity between them, thus providing a warm and dry interior.

It is claimed that such houses can be built in most of the districts to compete with ordinary houses in price, speed in building, durability and comfort.

The great cry for rapid construction material and the necessity of economy have brought about many changes in the planning of the small house.

Now that we are faced with economy in every particular, a necessity rendered more and more urgent by high wages and material, we are faced with introducing economy in floor space. Not that I would advocate the planning of unduly cramped rooms, but we should be ever watchful for any improvements which will reduce such things as passageways.

Many of our architects who are building cottages in pairs with this idea in view are taking up the idea of one door to a cottage. In this way the house can be made much



solid block which is run in position. Key block piers are set at all corners and angles. Doric patent building sheets composed of Portland cement and asbestos fibre, reinforced with netting, covered with a weather proof bituminous coating and with a rough cast exterior surface are placed in position from pier to pier and fixed by stretches of wood held together by iron dogs to form

made of very high grade impervious reinforced concrete mixed very wet, and the inner slab of porous concrete made from crushed clinkers. All the slabs are cast the full height of the story in one piece.

The roof may be formed with hips or valleys, as desired, and is made in large sections which lift straight into place. There are no horizontal joints, the water



On the left the entire steel frame is in place and on the right the completed house with its concrete exterior is shown
(Photographs copyrighted by International News Service.)

the exterior and interior surfaces of the wall. Concrete is then poured into the space between the sheets and left to form with them a solid monolithic wall.

The outer sheets can be painted or white washed, as desired. The internal walls may be left untreated in their natural gray color or they may be papered, painted or tinted.

When the first floor is reached the joists are placed in position and anchored to the walls with prongs and bars attached to them.

having a clear run from ridge to cove, while the vertical joints allow for contraction and expansion. The roof surface can be made any color and any texture desired.

The surface of the house can be treated in an endless variety of ways since the surface of the slabs are exposed to the worker throughout the process of manufacturing. Thus the natural texture and color of the surface may be varied by the trowel treatment applied to the surface, by working in colored stones or earth, by

warmer, and it is a great advantage for the housewife to know that every one will come to the same door. Callers, tradesmen and others all use the same door, and the back premises are thus rendered more private, but the chief gain is in the reduction of passage through the house.

This arrangement is a new idea in the planning of our houses. But new ideas which effect a saving are being made very welcome at the present time by building communities all over England.

Sliding Doors--By A. Benton Greene

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THE only difference between the common door, discussed in last month's issue, and the sliding door, is that one is hinged and the other is hung. In all other respects, such as in the construction of the rails, stiles and panels, as well as in the hanging of the trim, they are identical.

The purpose of a sliding door is primarily to save wall space. A hinged door renders the wall against which it is swung absolutely useless so far as the hanging of pictures or the placing of furniture is concerned. Not so, however, with a sliding door. It disappears into a pocket especially provided for it in the wall, and leaves undisturbed and intact the wall surface on either side of the opening.

Sliding doors are almost invariably used between the living room and dining room. When the doors are rolled back the two rooms become practically one and give an air of spaciousness which, under present cramped conditions, is a most welcome adjunct to any house. The advantages of such a combination of rooms for social purposes are quite evident.

Sliding doors usually come in pairs, although a single sliding door is not uncommon. They are most often made 3 feet wide and 7 feet high and should be at least $1\frac{3}{4}$ inches, or better still, 2 inches thick. To prevent them from warping it is imperative that they be built up on a pine core and veneered, as explained in the previous article.

Formerly, sliding doors were worked on floor tracks. But these were such a constant source of danger and were so unsatisfactory from an operating standpoint because of the unevenness of the floor and the shrinkage of the timbers, that they have been entirely discarded. Nowadays they are suspended from the top by hangers. These run on a track which is either secured to the side of the studding, as here shown, (See A, Fig. 2) or are hung from the header B.

There are many patented tracks and hangers on the market. It is often puzzling to choose the proper hanger from so wide a selection. The one which will give the most satisfactory results will satisfy the following conditions: (1) The track as well as the hanger must have both lateral and vertical adjustment which will give the doors any clearance or alignment desired without the necessity of blocking up or removing them. (2) The operation of the doors must be free, straight and noiseless.

Regarding the first condition, the studding which form the framework of the door opening will settle. When this almost inevitable settlement occurs the track will sag, causing the door to drop and thus prevent it from running smoothly. Both track and

hanger must, therefore, be so constructed that the door may be raised or lowered by simply loosening a lock nut and turning a bolt or some other similar arrangement which is easily accessible and quickly adjusted.

The second condition is really dependent upon the first. If the hanger is of the roller or ball bearing type the door will have a free and easy motion. The different methods of keeping the door in its path and of eliminating all possible noise and friction will be explained later on in greater detail.

Figure 1 shows an elevation of a five-panelled double sliding door. The heavy lines drawn through the most vital parts of the doorway indicate the places through which the sections shown to the right and at the bottom are taken. The corresponding designations of the enlarged sectional views help to identify them.

In the section through the head, Fig. 2, we have illustrated one of the many forms of hangers. The space in which the hanger is housed is all enclosed and is about four inches wide and seven inches high. The steel track is placed directly over the center of the door, being held in position by two brackets, C, which are riveted to the track and nailed to a board, A. The hanger, which is attached to the door, is fitted with an adjustable device which permits the door to be raised or lowered in case the partition settles. The header, B, not only tends to keep the studding apart, but also protects the hanger from dirt and falling plaster. Another feature in the section through the head that arrests our attention is the head piece, D, which should be so set as to allow only for the free operation of the hanger.

In Fig. 4 we note two rows of studding with a space between them. This forms the pocket into which the door slides. The studding may be set edgewise, as here shown, if a bearing partition, or flatways, as shown in Fig. 6, if a non-bearing partition. In either case, the studs at the jambs should be doubled and set perfectly true and plumb.

The pocket to receive the sliding door is about two inches wider than the door is thick, its depth being regulated by the width of the door. In the better class of buildings the pocket is lined with thin matched boarding. This is done to hinder any falling plaster from interfering with the working of the door. The pocket should also be cut off at the back, as indicated, to retard the passage of smoke, fire and vermin. The stop or bumper, as its name implies, keeps the door from sliding too far back into the pocket. It is placed

where shown and is arranged to strike the middle of the door.

There are several ways of keeping the door from swinging laterally. One way is shown at E, Fig. 4. A cast iron guide is screwed down to the floor near the front of the pocket and fits into a slot formed at the bottom of the door. (See Fig. 3.) Another way of preventing the door from wobbling is to attach two rollers to the back of the door and sliding them along between two half-inch wood guides placed in the pocket about four inches from the floor. Still another way is to use a wooden dowel with a rubber tip instead of the cast iron guide explained in the first method. The rubber tip insures noiseless operation.

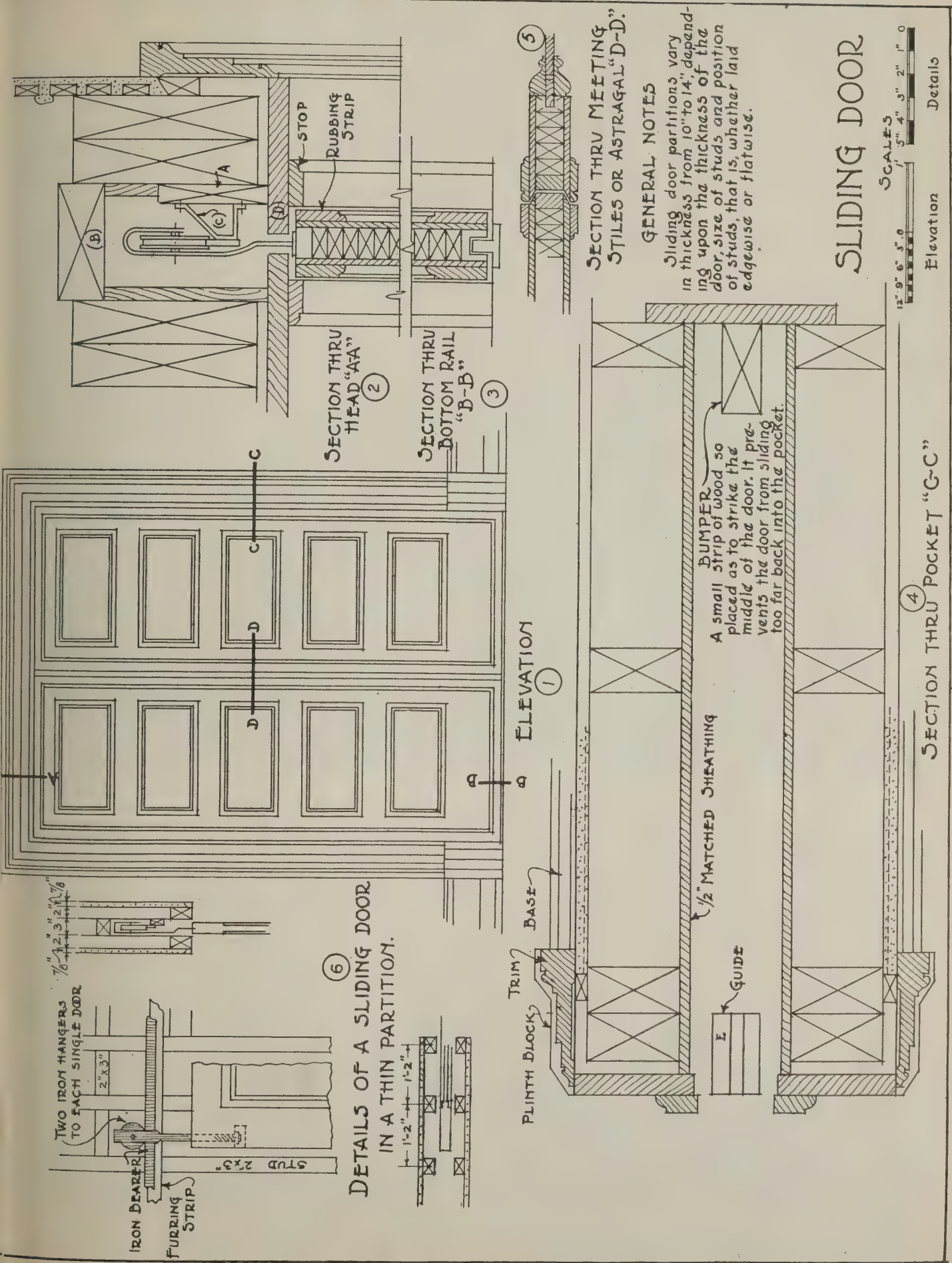
Now as to the construction of the door. The rubbing strips or friction strips, as they are sometimes called, applied to all the edges of the door on both sides serve to protect the faces of the door from rubbing against the stop. The veneer construction has been explained with sufficient detail and clearness in the April issue of NATIONAL BUILDER and requires no further comment here.

The astragal moulding illustrated in Fig. 5 tends to keep the doors in perfect alignment. It adds considerably to the general appearance of the room and is necessary to make a tight joint when the doors are closed.

Special hardware must be used for sliding doors. No knobs, of course, can be used for they would strike against the frame and prevent the door from sliding completely into the pocket. Instead escutcheons are sunk into the meeting stiles. A simple lock with a flush pull is ordinarily used. When the door is closed the pull is pushed into a case. Below the pull there is a button which, when pushed, releases the pull and throws it out.

WHAT "SNOWBALLING" MEANS

Four months have passed since the New York building trades wage agreement stabilizing the wages of skilled craftsmen employed in that industry at \$8 per day was approved. Now the unskilled laborer demand \$1 an hour minimum. The bricklayers' laborer, at \$1 an hour, is able to work in all kinds of weather. The bricklayer can work only half a year, owing to adverse weather conditions. If the laborer is not engaged in helping the bricklayer on rainy days, he may be employed in aiding some of the crafts employed on the sheltered inside of a building. This makes it easily possible for him to earn more in a year than the skilled bricklayer. This is an example of what is known as "snowballing" an industry.—Dow Daily Service.



A Summer Cottage

THE design of summer cottages involves certain features that are not common to ordinary house design. In the first place, formality in planning may be almost entirely dispensed with. The summer cottage plan usually takes a somewhat rambling form in which all of the important rooms,

even more so than that of a permanent home, should be governed by the plan. Picturesqueness is, of course, usually implied by the natural setting, but no element of the plan should be sacrificed merely to obtain a picturesque effect.

The designer should be especially mind-

the occupants. Camp life seldom extends over a period longer than a couple of weeks, while a summer cottage is usually occupied for months at a time. Hardships that are endured as a matter of course in the former will soon prove disagreeable in the latter.



Plate 1—View from the southwest. Note the softening of the roof line at the eaves

including sleeping rooms, are contained on one floor. Basements are usually omitted. Porches are magnified in size and number; more and larger windows are provided; fireplaces become really important necessities for comfort, and more leeway is permitted in the general arrangement, size and number of the rooms.

The exterior design of a summer cottage

ful that the essential purpose of a summer cottage is to provide a change from the routine life of closely settled communities. He should remember, however, that the imposition of inconveniences similar to those of camp life are seldom justified by the informal nature of the problem. In other words, the plan must be logical and suited to the settled customs or needs of

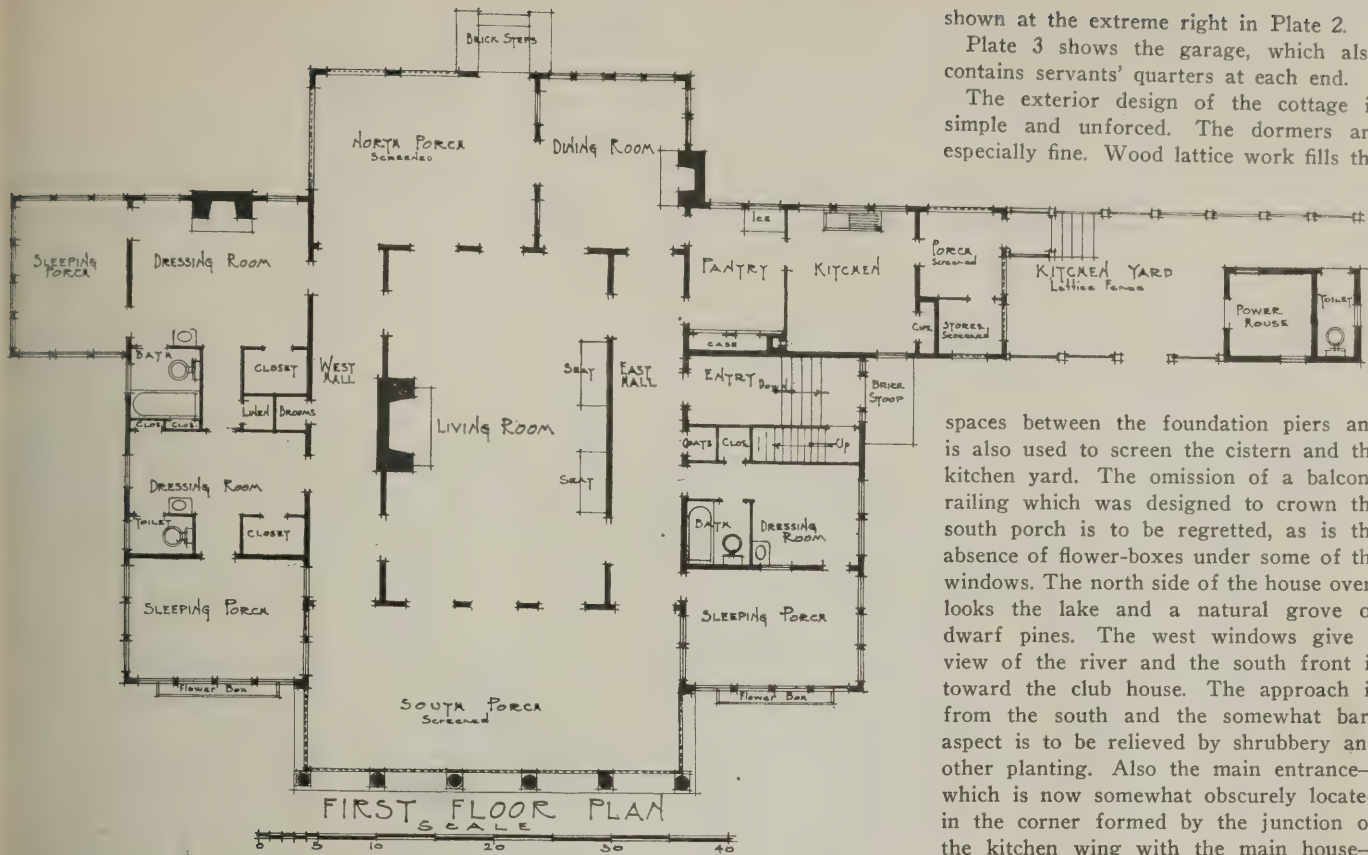
The size of a summer cottage and the completeness of its equipment, of course, depend largely on the amount of money that is to be expended. Summer cottages vary in type from the one room shack to the more or less pretentious building containing all of the modern conveniences of the town house. Private lighting, water and sewage systems are not unduly ex-



Plate 2—South elevation of the house. The foreground is to be improved by planting



Plate 3—The servants' quarters and the garage are combined under a single roof



shown at the extreme right in Plate 2. Plate 3 shows the garage, which also contains servants' quarters at each end. The exterior design of the cottage is simple and unforced. The dormers are especially fine. Wood lattice work fills the

spaces between the foundation piers and is also used to screen the cistern and the kitchen yard. The omission of a balcony railing which was designed to crown the south porch is to be regretted, as is the absence of flower-boxes under some of the windows. The north side of the house overlooks the lake and a natural grove of dwarf pines. The west windows give a view of the river and the south front is toward the club house. The approach is from the south and the somewhat bare aspect is to be relieved by shrubbery and other planting. Also the main entrance—which is now somewhat obscurely located in the corner formed by the junction of the kitchen wing with the main house—is to be dignified by a trellised pergola leading from the south. A supplementary entrance opens from the north porch. The main entrance leads into a wide hall which is so designed that it is necessary to pass through two sets of screened doors before entering the interior of the house. This arrangement prevents flies and mosquitos from being carried into the main body of the house. Before going further it is well to examine the unusual relation of the living

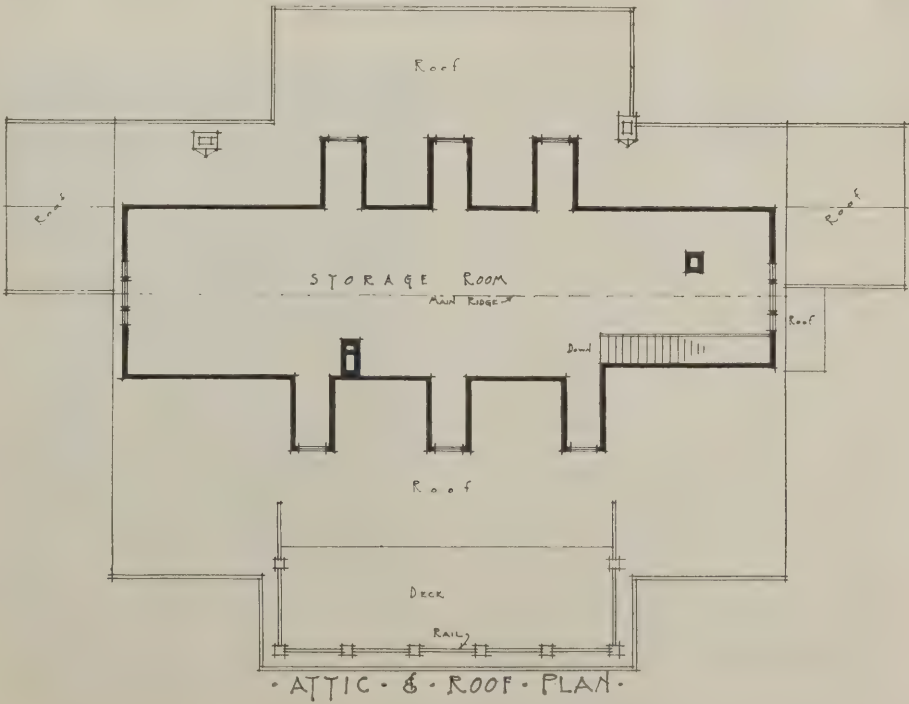
pensive—even fuel gas may be economically generated by means of small private gas plants that are on the market. Refrigerating machines designed for small houses have also reached the practical stage of development.

The structural requirements of the summer cottage are usually less rigid than are those of the permanent home. Frame construction is largely used for the walls; the foundation may consist of wood posts or masonry piers instead of solid walls; wall board is often substituted for interior plastering; single thickness floors are used, and wall sheathing may be omitted. Field stones, when locally obtainable, are a favored material for walls, as are solid logs. The latter, however, are now almost prohibitively expensive except in especially favored localities.

A feature that is sometimes overlooked is adequate provision for guests. It is seldom necessary nor desirable to include a large number of separate guest rooms, but the attic, for instance, should be made available for use as a sort of men's dormitory. As such the essential requirements are a stair and ventilation, the attic walls may remain unfinished, but a toilet should be included in the attic story if practicable. Wall beds might be provided in the living room or on porches for the use of women guests.

The summer cottage which is the subject of this article is an especially interesting example of summer cottage design. The architects were Favrot & Livaudais, and it was built for Mr. Frank Roberts of Lake Charles, Louisiana.

The cottage is one of a group built for the use of a summer colony at Prien Lake, near the Lake Charles Country Club, which was described in an article in the May issue of NATIONAL BUILDER. The construction is of frame on brick piers. The roof is of asphalt shingles and narrow clapboards are used for the walls. The interior walls are finished with wall board and the floor and trim are of pine. A private electric plant and water pressure system are housed in the small building



room to the other elements of the plan. The north and the south ends of the living room open onto screened porches and along the east and west walls are wide halls which connect the porches. Thus the living room is practically isolated from the other rooms and maximum coolness and ample light is assured by the numerous French doors which are provided on all sides of the room. The dining room opens from one corner of the living room and is separated from the kitchen by a very roomy pantry. Both the living room and dining rooms contain fireplaces and the former has seats built in along one wall. The

THE accompanying illustrations show a filling station in Houston, Texas. The architect was Maurice J. Sullivan.

The construction is of frame finished with stucco on metal lath. The trimmings are of wood, but the columns are of stucco. Each column contains a wood post which is securely anchored to the foundation and the roof to prevent the latter from blowing off during high winds. Concealed lighting and reflectors are used for illumination,

thus producing a striking and attractive effect at night.

This station introduces what is probably a new method of handling lubricating oils. The system consists of large glass cylinders filled with oil and connected to storage tanks in the roof. Four cylinders provide for as many different weights of oil, and a small air line is led to the bottom of each cylinder. The air thus introduced into the cylinder forms bubbles which are constantly

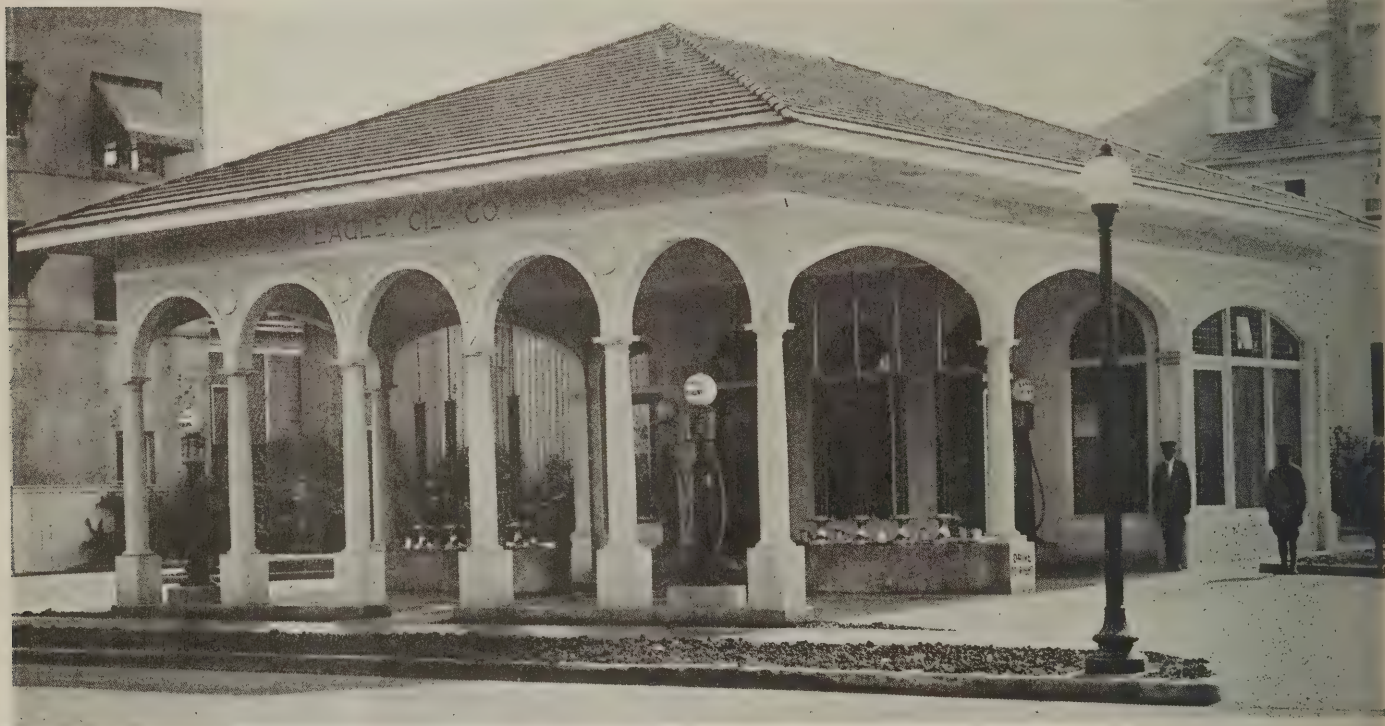


Plate 1—This station provides for serving four cars at one time

pantry contains a built-in cupboard and an outside icing refrigerator. Both the pantry and the kitchen have high windows opening into the entrance hall, thus insuring cross-ventilation. The kitchen contains a sink and closet and opens onto a screened porch containing a store room for supplies.

There are three sleeping porches, each of which are provided with dressing rooms. Each sleeping porch is open on three sides and is provided with sash, screens and Venetian blinds. Each of the dressing rooms is provided with toilet facilities; two of these rooms contain baths, and one has a fireplace. Large closets open from each dressing room, and a broom closet is in one hall and a coat closet in the other.

A stair leads from the entrance hall to the attic which is well lighted and ventilated and is available for use as a large sleeping room.

Careful study of the plan will disclose features that may not be considered in this article.

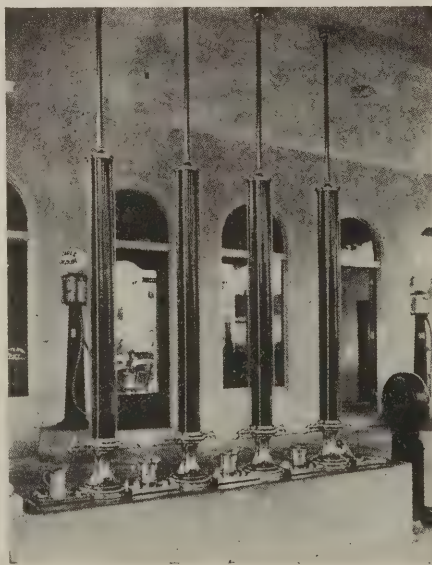


Plate 2—Detail of the lubricating oil cylinders which show the qualities of the various types of oil

rising through the oil. In this way a customer can judge the relative viscosity of the oils, as the bubbles in the heavy oils rise more slowly than those in the light oils.

"CUBING" A BUILDING

Estimating the cost of a building by "cubing" requires considerable experience to make even an approximate guess. Usually the extreme length of the building multiplied by the extreme width and then by the height from the bottom of the foundations to wall-head will give the cubic contents in feet. Where there is a pedimented roof, usually the length and breadth of the building is multiplied by half the height to find the cubical content. After the cubical content is obtained the price per cubic foot is calculated upon the basis of the total cost of a building of a similar character, ascertained at the price per cubic foot. This method as well as the method of computing by the floors is about obsolete

Two Public Garages

PROBABLY the most popular type of public garage building is that in which one or more sales or show rooms are combined with the garage. By this scheme the valuable display space along the street is

and plaster partitions into four rooms, each of which has separate entrances, toilets, and so forth. This arrangement makes it possible for each sales room to be rented separately if desired.

The entrance to the garage is between the sales rooms and is equipped with doors that slide flat against the walls. The building is 125 feet square and has four rows of posts. The garage is lighted from three



Plate 1—Brick walls with cement stone trimmings. Note the show windows which extend almost to the floor level

utilized to good advantage without affecting the desirability of using the remainder of the building for garage purposes.

The accompanying illustrations show two such buildings located in Houston, Texas. The architects were Finger & Bailey.

Both of these buildings have brick walls, cement floors and felt and gravel roofs. The roof construction is of frame supported on wooden posts in both cases. Where ordinary roof construction is used over long spans, as in these buildings, it is, of course, necessary to support the framing on posts. It may be said, however, that many people object to having the garage space obstructed by posts. For this reason light steel or wooden roof trusses are coming into general use. Light, wooden trusses of the lattice type have been successfully used for spans up to 125 feet.

Plate 1 shows a garage in which one end forms a large show room. The show room is separated from the garage by a metal lath and plaster partition. This building is 60 by 100 feet with one row of posts down the center. The garage has light from two sides supplemented by two skylights in the roof. An objectionable feature of this plan is that but one toilet is provided. In view of the public character of a garage it should be remembered that toilet facilities for both sexes should be provided.

Plate 2 shows an arrangement in which the sales space is divided with metal lath

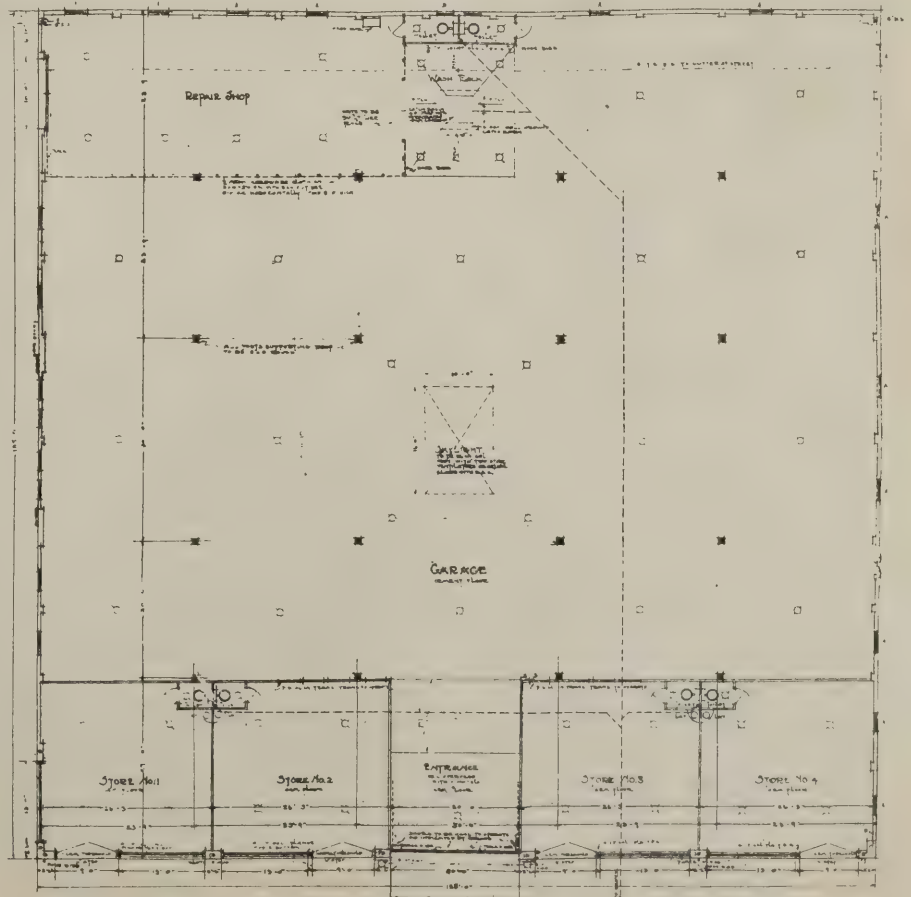




Plate 2—Stucco on brick with brick trimmings. The brick copings might give trouble in a severe climate

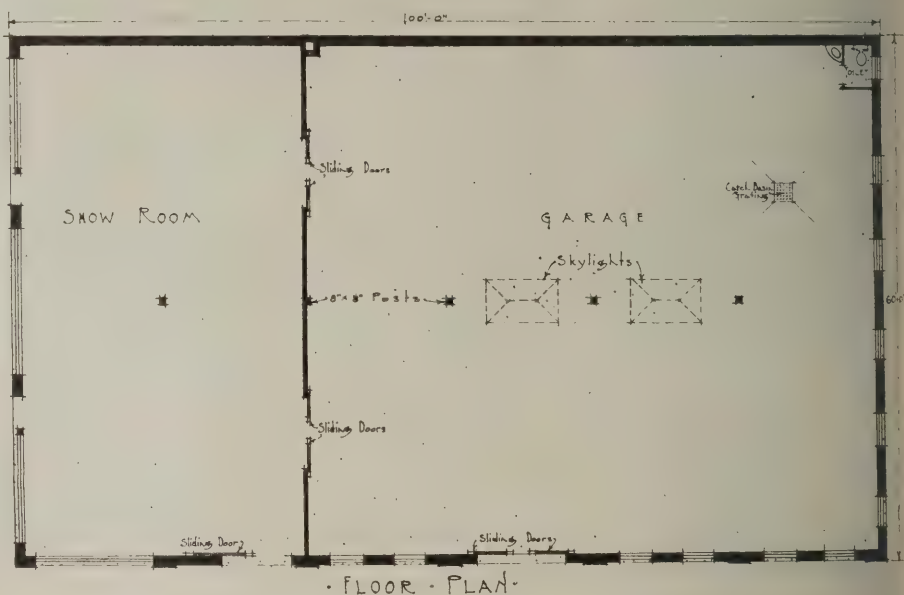
sides and has a skylight ventilator. One corner of the garage space is partitioned off with hardware cloth to form a repair shop about 23 by 50 feet in size. There is also a wash rack and catch basin for washing cars.

Two-Story Private Garages

The two-story private garage is now becoming quite popular throughout the country. A second-story may be included at only a slight increase in cost over that of a single-story garage and the additional space will be found valuable to almost any owner.

Among other uses to which the second story may be put are the following: Children's play room, chauffeur's living quarters, house servants' sleeping quarters, study or studio, work shop, laundry, billiard room, tea room and various other uses which will suggest themselves to those who are interested.

If the second story is to be used as living quarters it should have a bath. In any case it is wise to provide a toilet. If it is to be used as a tea room, etc.,



electric or gas outlets should be provided for hot-plates, and so forth, also a sink is usually desirable.

Heat either from a separate plant in the garage or from the main house plant should

always be included in northern climates.

One objection to two-story garages is that the height is apt to appear too great for the building. If it is well proportioned, however, it will usually be pleasing.



Plate 1—A garage for a fleet of delivery autos. Chauffeurs' quarters in second story



Plate 2—A garage dug into a hillside. Servants' quarters in the second story

Five Private Garages



An attractive two-car garage of a Kansas City, Mo., home. The flat roof is used as a children's play porch, reached by a stairway on one side



This house being situated on a hillside, the garage is in the rear and a part of the basement, and reached from a rear alley. The garage and basement walls and foundation are of stone. Directly over the garage is a rear porch, and over the porch is a glassed-in sleeping porch. Located in Kansas City, Mo.



Facing a picturesque canyon in Kansas City, Mo., and approached by a winding road or hillside street, this house has a pair of garages built directly under the front entrance as a feature of the basement. A sort of balcony over the garages forms the front porch of the house



This garage, entered from a rear alley, is directly joined to the house, its roof comprising a side pergola and terrace. The doors are of glass. It is located in Kansas City, Mo.



A small thatched-roof garage in Los Angeles, Cal. The outside walls are covered with narrow siding painted white, thatched roof is green

A Novel Chimney Thimble—By L. S. Bonbrake

This thimble is made in two sections; one a plain, half cylinder, the other flaring, with a taper from the front to the back. The sections are united in the center by seaming at "I."

The thimble is made with the usual $\frac{1}{8}$ -inch flange on its front end to prevent it from being pushed back into the chimney and could have an extra length allowance

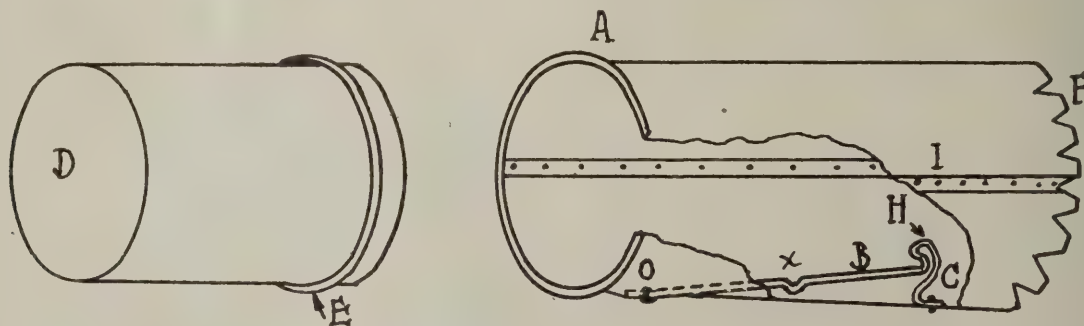
bend or indenture "X" is made two inches from the front, or half way, as the distance from "O" to "H" should be four inches. One end of the spring strip is riveted near the front edge of the thimble as at "O" and countersunk. The other end is riveted, as shown.

When the stove pipe "D" is slipped into the thimble it cannot go far enough into

oring the paper or plaster; also the stove pipe cannot go too far in, neither can it accidentally pull out.

WHY HARDWOOD LUMBER IS HIGH PRICED

The extraordinary amount of lumber consumed for various purposes during the



CHIMNEY THIMBLE.

to provide for the notches "F," which are slipped into the back edge of the thimble so that it may be cleated into the chimney inside bricks. This precaution is considered unnecessary, however, as the wedge shape of the thimble will prevent it from being easily pulled out of the chimney.

A spring steel strip "B" is formed, as shown in the drawing. The inner portion of the strip has an "S" spring formed as at "C," with a check "H" on its top. The

the chimney to retard the draft, as the check "H" will stop it. Also the swage "E," two inches from the end of the stove pipe, will engage with the indenture "X" which, together with the pressure of the spring, will keep the stove pipe from accidentally pulling out of the thimble.

The advantages of this thimble are that if water should run down the chimney it cannot pass through the thimble and thus into the room to dribble down the wall under the pipe collar, streaking and discol-

war, the scarcity and high cost of labor, inadequate transportation facilities, and a tendency on the part of workers to restrict production; the greatly stimulated demand for furniture and other commodities made partly or wholly from hardwoods, has made the shortage. It is now recognized that any material weakening in quotations is unlikely until production overtakes consumption, and there is little in sight at present to encourage expectations of this nature.

Three Buildings in Mission Style



Plate 1—A railway station at San Antonio, Texas. White Stucco with red tile roof. A handsome, well-executed building



Plate 2—A public garage at Belton, Texas. A simple treatment that could be improved by a more careful study of the openings at the corner



Plate 3—A bottling plant at Dallas, Texas. White stucco with red brick trimmings. An improvement over the usual building of this character

Stucco

IN VIEW of the several applications of the word "stucco" which exist in different portions of the country, it is felt that this article should properly begin with a discussion of the true meaning of the word as defined by competent authorities. In some portions of the country stucco refers to

prehistoric times and it was probably introduced by some primitive builder of an observant nature who, noticing beavers, certain birds or other nest builders making effective use of mud plaster in their works, decided that his hut would be improved by this method of keeping out the weather, as

adobe bricks are plastered on the exterior with mud stucco.

The perishable nature of stucco made of mud, however, rendered the discovery of the properties of lime highly important. Just when and how this discovery was made is not known. Perhaps a descendant



Plate 1—Old stucco walls in New Orleans



Plate 2—Old Pennsylvania house with stucco walls and frame gable

moulded plaster run in place; in other portions it refers to rough cast, and in still others to ornamental plaster cast in moulds and applied separately. This lack of consistency in the use of the word has been responsible for more or less confusion and has caused some serious mistakes.

The word stucco comes to us from the Italian, and in its original meaning referred to any fine work, such as moulding or modeling run in place. This definition, however, has been largely displaced and may be said to have been rendered obsolete by the American Society for Testing Materials, as this body has defined stucco as "a material used in a plastic state to form a hard covering for the exterior walls or other exterior surfaces of any building or structure." Thus the description is confined solely to the use of the material as compared to interior plastering and to mortar and does not refer to the composition of the material.

The U. S. Bureau of Standards, the Portland Cement Association, the Associated Metal Lath Manufacturers and other recognized authorities are substantially in agreement with this definition, and it seems desirable and proper that this meaning of the word stucco should become generally recognized and accepted.

Stucco is among the oldest methods of building construction. Its use extends to

trance of insects and the smaller animals.

The method of mud plastering is of course comparatively ineffectual in a wet or severe climate, but under favorable conditions has persisted even to the present time, as may be witnessed in portions of Egypt, Mexico and other semi-arid countries where houses of sun-baked mud or well as offering an obstruction to the en-

of the discoverer of mud stucco tipped a basin of water onto the stones which surrounded his fire and was surprised to see them change into a pasty substance which finally became hard and tough. This accident might lead to speculation as to the value of the new substance for use as a building material, first probably as a mortar and finally for use as stucco. In any



Plate 3—Stucco and stained woodwork often harmonize



Plate 4—Stucco is well suited to park buildings

event there is evidence to show that the use of lime stucco has been practiced for more than forty centuries. The Greeks used a very fine hard stucco that was

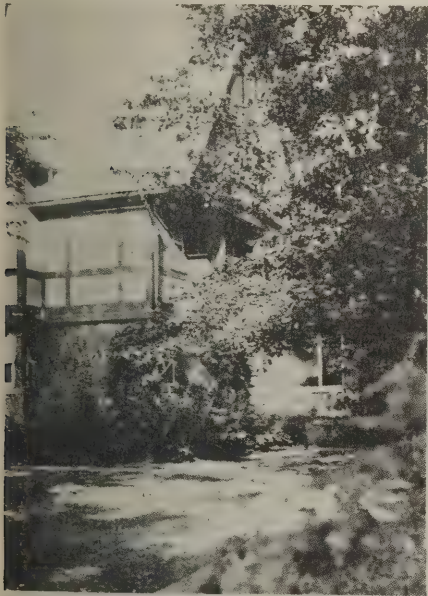


Plate 5—Half timber with stucco panels is popular

highly durable and could be polished similarly to fine marble. It was used extensively

on their buildings and finally became known to the Etruscans and then to the Romans.

The Moors and the Arabians understood the use of stucco to a marked degree and many evidences of their skill are in existence. In Europe stucco was used throughout the Dark Ages and during the Renaissance was again brought to a high stage of artistic development in Italy, but the secret of preparing a semi-hydraulic cement that would prove durable and withstand the rigors of a severe climate seems to have been lost for a number of years and it remained for John Smeaton, an English engineer, to rediscover it about the middle of the eighteenth century. This was a natural cement, as was the so-called "Roman cement," which was introduced into England by Joseph Parker some fifty years later.

The early use of stucco in America was largely confined to certain districts in New Jersey and Pennsylvania. Scattered examples are also found from New England to Virginia, but these are exceptions rather than the rule. Again in New Orleans it was used almost invariably on the walls of the brick and timber buildings which were erected during the latter part of the eighteenth century to replace the frame

buildings which had been destroyed in the great fire.

The stucco of Colonial days, however, was composed of ordinary lime and required constant attention on account of the severity of the climate. Therefore the use of this material was generally looked upon as a sort of makeshift until a comparatively few years ago when the durability and other advantages of Portland cement were fully recognized.

Portland cement was invented by Joseph Aspdin, an English brickmaker, who in 1824 took out a patent covering its manufacture. Its name was derived from a slight resemblance borne by the "artificial stone," as it is described in the patent, to the then popular "Portland stone." The first American factory for the manufacture of Portland cement was established in 1878. The development of the industry in this country was feeble for a number of years, but about 1890 the popularity of the new material began to make itself felt and for a number of years America has led all other countries in the manufacture of this product.



Plate 6—Stucco offers possibilities in remodeling old store fronts



Plate 7—Ready for its stucco "skin"



Plate 8—A filling station of stucco on hollow tile

Hollow Tile Construction

By F. H. Sweet



Plate 1—Brick veneer with stone trimmings on a hollow tile wall. The slate roof increases the fire resistance

A TYPE of construction that has been introduced only in recent years, but which has progressed with leaps and bounds is what is known as terra cotta hollow tile. This material was formerly used to make partitions and floors in office buildings, but it has been demonstrated to be thoroughly practicable for the entire construction of a building—floors, ceilings and side walls. While it has not been in use long enough to demonstrate beyond all doubt that it possesses all of the desirable qualities for building construction, certainly the weight of evidence is very much in its favor. It is practically indestructible and is certainly unburnable. The hollow dead air spaces in the tile form some insulation against heat



Plate 4—Many of the modern schools are built of hollow tile faced with brick and have combination hollow tile and concrete floors



Plate 3—All of these houses have hollow tile walls. They are variously finished with brick veneer, plain stucco and half timber

and cold, and when once properly put in place the tile stays there.

A terra cotta hollow tile is simply a hollow block of fire-burned clay, containing two or more dividing partitions. These blocks come in various sizes, but the standard thickness for outside walls of dwellings is perhaps eight inches. By standing these blocks on their edges and by cementing them together by a mixture of portland cement, sand and lime putty, the side walls of a house can be built up in an inconceivably short time and even by comparatively unskilled labor. When such a wall is in place the outside surface can be treated in one of a dozen ways to give a pleasing exterior. The inside furnishes the surface upon which to put the plastered wall, but in the best work the walls are usually furred. For the inner partition walls of a house tile or gypsum block can be obtained four to six inches in thickness

and even the floors and ceilings can be made out of these materials. Even the foundations of the house may be built of vitrified terra cotta hollow tile.

Of course a wall built of this material is not a finished wall like brick or stone; it requires an additional coating of brick or stucco to give it a finish. There are any number of variations in which stucco may be employed. While pigments are used for coloring concrete, probably the best effects can be obtained by the use of colored sands. In some parts of the South they are using pulverized coral sand for this purpose, giving a remarkable pink tint, and by the use of marble dust and muriatic acid a brilliant sparkling finish can be obtained. If the stucco is properly put on it is there for all time. The house built of cement-coated terra cotta hollow tile will never require painting.

The question of the application of stucco

on hollow tile blocks will bear a great deal of study. Whatever the finish is, the wall should be thoroughly wet before application of the first coat. This will take care of a certain amount of suction that the tile creates and will prevent a too rapid drying of the stucco. While the surfaces are wet the first coat of mortar should be applied to a thickness of half an inch, trowelled under pressure, then floated evenly. This coat should be composed of one part cement, three parts clean, sharp, coarse sand and 10 per cent of lime putty and should be thoroughly scratched in order to form a key for the finishing coat. It should be occasionally sprinkled with water during the first few hours of application in order that the material will not set too rapidly. The finishing coat should be applied within twenty-four hours and should be about a quarter of an inch in thickness and mixed one part cement or two of sand. For a smooth, white, brilliant finish use one part white portland cement, two parts clean, coarse, white marble dust and 10 per cent of lime putty.

The addition of yellow ochre or the use of clean, brown sand in place of white, coarse sand will give a buff or yellow tone to the stucco. If only cement color is desired ordinary portland cement may be used instead of white portland cement. A darker color may be produced by the addition of lamp black in proper proportions.



Plate 5—In this example short courses of tile were filled out with brickwork

There are several methods of waterproofing stucco finish. It can be done by including in the finishing coat a small percentage of crushed shell lime, or by including in the mixture one of the dry waterproofing mixtures now on the market, or by painting the outside of the building with a colorless liquid which looks like water and can be applied at very little cost.



Plate 2—The wall of the house in the foreground is laid with a special hollow tile made with a brick face. The other houses are of stucco on hollow tile

There are many firms which manufacture this latter product.

For those desiring all-fireproof houses the construction can be as follows: With a cost ranging about 20 per cent more than for frame, 8-inch hollow tile wall, 8-inch combination long-span fireproof floors, and the same construction for the roof. If the finished roof is made of fireproof shingles or architectural tile and the walls and floors, including the attic, are of absolute fireproofing, it is very difficult for a fire to make headway, even though the roof covering is supported on wooden framing.

The high rate of insurance demanded by insurance companies for frame buildings in the country is greatly reduced for fireproof

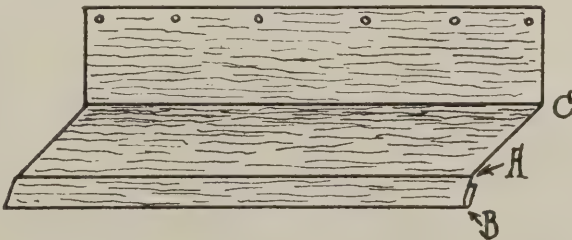
construction. Perhaps the most optimistic would say that it is not necessary to carry insurance at all on this type of building. This saving would make a difference in initial first cost between the two types of buildings and within a few years will perhaps save in insurance the difference between fireproof construction and the ordinary kind, besides the saving in repairs and maintenance.

English half timber and stucco-finished house walls can be constructed of the tile with pieces of wood or wall plugs inserted between the joints of the blocks upon which to nail the half timber. Stucco finish applied after this is done gives a very satisfactory result.

Crimped Metal Flashing

If the type of metal flashing herewith illustrated is used for covering over the ends of slate and other shingles abutting

stiffens same into a uniform straight line which is reinforced by the slight bend "A" immediately back of the hem "B." If the



CRIMPED METAL FLASHING

against a higher building, a deck or other obstruction, it will not buckle and kink on its outer edge as will the plain, flat tin almost universally used for this sort of work.

This flashing, with a quarter-inch hem, as shown at "B," forms a complete fold back under the metal at its edge and

corner bend at "C" is given slightly more pitch than that of the roof to be flashed the front of the flashing can be made to bind down more firmly upon the shingles when the back is forced down into place. This flashing may be made in a tin shop or can be made with tongs on the job.—
L. S. Bonbrake.

Two Houses in Good Taste

THE general public is gradually awakening to the fact that simplicity is the keynote of successful house design. A few years ago freakishness was the rule; the most popular designers were considered to

be those who introduced the most spectacular "stunts" into a design, and every instinct of good taste was apparently submerged by attempts to do something "different" in the way of scrambling a mixture

of porches, gables, dormers, bay windows, roofs and built-in fittings and calling the result a house.
Of course the desire for individuality in our houses is inherent in the most of us,



Plate 1—An "aeroplane" bungalow

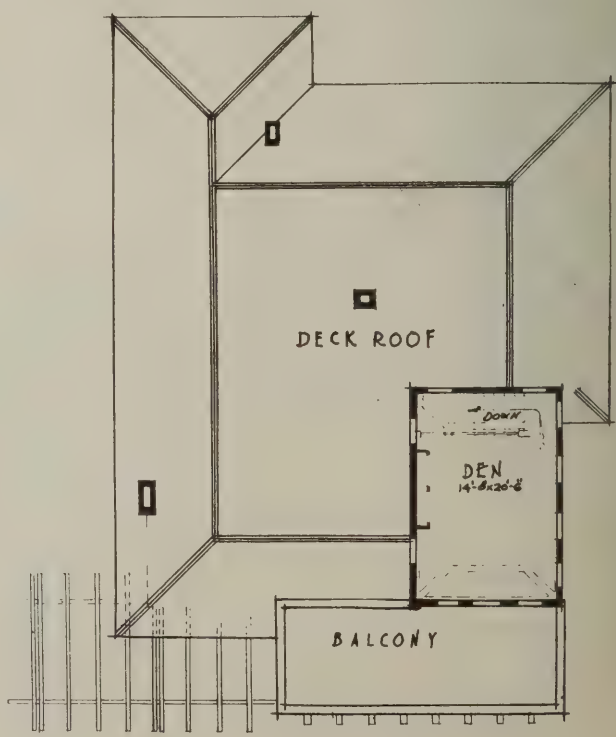
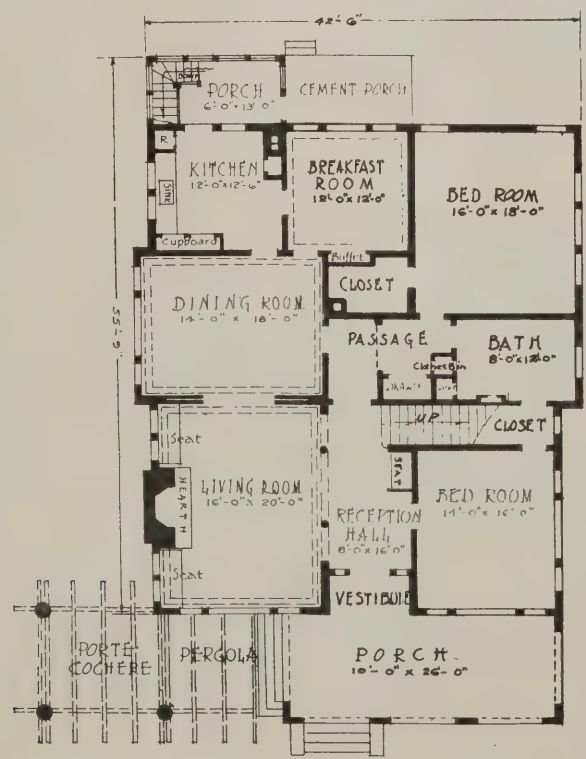
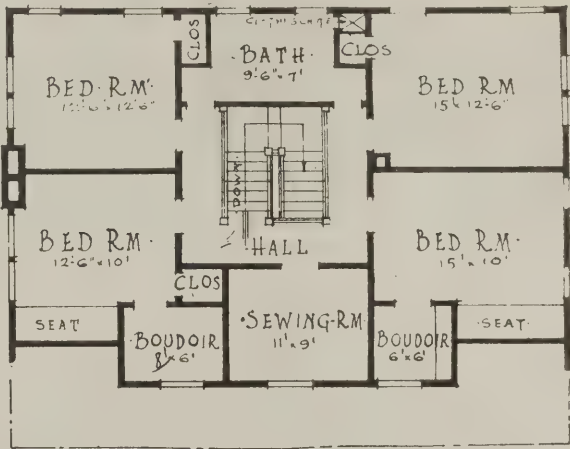
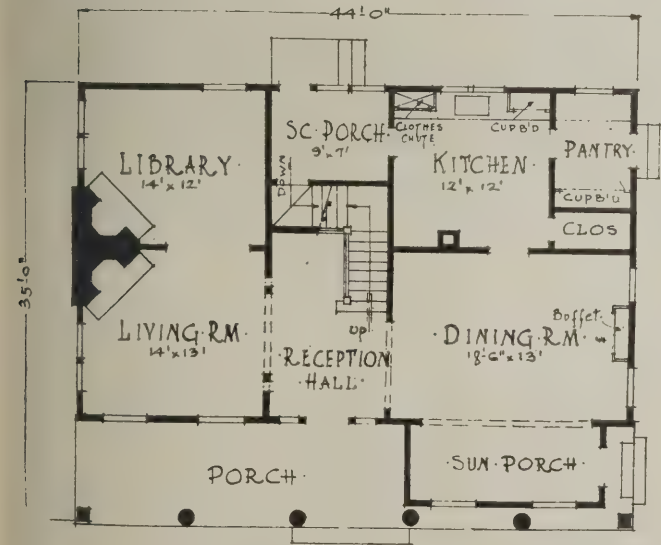




Plate 2—Designed in the Long Island farmhouse style



but that does not mean that we should sacrifice judgment and common sense in order to have a home different from those of our neighbors.

The accompanying illustrations show two houses that have individuality combined with good taste. They were designed by Ye Planry, Inc., of Dallas, Texas, and are interesting in plan and exterior design.

Plate 1 is an airplane bungalow, built of hollow tile with stucco finish. The treatment of the porch and the pergola is especially good. The reveal of the arches of the porch is about twelve inches, a great improvement over the "skinny" six-inch reveals that are so common. The projecting

timbers are derived from the pueblo style. The heavy columns and timbers of the pergola are very appropriate.

The living room and reception hall form practically one room. The dining room opens into a breakfast room and each of these rooms opens directly into the kitchen. A large porch at the rear is partly screened and contains the basement stair. Two bedrooms and a connecting bath complete the first floor plan of Plate 1.

The most striking feature of this house is the den which is reached by means of a stair from the reception hall. Rooms of this sort receive splendid ventilation.

Plate 2 shows a house that suggests the

Long Island farmhouse type. The porch columns and the cut-in dormer with the long flower-box are well proportioned. Note that the change in the roof slope is softened by a long curve and is not an abrupt break. The walls are of shingles, stained silver-gray.

In the plan of Plate 2 the living room and library might be combined to form one large room, and the position of the sun porch could be changed to open from the living room instead of the dining room. A screened porch is contained within the main walls of the house, and a large pantry and a closet are provided for the kitchen.

The second floor contains four bedrooms, two of which have dressing rooms or boudoir in connection. A large sewing room and a bathroom complete this floor.

A Bungalow of Pleasing Style and Economical Arrangement

By Charles Alma Byers

THIS little bungalow is especially compact and economical in interior arrangement. It, in fact, has exceedingly little floor space devoted to hall connections

The interior woodwork consists of pine throughout, which in the living room, den, dining room and breakfast room is finished in old ivory, and elsewhere in white. The

walls of the rooms named are papered and those of the kitchen and bathroom are finished to the top of the windows and doors with a smooth, hard plaster coat

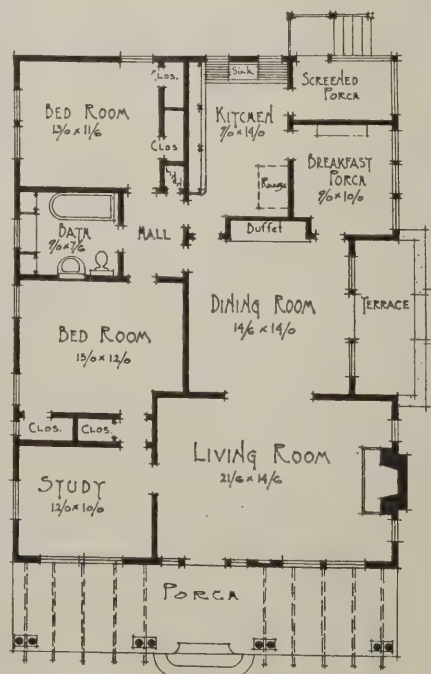


A California bungalow. Designed by John R. Avery, Los Angeles, Cal.

and yet every division is conveniently accessible. The house also possesses a very pleasing exterior. Across the entire front extends the combined entrance porch and pergola-covered terrace floored with cement and on one side is still another but smaller terrace, with glass doors leading to it from the dining room.

The outside walls are of narrow re-sawed siding which, including all finishing material, is painted white, and the shingled roof is green, while the chimney and the foundation walls of the terraces are of red brick.

The built-in features of this bungalow include buffets in each the dining room and breakfast room, linen cabinet in the small hall, much cupboard and drawer room in the kitchen, a combination of shelf and drawer cabinets and box-seat in the bath room, and a mail-box in the living room wall at one side of the front door. Each bedroom has a good closet, and between the den and the front bedroom is an extra pass closet.



which is enameled like the woodwork. The bathroom is floored with tile, and hardwood is used for the flooring throughout the remainder of the house, except in the kitchen. The kitchen sink is also of tile. The fireplace of the living room is of brick, with wood mantel-shelf.

No basement or cellar is provided and the heat is supplied by built-in gas radiators. The bungalow is located in Los Angeles, Cal., and was designed by John R. Avery of that city. The building cost is estimated to average approximately \$4,800, complete, including garage.

ESTIMATES

The first essential in making reliable estimates is to keep cost sheets of material and labor on file and constantly change and bring them up to date. The most successful contractors have such cost sheets indexed and filed away for ready reference. By comparison with the market prices of materials at any given time, they can be used as a certain guide.—E. L. Seabrooke.

ENTRANCES

Plate 1—A cast concrete entrance for a storage warehouse. The door and frame are of bronze copper.

Plate 2—A somewhat elaborate Colonial entrance.

Plate 3—A simple, dignified and appropriate entrance for a house with a Germantown hood.



Plate 2



Plate 1



Plate 3

Awnings



Plate 1—Awnings with stencilled patterns on a plain ground add to the appearance of a stucco house



Plate 2—A pergola with an awning makes a pleasant spot for a hammock



Plate 3—Awnings add a somewhat festive appearance to a house



Plate 4—Houses with many porches and windows need awnings to make them comfortable

IN SELECTING awnings for a house one should carefully consider their decorative value. The appearance of a house may be

easily spoiled by the addition of awnings that do not harmonize with the general appearance. The variety of colors and patterns in which they are offered often proves confusing and it usually requires careful judgment to select the ones most suitable for a given house. The same pattern or design should be used throughout.

The usual pattern is the familiar blue or brown stripe on a white ground, but almost any desired colors may be obtained. The stencil designs come in scores of patterns, but those based on the Greek fret are most popular. In general, striped awnings are suitable for brick or other dark toned buildings, while stencilled awnings are suitable for stucco or similar light toned ones. The scallops around the edges of awnings are also varied in pattern, but unless outlined with color, do not have much effect on the general appearance.

The durability of awnings is, of course, important and they should be bought from responsible dealers or manufacturers. All exposed hardware should be galvanized or otherwise protected against rust, the canvas should be new and of heavy weight, and the colors should be fast.



Plate 5—The upper portion of entrance awning is flat against the gable, while the lower portion is hooded



Plate 6—Awnings may be used on either round or flat arched openings



Plate 7—Roller type awnings. Note that the upper portion is flat against the window, while the lower portion forms a hood

There are two principal types of awnings in general use: the hooded type, which folds up against the wall at the top, and the roller type, which operates similarly to the ordinary roller shade. Some of the latter type may be operated from inside the room without opening the window or the screen. Further advantages that are claimed for the roller type are that they are more weatherproof; are not so noisy nor so likely to be damaged during high winds; do not form pockets for the accumulation of water and dirt when not in use, and are more durable.

Any ordinary type of plain or arched opening may be neatly fitted with awnings. Even casements opening out may be fitted with a special box type that allows the windows to be operated. This type of awning, however, has a clumsy appearance. From a standpoint of appearance, it is

better to have few rather than many awnings on a house. Windows under wide,

overhanging eaves seldom need them and may often be omitted on north elevations.



Plate 8—Awnings make a sunny porch livable on hot days



Plate 2—Used in connection with wood rails to form a balcony effect at the end of a porch

Ornamental Ironwork

ORNAMENTAL ironwork details are becoming increasingly popular, and the number of uses to which the material may be applied with decorative effect is almost unlimited.

The accompanying photographs indicate a few of the various features.

In designing ornamental ironwork, "fussiness" should be avoided. Scrolls and other curlicues such as were common in this sort of work twenty-five or thirty years ago had best be avoided. Straight slender lines are characteristic of the material and should be used almost altogether, but a simple geometrical form at the ends or in the center of a panel is often used to overcome an appearance of stiffness. Small brass balls and knobs are often used over the corner posts. These, however, require frequent polishing and wrought iron is sometimes used instead.

For ordinary railings, balconies, and so forth, the balusters are usually made of 5/8-inch square bars and the posts are of 1 1/4 or 1 1/2-inch hollow square tubing. The rails are usually made of 3/4-inch channels, the upper rail having a small moulded section fastened to the channel.



Plate 1—Ornamental ironwork seems especially suited for use over entrance



Plate 3—Flower-pots are set in these ornamental iron flower-boxes, thus making a very simple and effective treatment

A Hollow Tile House

FOR some years past hollow tile has been rated as one of the recognized structural materials, and it is becoming more popular from year to year as the general public becomes acquainted with its use. As with all materials its use has sometimes caused dissatisfaction, but in such cases the fault was likely due to ignorance or carelessness on the part of the builder rather

has ample strength to carry any load that may be placed upon it. In addition to these qualities; its adherents claim that the air spaces provide insulation against heat and cold, and also offer an obstruction to the passage of moisture through the wall. Hollow tile lays up rapidly and is adapted to receive any of the usual surface treatments such as stucco, half-timber, or brick

production of trelliswork forms contrasts with the plain wall surfaces. The pergola treatment and trelliswork of the sleeping porch is interesting, as are the architraves around the first story windows. The hoods at the entrance and above the first story windows at the end projection are too "thin" to be pleasing. A treatment similar to that of the main cornice would be



Plate 1—The unfinished entrance and uncompleted grading and planting detract considerably from the appearance of the house

than to a defect in the material. For instance, some types of hollow tile are designed to stand on end with the air spaces vertical and the webs "registering" (each web lining up with the ones in the blocks below). In some cases no attention has been paid to this requirement and the blocks have been laid flat, with the air spaces horizontal. This method results in concentrating the load on the outer vertical shell of the tile and sometimes results in a failure of the wall.

It should be understood, however, that some types of hollow tile are designed to lie flat, with horizontal air spaces. Most hollow tile manufacturers have prepared descriptive matter on their products and will furnish such data and other information to interested inquirers.

Probably the most general use of hollow tile has been in residence work. For such work it forms a light, durable wall that

vener. The manufacturers also claim that it is practicable to apply the interior plaster directly on the hollow tile without furring the walls.

The house which illustrates this article was designed by William Ward Watkin, architect, for F. J. Schlueter, of Houston, Texas. The walls are of hollow tile with stucco finish. The exterior trimmings are of wood and the roof is of slate surfaced asphalt shingles. A tile roof was first proposed, but it was found desirable to substitute a cheaper material. The floors of the kitchen, the pantry, the lavatory and the bath rooms are of tile. The finished floors of the first story are of oak and the second story floors are of edge grain yellow pine. The terrace paving is of 6-inch square, red quarry tile.

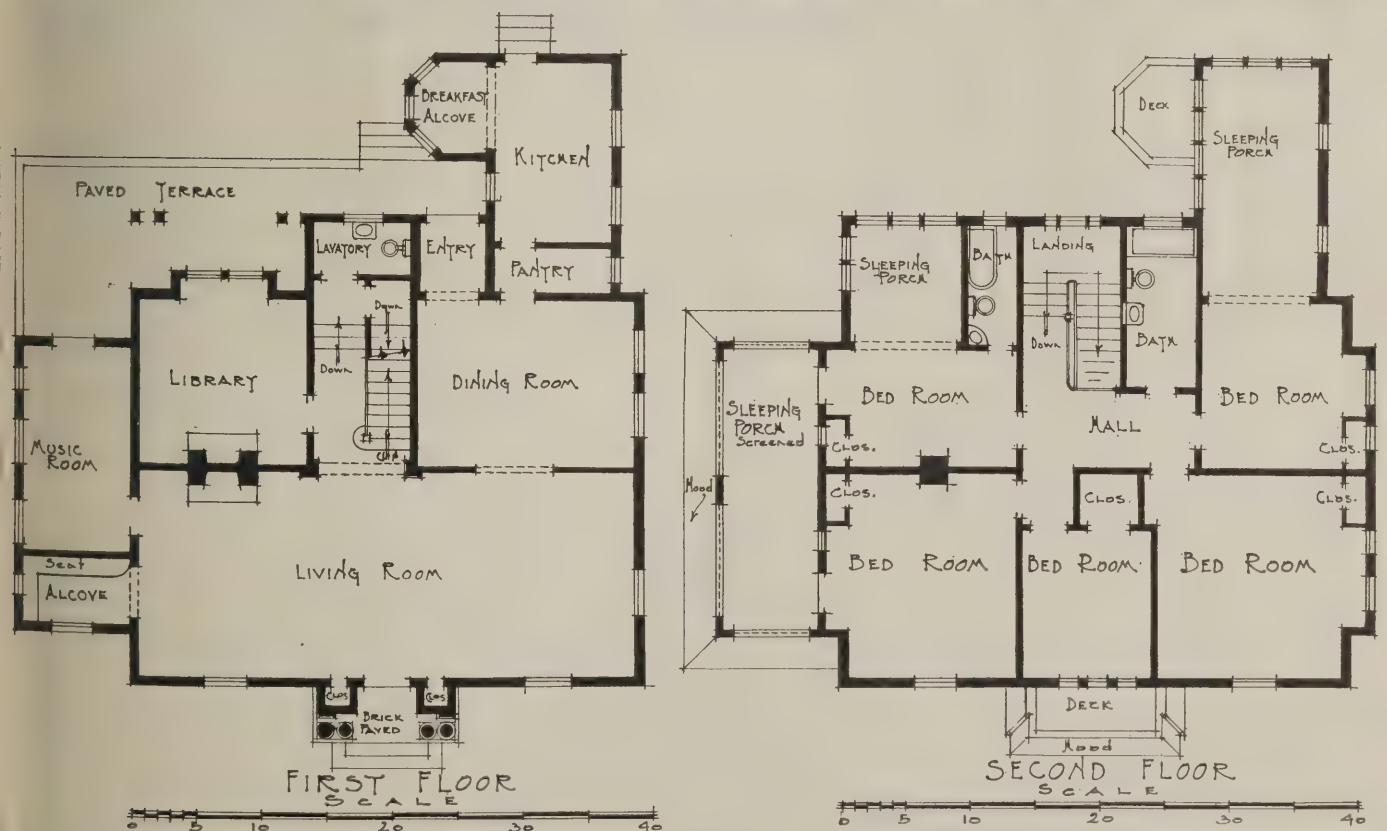
The exterior is somewhat Italian in character, a style well suited to the stucco finish and the plan arrangement. The in-

terior treatment of the garage is similar to that of the house, and in addition to car space, it provides servants' quarters in the second story.

The entrance to the house opens directly into the large living room which extends entirely across the front of the house. At the sides of the entrance are two coat closets, and an alcove with seats is built in at one end of the room. Wide cased openings open into the dining room



Plate 2—The rooms of one side of the house overlook a small garden



and the stair alcove. A lavatory is provided under the stair landing and the basement stair is placed under the main stair. The location of the basement stair may be criticized from the fact that it may be reached only by passing through

principal rooms. A small living porch with French doors into the terrace, opens from the living room. Fireplaces are provided for the living room and for the study, which opens from the stair alcove. The dining room has a beamed ceiling

and a buffet is built-in under the large elliptical window at one end. An alcove with French doors onto the terrace is located at one corner of the dining room.

In common with those of many late houses, the serving pantry is made quite

small and is retained merely because it retards the passage of odors from the kitchen into the other rooms. The kitchen is excellently lighted and ventilated and has an exterior door under an arbor trellis. A breakfast alcove with seats and table is built into one side of the kitchen.

The second floor contains five bedrooms, two sleeping porches and two bath rooms.

A possible objection to the bed rooms is the smallness of the closets, nor is a linen closet provided for this floor. French doors open from two of the bed rooms on the sleeping porch at the side. The other sleeping porch has only a cased opening between it and the bed room which it serves. One bed room has a dressing alcove and a private bath. A bath room

opening from the hall serves the other bed rooms.

The hall is well lighted by means of a large triple window, which extends from just above the landing, almost to the ceiling. This window has a semi-circular transom and forms an important decorative feature of both the lower and upper halls.

A Bungalow at Rye, N. Y.

THE accompanying illustrations show a bungalow at Rye, N. Y., designed by Urwin J. Magill.

This bungalow is a splendid example of the possibilities of incorporating good design in a small house. It is entirely free from the clumsy character of many bungalow designs and is suggestive of old Colonial work. The wide siding is in scale with the rough stone chimney and the flower boxes and shutters add interest and character. If the open porch were glazed in, a needful appearance of solidity would be given to this corner. At the same time the porch would become available for year-around use. In justice to the architect, it should be said that the original design contemplated an enclosed porch.

The plan is unusual in that no dining room is provided. The omission of dining rooms in small houses is becoming general throughout the country, either the kitchen or the living room serving this purpose. In the present example the



A bungalow at Rye, N. Y. Urwin J. Magill, Architect

porch could be made into a dining room if desired.

The three bed rooms provide more sleeping room than is usual in bungalows, and could be further supplemented by additional bed rooms in the attic if desired. One objectionable feature of this plan is that the bed rooms are rather far removed from the bath room and that, in the case of the front bed room, it is necessary to pass through the living room to reach the hall. It should be remembered, however, that that which is considered a defect by one person is often tolerated and approved by others.



FLOOR PLAN
SCALE
10

LAYING PORCH FLOORS

Before laying a porch floor without making it waterproof; paint the tongues of the board with white lead before forcing them into the grooves. This will preserve the floors to a good old age, for a porch floor rots because the water gets into the joints. Also remember that a slight slant is desirable to prevent water from standing and soaking in.

MARKING DOOR JAMBS

J. R., of Connecticut, wants to know if a templet or any quick method is used in marking the cuts for the joints of ordinary door jambs.

Roof Framing

Compiled from the Contributions of a Number of the Leading Writers on the Subject—Continued from the April National Builder

GAMBREL ROOFS

Figure 1 represents an octagon style gambrel roof, while Figure 2 represents a hexagon style. The octagon is favored for wide buildings and the hexagon for narrow ones. In damp climates the

not being at hexagon joint, so it changes lengths and cuts. Square No. 3 will cut plumb, and seat 8x14 in., while square No. 4, cuts middle joint, 4x15 in. To get length square No. 5, laying 8x13 $\frac{1}{2}$ in. (as 14 in. is not just right,

then run the rule up along the tongue till 45 degrees is reached, 2 3/10 in. will be it. Sometimes the gambrel is not wanted at 45 degrees, but if so proceed with this same solution, either raise or lower

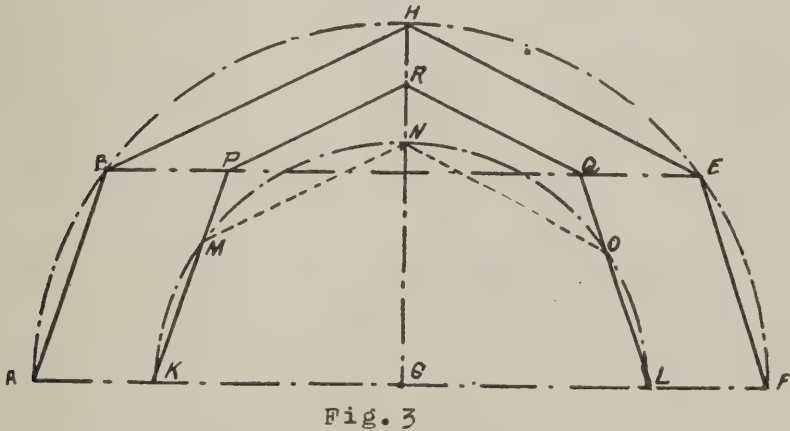
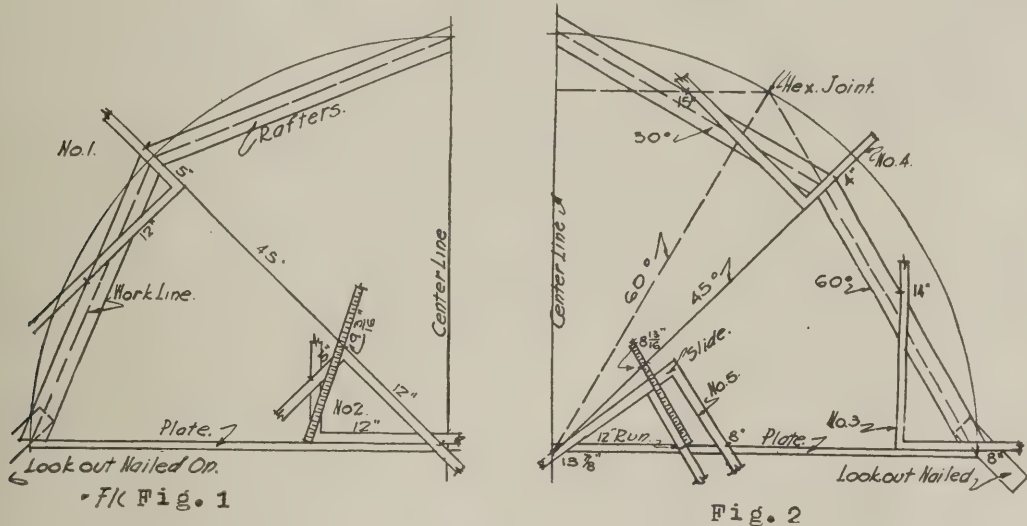


Fig. 3
Gambrel roofs

hexagon should be used, as it gives a better pitch on the upper slope. Now for cuts and lengths. Square No. 1, 5 in. and 12 in. cuts the three joints on rafter, Figure 1. Lay two squares and rule No. 2 for length to one foot run; you will find it to be very close to 9 3/16 in., therefore multiply it by the number of feet in one-half the width of the building, and dividing the result by 12 in., gives the length of each rafter on to the first rafter. Now Figure 2. This is marked a little different on account of 45 degrees

only near enough to cut a joint) slide back so 12 in. run shows at tongue, then lay rule as shown, it will cut 45 degree line with 8 13/16 in., and as before multiply by your run feet, and divide by 12, gives length. Like 10 ft. run, 8 13/16 multiplied by 10, is 88 1/2. divide by 12 in. is 7 ft. 4 1/2 in., length of rafter on work line. Don't forget to keep one arm of the square parallel to the pitch line, and the rule, too; the octagon Figure 1 can be worked the same way, just by laying square on plate line, 5x12 in., and slide back to one foot run on plate,

the 45 degree line, and work the squares in both angles. Where a narrow gambrel meets a wide one, the narrow gambrel, if proportioned the same as the wide one, would give the outline as at KMNOL, Figure 3. This outline would be undesirable, as the slopes would not intersect properly and a uniform height of ceiling would not be obtained. If, however, the side pitch K M is continued up to the curb line of the main roof at P, and P R is drawn parallel with the upper slope of the main roof, the outline K P R Q L

will be suitable for the wings, and the ceilings will be the same height as in the main part of the house. Both roofs

square on 9 in. or run until 3 in. is the reading. From 3 in. to rise on tongue is the length.

the new figures on run (in this case, they are $7\frac{5}{16}$ in. or 7 ft. $3\frac{3}{4}$ in.). measure across corner of square, using the

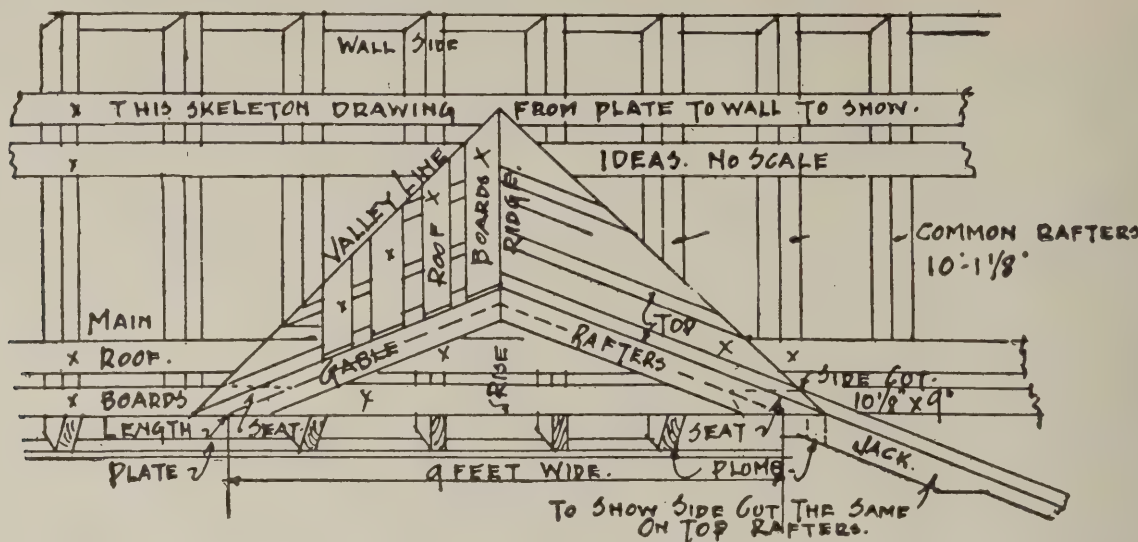


Fig. 1—Beveled seat cuts

will have the same pitch, and their intersection on the plan will be at an angle of 45 degrees with the sides of the house.

BEVELED SEAT CUTS

We will now consider a gable roof that sets flat on another roof slope. Assume that the pitches are the same and that the bottom of the gable rafters set on the roof sheathing, thus forming a valley. There is a bevel cut to these rafters at the seat, and many men wonder what figures on the square get this cut. Now the only difference between the side cuts for ordinary jack rafters and the bevel cuts for these rafters is that while jacks would be plumb cut, these rafters are seat cut. In other words, use the length and run of common rafters to get this bevel cut. Always cut on length. Notice in Figure 1 a portion of porch roof and the gable mentioned, also at the right a jack extended to show side cut to equal same line as the side cut of small gable rafters that sets on top, and is on same line as jack or other common rafters, so the side cut must be the same.

For example, assume that the gable sets on a porch roof (Figure 1) and that the run for the porch rafters is 9 ft., and length 10 ft. $1\frac{1}{8}$ in. Then the bevel cut for the seat of the gable rafters is $9 \times 10\frac{3}{32}$ in. on the square.

How about length of these gable rafters? If you wish gable width the same as porch, 9 ft., take one-half length of common rafter and use same figures to cut seat and top. Also take off the thickness of board it sets on. If a different width gable, place square on straight edge board, rise and run, say in this case, gable to be 6 ft. front. Slide

TWO-PITCH ROOFS

The following method may be used for any case where roofs of two pitches are concerned.

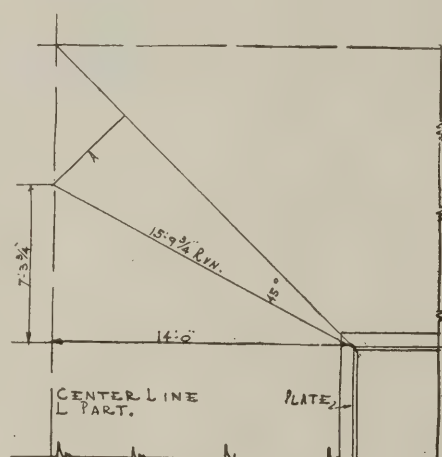


Fig. 1

Two-pitch roofs

In this example both the L portion and main building are 28 feet wide. Therefore the run of all common rafters is 14 feet. (See Figure 1). But the main roof has a rise of $11\frac{1}{2}$ feet, while the L roof has a rise of only 6 feet. It is desired to find the length of the valley rafter.

Use steel square, one inch equals one foot, 14 in. run, and $11\frac{1}{2}$ rise, as shown in Figure 2. This will give full length of common rafter for steep pitch.

Next find run for valley. To do this, place square on straight edge, run and rise of common rafter on high roof, slide on run to other rise. After finding

new figure and the run of the common rafters. This gives run of valley (in this case, measuring from $7\frac{5}{16}$ to 14, reads on rule $15\frac{25}{32}$ in., or 15 ft. $9\frac{3}{4}$ in. run of valley.)

Now to find length of valley. Measuring across the square from run of valley to rise of valley gives the full length of valley. In this case measuring from 6 to $15\frac{25}{32}$ reads on rule $16\frac{7}{8}$ in., which represents 16 ft. $10\frac{1}{2}$ in., length of valley.

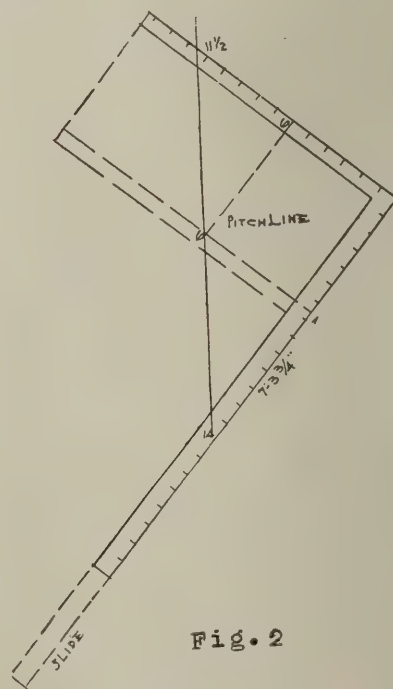


Fig. 2

Two-pitch roofs

How about side cuts on these rafters? Three different ones, one on valley, one on top jacks left, one on top jacks right. Side cuts are something that no one

knows perfectly. Of course, it is a fact, for all practical work, length and run of rafters get side cut, providing their run is square or 45 degrees. But in this case the side cut is different on each side of the valley on account of pitch, making it swing at A. Note the difference at A where valley run swings off of 45 degrees, where it would be with equal pitch roofs. This rise only lets the rafters strike a little over half way up the steeper roof, as the rise is only three inches over one-half the other. Now the difference between rise and run for this valley is only about 1 ft., and if set at a 45 degree angle we could use, say 15x16 in. on square for side cut, but the valley swings around and drops below the higher pitch nearly half way; divide the one-inch difference and decrease one-half to fit ridge, 15x15½ in. Therefore, use a little over one-half the length of valley and its full run for the side cut. In this case one-half of the length (16½ inches) is 8 7/16 inches, say 9 inches, for a little over one-half. The run is 15 25/32. Set square on 15 25/32 and 9 inches. Cut on 9-inch edge of square. A similar line of reasoning can be used for the side cuts or jacks.

PLATE LINE FOR TWO-PITCH ROOFS

In this roof we have a pitch of 6 in. on one side and 9 in. on the other, as shown in the sketch and the two roofs intersect in valley A B.

In laying out this roof it is necessary to know the exact projection of the cornice, which in this case is 2 ft. from face of plate to outside of crown molding or cornice (at A).

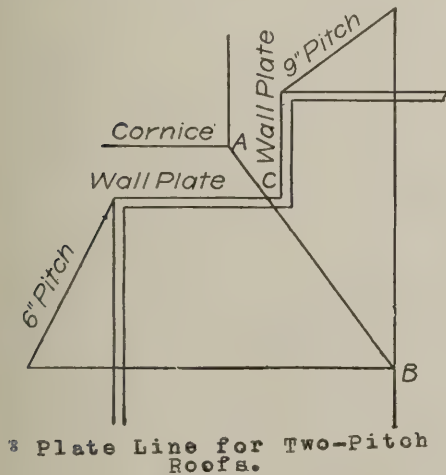


Plate Line for Two-Pitch Roofs.

If there were no cornice on building, the lower end of the valley rafter would stop at point C, and top of plates would be even, but in a projecting cornice, the plate on 9 in. pitch roof must be raised above plate on 6 in. roof just in proportion as one rises faster than the other roof.

In this roof the plate on 9 in. roof

will be 6 in. above plate on 6 in. roof, the difference of rise in the two feet projection of cornice.

UNEQUAL PITCHES

It sometimes happens that there is a roof to frame up with unequal pitches, and yet they must intersect and come to the same height at the top. We will now show that our easy system of obtaining lengths and cuts applies to all roofs when you know how to handle the square. Figure 1 represents the plan of an irregular hip roof with a deck, or you can suppose it to be the corner of a porch roof where it turns the corner of a house.

On one side of the hip the common rafters have a run of 7 ft. on the other side the run is 8 ft. We will suppose the rise on both sides to be 6 ft. For the first step, lay your square on the straight edge with 7 on the blade and 6 on the tongue, and the distance on the straight edge from A to B, Figure 2, represents the length of the common rafter on the short side of the roof, about 9 ft. 3 in. The blade of the square gives the bottom cut, and the tongue the top cut.

Next lay the square on the straight edge with 8 on the blade and 6 on the tongue, see Figure 3, and the distance from C to D on the straight edge, 10 ft., will be the length of the common rafter on the long side of the hip. The blade gives the bottom cut and the tongue the top cut.

Now for the hip rafter, lay the square on the straight edge with 8 on the blade and 7 on the tongue. Then the distance on the straight edge from E to F, see Figure 4, will represent the run of the hip rafter, which is about 10 ft. 8 in. Now with this measure lay the square on the straight edge with 10 and 8 twelfths on the blade and 6 on the tongue, see Figure 5, and the distance on the straight edge from G to H will be the length of the hip rafter and is about 12 ft. 2 in. The blade gives the bottom cut and the tongue the top plumb cut of the hip.

Now for the cuts across the back of the jack rafters. We already have the figures that will make these cuts if we know how to apply them. For the jacks on the long side of the hip, take the length of rafter on this side, 10 in. on the blade of the square, and the run of the rafter on the short side, 7 in. on the the jacks on the short side of the hip, take the length of rafter on this-side tongue, and the blade give the cut. For on the blade, which is 9 3/12 or 9¼ in., and the run of the common rafter on the long side of the hip, 8 in. on the tongue, and the blade give the cut.

The difference in the length of jacks can be obtained much in the same manner as before described. For the short side, lay the square on the straight edge with 7 on the blade and 6 on the tongue. This represents the pitch. Now slide the square forward till the figures on the blade represent the run of the first jack, being careful to keep the same pitch. The run you can obtain from Figure 5 and must be taken from the hip line to the plate. It cannot be taken from the spacing on the plate line because the hip is not on the 45-degree angle, but you can take the measure from the hip line to the plate on the line of the jack and it will be correct, according to your space. When you have the square in the right position as we have described, make your marks on the straight edge and you have the difference in the length of jacks for this side of the roof.

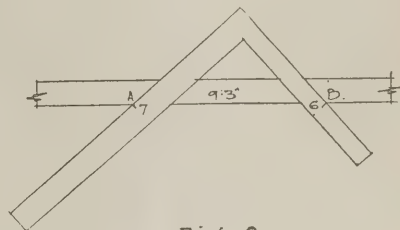


Fig. 2

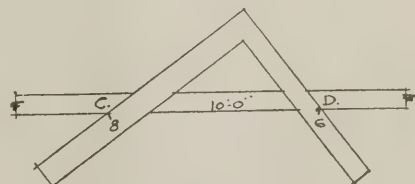


Fig. 3

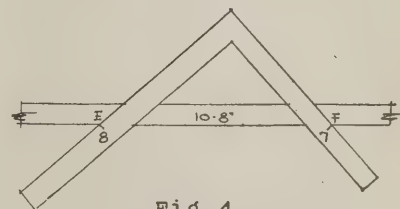


Fig. 4

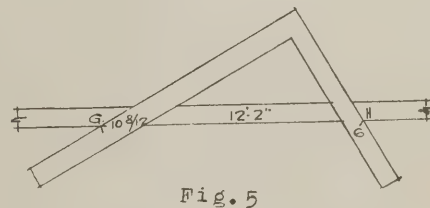


Fig. 5

Unequal pitches

For the long side of the hip lay the square on with 8 on the blade and 6 on the tongue and proceed as outlined above and it will give you the correct length, according to space. The spacing on the two sides has to be different in order to make the jacks member at the top, as shown in Figure 1.

Questions and Answers

"Kinks" that Experience has Proved to Make Better, Quicker and More Economical Construction are Shown in this Department. As Announced, \$5.00 Will be Paid for Each "Kink" Printed. Answers to Questions of General Interest Will Also be Paid for at the Minimum of \$5.00 and at a Higher Rate, According to their Character

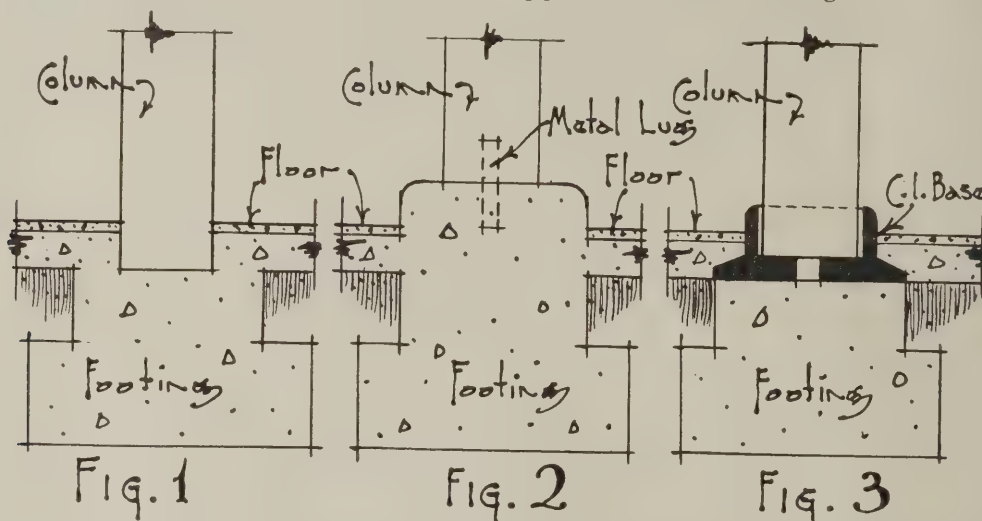
COLUMN BASES

The S. S. Co. of West Virginia asks if the method of setting interior columns or posts, as shown in Fig. 1, is in any way objectionable.

to the mixer, as the city pressure forces the water to any height desired.

To make this heater, use a 10-inch casing about 14 feet long and reduce the ends to 1 inch to receive 1-inch pipes. One of these

of all shearing cuts in wood turning? Explain the principle. Also, explain the purpose of and make a sketch to illustrate the use of 'rods' used in furniture making."



It is generally considered that wooden columns embedded in concrete, as shown in Fig. 1, are more apt to decay at the bottom than are those which are raised above the floor level. It is held that moisture is likely to be present in the concrete due to contact with damp soil or to water absorbed during manufacturing processes or when the floors are scrubbed.

Figures 2 and 3 show methods that are generally use for raising the bottoms of wood columns above the surrounding floor. In addition to this precaution it is advisable to dip about six or eight inches of the end of the column in creosote. The creosote should be heated to between 200 to 220 degrees F. and the end of the column treated for 15 minutes or longer. Each column will require from one to two quarts of creosote, according to its size and absorption.

WATER HEATER FOR CONSTRUCTION WORK

The accompanying sketch shows a type of water heater that I have developed for heating water for construction work. Someone may have something better, but I have used this type to furnish plenty of hot water on jobs where I ran two shifts—a day and a night crew. This heater does not require any tanks elevated in the air to supply the pressure to supply the water

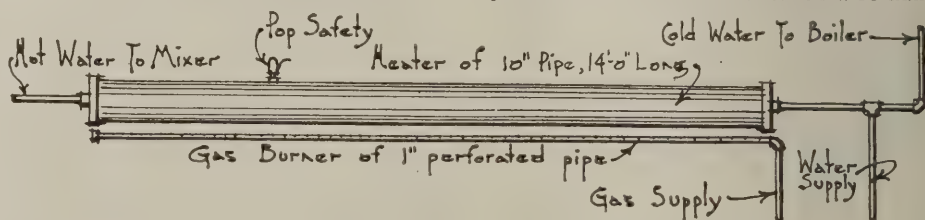
pipes is attached to the city pressure and fills the heater with cold water. The pipe at the other end delivers the hot water after it leaves the heater. A gas burner made of 1-inch pipe with holes drilled four inches apart is run under the full length of the heater.

As the water is forced up into the mixer a safety valve is placed on the heater. It will also be necessary to run a separate line to the boiler from the cold water line as an injector will not operate with hot water. To conserve heat the heater and

WIRE NAILS AND CUT NAILS

In the February issue of NATIONAL BUILDER, J. M. Jensen, builder, Arnold's Park, Iowa, gave his experience as in favor of wire nails, contrary to the findings of tests by the government. Mr. Jensen asked for experiences from others. S. F. Black, contractor and builder, New London, Ohio, complies, and says:

"Mr. Jensen is just the man I am looking for, and I will say he has started something. I have been driving nails for fifty years and I am still at it. When wire nails



burner should be enclosed when gas is used. It may, however, be operated with wood or coal for fuel if desired.—B. F. Nelson, 1220 23d St., Parkersburg, W. Va.

WOOD TURNING AND FURNITURE MAKING

H. W., of Illinois, asks, "What one word will define the theory or principle

came on a good test was made at the arsenal at Watertown, Mass. Wire nails from 3d to 60 were tried on three kinds of wood, and the test showed it took five wire nails to hold three cut nails.

"Here is my first test: I made an oak water-box, tongue-and-groove joints, and used 16d wire nails. With all the pounding I could do the nails would not draw because they were smooth. I used 16d cut nails between the wires and drew the work

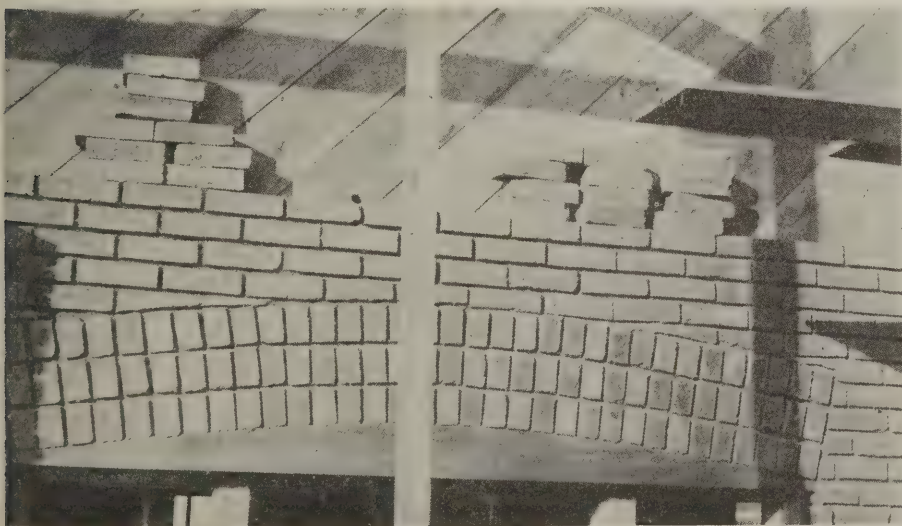
down until the joint evened out. That was my first test, and right here I want to ask Mr. Jensen if he ever saw a waxed or varnished cut nail, and why, oh why, is a wire nail varnished? Mr. Jensen, please rise.

"I admit that a wire nail pulls hardest at an angle of 45 degrees; but what does a nail amount to if it will not stay down? I used wire nails to put on the siding and the warp started them out, so I had to re-nail with cut nails, and if Mr. Jensen were here I could show him a house with wire nails sticking out so far he could hang his hat on them, and I have orders to re-nail it—and it has been renailed once—with wire nails. I was called to see a shingle roof five years old, and seven out of ten of the nails were rotted off and nothing left but a rusty hole. I stripped an old roof and the nails were perfectly good and could have been used again. They were *iron* cut. I built my home here nine years ago and there is not a wire nail in the outside of it. Ten years ago a Cleveland man asked me why his siding was coming loose. I asked him how long it had been built, and he said eight years. I asked him what nails he used, and he said wire nails. I told him the nails had rotted off, and he made me walk a half mile to prove it—and I did.

"Here is another: What does Mr. Jensen do with the piece of wire after he tears the head off? Also, did he ever tear the head off a cut nail? Come again, Mr. Jensen."

BRICK VENEER ARCHES

E. L. W. wants data on rowlock arches for brick veneer walls. *Answer*—Rowlock arches for brick veneer walls are designed in a similar manner to those for solid brick walls. The window or door frames



A 3-rowlock arch for a brick veneered wall

form the centers. The number of courses of rowlocks is usually determined by the width of the opening, figuring one course of rowlocks for each 18 inches or two

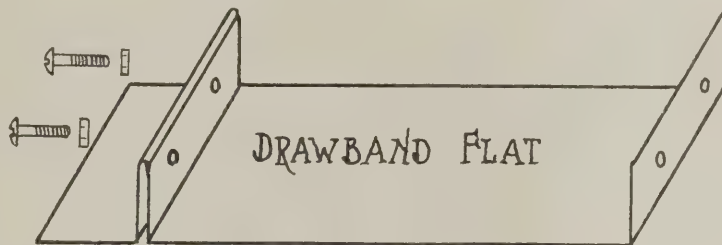
feet of span, according to the hardness of the bricks. The use of the arch is usually about 1½ inches for each foot of span, which makes the radius about equal to the width of the opening.

Brick arches should be laid in portland cement mortar and should be bonded with hoop iron, if additional strength is required. The bricks may be ground to form radial joints, or may be laid with wider joints in the upper courses than in the lower ones, depending on the architectural effect desired. If the bricks are to be ground, the arch should be laid out full size on a heavy piece of paper with the bricks and joints drawn in their exact size and position. The bricks are then ground to fit the spaces indicated on the drawing.

PRACTICAL KINKS IN FURNACE AND METAL WORK

No. 1. Doubling the diameter of a pipe increases its capacity four times.

No. 2. Add one tea cup full of vinegar



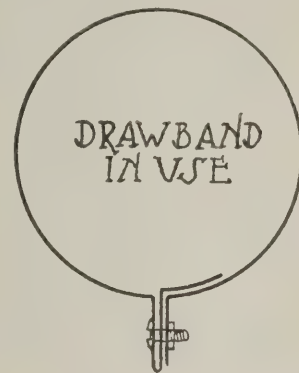
to a gallon of common flour paste for furnace pipe work and it will stick closer than a tick. It will hold paper on glass.

No. 3. When it is positively necessary to drive a nail through the body of a tin roof, drive it first through a narrow strip of tin, bend tin over nail head and solder.

No. 4. When under certain conditions of

dome from sagging from the weight of sand run a wire through a large washer on the inside of the center and draw it taut to a nail in joist above.

No. 6. When a dead hot air pipe is found between two live ones, close the damper of both live ones. If the dead pipe is improved, change its location on the casing.



No. 7. A short cut for finding the circumference of a circle: Multiply the diameter by three and add one inch to every

seven; i e., $3 \times 7 = 21$, $21 + 1 = 22$. In this example the result is only .009 off—too small a difference to effect ordinary calculations.

No. 8. A metal roof, especially referring to tin, should be painted immediately after it is completed. If completed in the fall, paint again in the spring, following with another coat in a year, after which a coat of good paint every three years will answer all requirements. Use a four-inch and not a wide whitewash brush.

No. 9. One of the most practical kinks in the erection of furnace pipe, and especially the smoke pipe, is to have the pipe connected by a draw band. All sorts of worry and annoyance are avoided by its use. (See sketch.)—L. S. Bonbrake, Peoria, Ill.

LENGTH OF RAFTERS

It is possible for one to frame a roof and put it in place and not know the length of the rafters, for if one measures them by using the rise and run, laying the square on several times, he does not learn their length in feet and inches.

It would seem more logical, however, to find out this actual length, for it might be necessary to know what length sticks to get for rafters, or one might wish to figure the number of shingles needed before the roof was up.

The new styles of squares, or rather those with the new styles of marking, have tables

wind the open check draft of a furnace pipe will not retard the draft sufficiently, pull out the soot pan.

No. 5. To prevent the center of a furnace

TABLE FOR RAFTER LENGTHS						
RISE PER FOOT IN INCHES	PITCH IN DEGREES	PITCH	LENGTH IN INCHES PER FOOT RUN	LENGTH IN FEET PER FOOT RUN	OR MULTIPLY SPAN IN FEET BY :	OR ADD INCHES FOR EACH FOOT RUN
2	9° 28'	1/12	12.17	1.014	0.507	0 11/64
3	14 2	1/8	12.37	1.030	0.515	0 3/8
4	18 26	1/6	12.65	1.054	0.527	0 21/32
5	22 37	5/24	13.00	1.085	0.543	1
6	26 34	1/4	13.42	1.118	0.559	1 27/64
7	30 15	7/24	13.89	1.158	0.579	1 57/64
8	33 41	1/3	14.42	1.202	0.601	2 27/64
9	36 52	3/8	15.00	1.250	0.625	3
10	39 48	5/12	15.62	1.302	0.651	3 5/8
11	42 31	11/24	16.28	1.357	0.678	4 9/32
12	45	1/2	16.97	1.414	0.707	4 31/32
15	51 21	5/8	19.21	1.607	0.803	7 13/64
16	53 8	2/3	20.00	1.660	0.830	8
18	56 19	3/4	21.63	1.803	0.902	9 5/8
21	60 15	7/8	24.19	2.015	1.007	12 3/16

giving the lengths of rafters per foot run for various pitches, but some have not yet purchased these new squares and a few words of explanation may be helpful to us all.

It would be well to make a copy of this table of lengths and keep it at hand for reference, and better to make two copies, so as to have one in your desk and one in the tool chest.

It would be even better for you to give more time to this matter and figure out each pitch and see that the figures given are right. They are, but you may want to satisfy yourself.

The lengths per foot run given in the table may be found by squaring the rise per foot in inches, adding this to 144 and extracting the square root.

To find the length of a rafter by the table it is only necessary to multiply the length per foot run given in the table by the number of feet and fractional parts in the run, or decimal parts will do better. You will notice that most of the lengths have decimal parts of a foot. Or take the even feet and measure the odd inches on the rafter at right angles to the plumb mark or top cut.

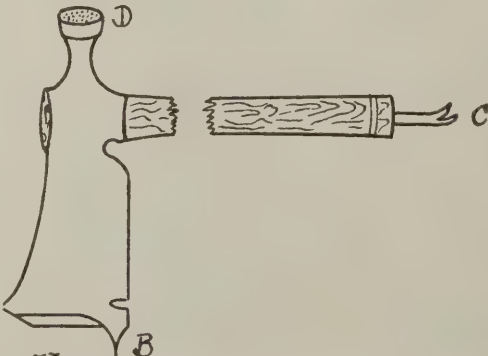
The only pitch which gives even degrees is the square or half pitch giving 45 degrees. But there are two others which should be noticed. The 7-inch rise and the 21-inch. The 7-inch rise is almost 30 degrees and the 21-inch, called 7/8, is almost 60 degrees. These pitches are often used on gambrel roofs. Remember that for a 30-degree pitch the length of the

rafter is practically twice the total rise and for a 60-degree pitch the length is practically twice the run.

To test this use 6 11/12 on the square and measure across to the 12 and get twice the rise. Then for the 60 degrees simply reverse, rise and run; or take 20 13/16 as rise and across to 12 gives 24 as length. —John Upton.

A HATCHET HINT

While slaters' and composition shingle tools are made of excellent design and material, it is not always that they can be bought or had at the time most needed. Therefore we herewith illustrate a combination hatchet which can be made by any good blacksmith. Usually a lather's hatchet



HATCHET FOR SLATE SHINGLES, ETC.

is preferred, yet any hatchet of medium weight that may be selected will answer. The blacksmith can weld a pointed tong

upon the heel, as at "B," and make a suitable pronged contrivance that may be inserted into the end of handle and secured by a ferrule, as at "C." The heel of the blade may be drawn down to a quarter inch straight sharpened point, as shown at "B."

This will complete a handy tool with all the necessary attributes; i. e., the drive at "D"; nail puller at "C"; punch for nail holes at "B"; slate cutter along the blade of the hatchet; also creaser for splitting composition shingles, such as asphalt and asbestos, which can be done by drawing the cutting edge "A" along a straight edge until the line or groove is deep enough so that the shingle will part nicely by tapping it lightly.

Do not hesitate to have one made when in need of same, as they have been used quite often and the satisfaction given will probably be better than anticipated. However, there is no desire to compare it to factory-made goods with their superior finish—it is simply a handy, home-made tool.—L. S. Bonbrake.

ELECTRIC DRILL CUTS COSTS

Electrically operated appliances are said to be rapidly coming into use in industrial fields, particularly during the present shortage of skilled labor.

In this connection a concern manufacturing electric tools cites an interesting case where an electric drill earned within \$8 of its cost price of \$116 in four days.

In this case a Cleveland manufacturer desired to erect a mezzanine floor, to be

supported by 28 iron columns. To anchor these columns securely at the base, it was necessary to cut square openings, 15 by 18 inches, through the floor, which consisted of seven-eighths-inch matched hardwood laid on two-inch planks imbedded in a heavy concrete base.

Sawing was out of the question. By drilling holes at the four corners and chipping with hammer and chisel, two men took four and two-sevenths hours to cut the first opening. Then it was decided to use a half-inch electric drill, which cut the remaining 27 holes in an average of a third of the time required to cut the first one by hand. Two men would have taken 12 ten-hour days to do the work the electric drill did in four ten-hour days.

The electric drill is said to be frequently used for general millwright work of cutting openings in wood, iron and steel.

AVOIDING EXTRAS

The "extra" is a thorn in the side of every person connected with the building industry. The owner, the architect, the contractor, and the material man are in most cases allied against them, yet one or more extras are almost sure to crop out even on small jobs.

Many architects and contractors assume that thoroughness in the preparation of drawings and specifications will offer ample insurance against extras. This idea is of course a step forward, but it should be remembered that the average owner does not easily grasp the meaning of working drawings and technical descriptions. A little time spent in interpreting the drawings and specifications to an owner will often save endless controversy after the job is begun. In residence work it is necessary to extend this method to include the mistress of the house. She is usually better qualified to pass on the interior arrangement, the position and character of fittings, the sizes of rooms and so forth than is her husband. It is a certain invitation to trouble to attempt to build a house unless the woman who is to live in it has a thorough understanding beforehand of what she may expect.

At least one very successful architect avoids almost all extras on his jobs by compromising or trading. He is often able to cancel the cost of an extra by eliminating or simplifying some other feature. For instance, if an extra electric outlet is requested by the owner, it is often agreeable to all parties to eliminate an outlet that is less necessary, thus balancing the cost.

WHO OWNS THE SALVAGE FROM ALTERATIONS?

A contractor and builder in the Middle West writes: "Recently I did some alteration work on a residence, by contract, which required the removal of some windows and frames, doors being placed in-



Plate 1—Sometimes a stone coping may be replaced by a brick one, thus giving the owner a credit that may be applied against an "extra" somewhere else



Plate 2—In some sections field stones instead of the brick specified, might be used for facing the foundation; the difference in cost to be used in cancelling an "extra" for facing the foundation; the difference in cost to be used in cancelling an "extra"

stead. Nothing was agreed upon or said as to the disposition of the salvage. At the completion of the work the owner was not content that I should claim the salvage. I do not want to be contentious, but I have always understood that unless otherwise agreed upon, that all salvage on completion of the work belonged to the contractor."

Answer—This is a question of the "custom of the trade," which the courts have ruled as understood to be a part of contracts, though not written into such contracts. At the same time the courts have decided that the cases coming under the claim of customs of the trade "must be reasonable." All the circumstances and the character and value of the salvage determine the "reasonableness." It is perti-

nent to inquire how the customs of the trade respecting salvage came about. In all probability it arose from the fact that the work of construction required in alteration work could be done more quickly if little regard was paid to the way in which the old material was torn out, or reduced to rubbish. Thus before materials became so costly a great deal of salvage was given away for the sake of getting rid of the rubbish. So it has come about that what might be reasonable as a custom of the trade in one economic decade might be quite unreasonable in a later economic decade, and the courts would decide the case in all probability on this basis. When making a contract don't leave it half done. Make it to fit all the circumstances. Put it in writing.

TWO REMARKABLE PHOTOGRAPHS

The accompanying photographs are air-plane views of the Wisconsin State Capitol at Madison, Wis., George B. Post & Sons, Architects. Plate 1 gives a general view of this building which has been called the handsomest public building in America.

Plate 2 is one of the most striking photographs ever secured. It was made from a point directly over the pinnacle

may be bought from any dealer and laid with good results on the sheathing or strips of a pitched roof.

"All around" workmen have covered innumerable buildings with these sheets, and when given ordinary care in laying they give the results intended.

In laying, lock cross seams made as shown at "A" and "A" in the sketch, should connect the sheets. The edges at these points are folded forward at the top of

single edge, the end of the anchor is bent up, as at "B," finishing by lapping over the pressed seam, as shown at "C."

If it is desired to nail this seam down, it may be accomplished as shown in Fig. 2, by driving an 8-penny nail between the standing flanges, as described in a former article.

The comb of the roof may be finished neatly by pounding the ends of the standing seam down flat for six or eight inches from the upper end. The first side laid should extend over the comb one inch. When all of the first side has been laid form the one-inch extension back upon itself. Allow the next side to extend over the comb two inches.



Plate 1

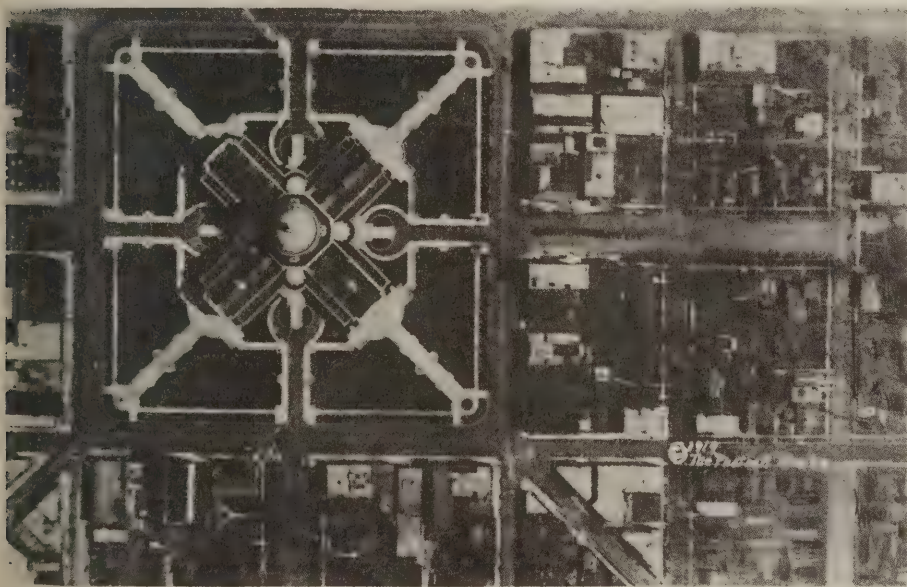


Plate 2

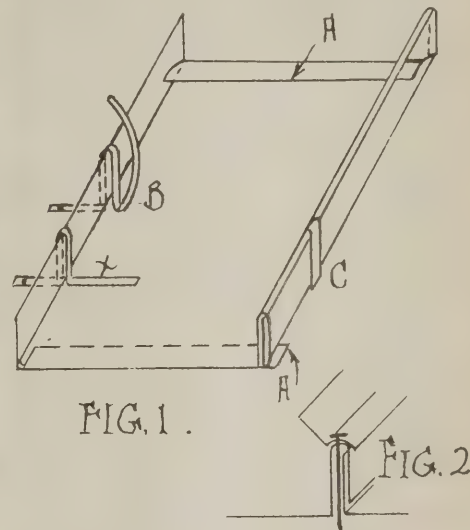
of the dome and has every appearance of being a rendered competition drawing instead of a photograph of an actual building.

PRESSED STANDING SEAM SHEETS

Pressed standing seam sheets may be used when cheaper construction than elaborate double seamed standing seam roofing is desired. Pressed standing seam sheets

the sheet and formed back under the sheet at the bottom. When the sheets are laid in position with the cross edges locked one into the other, the seams may be hammered down tight and smooth.

The standing seams at the sides are held firmly to the sheeting by means of long anchors which are nailed upon the single edged side of the sheet and bent down over the edge, as shown at "X." When the pressed edge has been adjusted over the



Pressed Standing Seam Sheets

When the whole roof has been laid, use the tongs to bend both of the comb extensions straight up, then bend the edge of the higher extension down over the lower one, thus making a standing comb seam of good appearance. To hammer the top of one side down flat upon the other and then nail through the sheets with nail heads exposed is not workmanlike; is unsightly, and will buckle and kink. Being altogether objectionable, it should be avoided.—L. S. Bonbrake.

LEAKS AROUND FLASHING

The origin of leaks encountered in a building are frequently hard to trace. One cause of mysterious leaks has been due to allowing the end of weather boarding to touch the bottom of the metal flashing of an abutting roof, as illustrated by Fig. 1.

Water flowing down the metal flashing of the roof can very easily catch onto the top edge of the weather board, when it extends too far over the flash, as at "X." The water frequently creeps along the top of such a weather board until it reaches an obstruction, such as a stud, when its course will be diverted downward. Then possibly some other obstruction again changes the course of the water, so that when it eventually shows up on the ceiling

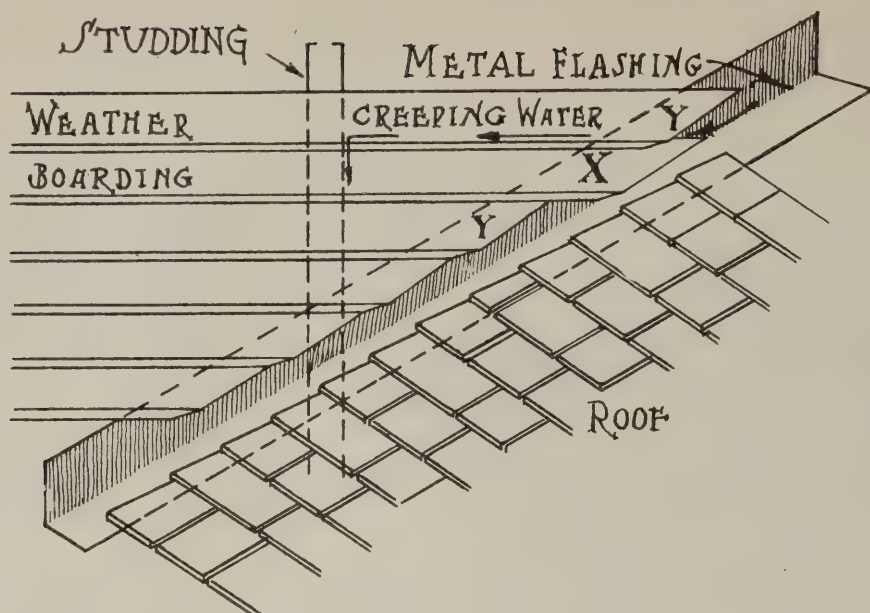


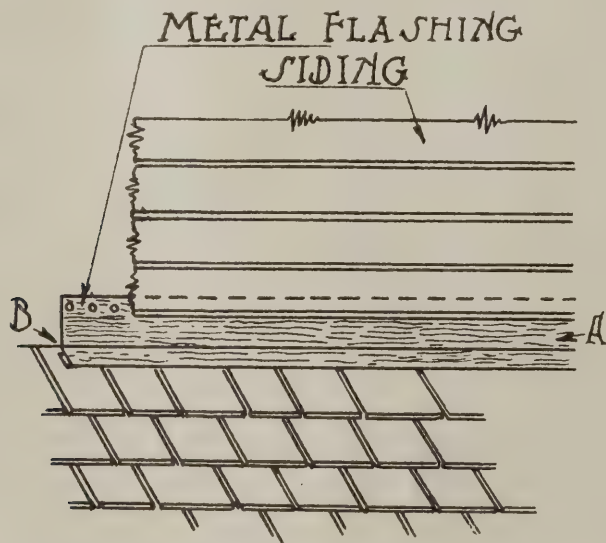
FIG. 1 SIDING ABUTTING SHINGLES

or wall, it is possible that the source of the leak may be hard to find, as it may be located at a considerable distance from the point where the water appears inside of the house.

A leak of this character may be entirely avoided by keeping the ends of the siding well back from the bottom of the metal flash, as shown at "Y" in Fig. 1.

One of the causes of leakage at the

This trouble may be prevented by not dropping the siding down close to the roof flashing. As shown at "A," Fig. 2, a space of between $\frac{3}{4}$ and 1 inch is left between the bottom edge of the board and the bend or corner of the flashing. This will allow the soot and dirt to be easily swept from its lodgement and will also permit painting the metal, which will assure its longevity as a protection against the elements.



SIDING ABOVE SHINGLES.
FIG. 2.

point of contact of a shed roof abutting against the side of a weather-boarded building is due to the fact that soot blowing into the corner of the metal flashing is held there when the siding fits down close to the flashing. By the action of the weather the accumulated soot will turn to an acid which will eat through the metal in short order, thereby causing a leak hard to remedy without taking off the siding.

Note the hem or fold formed on the bottom edge of the flashing strip at "B." This will stiffen the edge, prevent warp or buckle and keep the edge down smooth and firm against the shingles.

USE GOOD TOOLS AND KEEP THEM SHARP

Good tools and good workmen are not enough to satisfy the building superin-

dent who is looking for results. The tools must be kept in the best working order.

It is not enough to have good tools and the skill to use them; they must be sharp. And because good tools may all too easily be made poor ones by bad sharpening, it is well to learn the proper methods. Like their use, there is a right and wrong way to care for them.

It is merely the extreme edge of the tool which is not sharp, a few patient minutes on the oilstone will probably restore it. Grindstones should not be used when the oilstones will do. It is only the nicked blade, the uneven blade, or the blade so dull that the edge is rounded which needs the swifter cutting of the revolving stone.

Remember that each tool has its own particular kind of edge and bevel. A chisel, for instance, has a bevel of about thirty degrees; a penknife may have one which is two or three degrees only; the shape of a hatchet edge is different from either. Therefore, in grinding any edged tool, try to get exactly the bevel which it had when it came from the tool-maker.

Thus "A" shows a chisel normally beveled, and "B" a chisel with a much blunter bevel. The chisel "C" shows most of the bevel of "A" and just a little of "B." Yet while "C" would do better than "B" as a wedge to split wood, it is really no sharper than "B."

To sharpen a chisel or a gouge or a plane-bit on a grindstone, a device is made called a tool-holder, which holds the bit or chisel at the proper angle on the stone. If you have not such a holder, take the bit alone and rest its idle end upon some support close to the stone, so that it leans against it at the proper angle. Return it to this same angle after every examination during grinding, and you will produce the proper bevel with little difficulty.

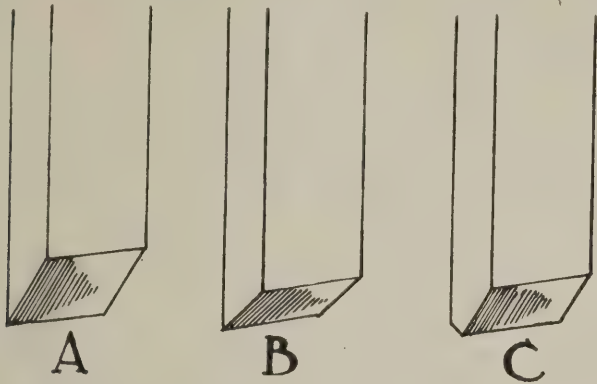
With any grindstone use plenty of water. With an emerywheel, be very careful; cut but a little at a time, and keep your hand on the blade, near its point of contact with the wheel, and do not let it get hot, or the temper will go and your tool will be ruined.

In spite of the fact that water on the grindstone will spatter on you if the stone is turned toward you, and some sort of protection is necessary for your clothes, having it revolve in this way is productive of a better edge for all such fine edges as chisels and plane-bits than when the stone turns away from you. The steel is ground back on the blade and not torn away from it, so that the resulting edge is less likely to be ragged than it would be if the wheel were turned away from you. For axes, hatchets, and such tools as scythes, it makes no difference.

Having a sharp, clean bevel on a bit, chisel or gouge, finish the job on the oilstone. Never put the flat side of chisel or plane-bit to the grindstone, and only on the oilstone with the flat of the blade flat on the stone. Chisels and plane-bits need

one perfectly flat side; to sharpen them with a double bevel, as in "C," is to ruin them for good work.

Pattern-makers frequently use an "inside ground" gouge. The ordinary gouge, how-



ever, is ground and honed only on the concave side, but any "burr" of steel remaining on the concave side can be removed with a slipstone—a little wedge-shaped oilstone with rounded edges, designed for such handwork.

It is also necessary to use a slipstone for sharpening bits of fancy planes, moulding-planes, beading-planes, and other cutting edges which have odd shapes or corners. A slipstone is also the best means of sharpening a draw knife—the knife being clamped in a vise and the stone rubbed on the blade—and in sharpening the cutters of bits for boring holes; these, like the edge of the chisel, must be sharpened only on the bevel; otherwise the bit will not bore true.

Hatchets, axes and other heavy-edged tools hardly need an oilstone finish; the whetstone—often used in sharpening sickles and scythes—can be used to smooth the edge.

In putting any tool on an oilstone, use enough oil to make it rub easily, but do not drench the stone. Rub with a circular motion, and do not rub too hard. It is patience and motion, not pressure and oil, which do the work.—F. H. Sweet.

REPAIRING METAL ROOFS

To redeem a metal roof that has been almost ruined by neglect in painting, sweep its surface thoroughly to eliminate all dust and dirt. Use a wire brush to loosen paint blisters and rust spots and cement the weak places. Where a large hole is found in the sheet, insert a patch, as shown in the sketch.

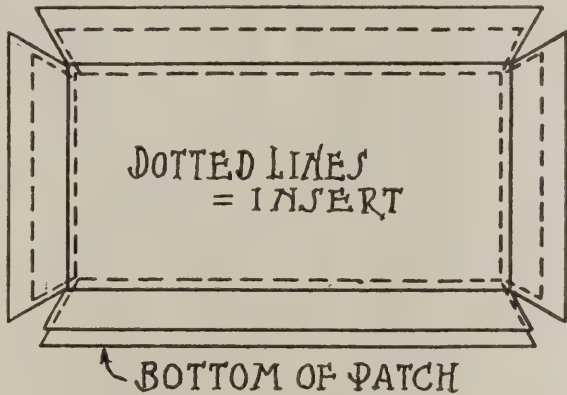
The sketch illustrates an insert made of a piece of sheet iron or steel to be used where a square cornered hole has been cut out around the damaged portion of an old sheet of roofing. The side and top edges of the sheet around the hole are formed up at a right angle 1 1/4 inches high. The bottom edge is 3/4 inch high. The metal insert is now cut to fit snug into these flanges; the sides and top of the insert

being formed up 3/4 inch, with the bottom edge turned up 1 1/4 inches. The top and sides of the sheet flanges are then turned over the insert flanges, while the bottom flange of the insert is turned over the

flange of the sheet. All flanges are then malleted down smooth and tight and then finished with cement.

After the roof has been thoroughly cleaned and bolstered up, use a good paint to coat it—not some coal tar preparation. Coal tar will eat the life out of thin sheet metal.

Use 8 lbs. of oxide of iron to 1 gal. of boiled linseed oil, and nothing else, for



PATCH FOR METAL ROOF

good outside work; keep thoroughly mixed. Spread on the paint with a small (4-inch) brush and brush it in well for best results. Graphite is an excellent filler, while yellow ochre has good wearing and protective qualities.

SETTING UP THE LATHE, WITH WORKING NOTES

When the lathe comes to you it will be covered with a thick, sticky grease which protects it from rust in transit. This grease must be removed with a cloth moistened with kerosene and the bright metal parts polished so that they are not sticky. By going over the lathe once a week with an oily cloth, you will keep all parts bright and shiny, as they should be. If you close up shop for any length of time, go

over the entire lathe with white vaseline, smearing it on thickly. Water poured on the tool will not injure it then.

When you select the spot for the lathe, bear in mind just a few very important points. First is the light; this really should come from over the right shoulder, as it should fall directly upon the work at the point of cutting. If this cannot be arranged, the light may come toward the worker, who will then have to wear a visor to shield his eyes. The least favorable position is to have the light come from over the left shoulder. It merely blinds by reflection and casts a deep shadow at the point where light is most needed. The only alternative is to place a sheet of white reflecting material on a movable arm so that the right is reflected upon the work.

The next consideration is the bench or table upon which the lathe is mounted. This bench should be stiff and rigid to resist the tendency of the lathe to vibrate, especially when running at high speed with a piece of work of unequal proportions (out of balance) between centers. If only a light table is obtainable, it should be braced with crossed wires and spreaders between the legs, and the feet really should be secured to the floor if possible.

This latter is a positive necessity if the countershaft or driving motor is on the ceiling or wall. If the motor is mounted upon or underneath the table, the feet need not be fastened to the floor. The best and most satisfactory bench is one built into the shop. It may be crude, but it must be stiff and level; even though the ceiling, floor and walls are out of true, see that the lathe bench and all brackets, supports, etc., carrying running machinery of any kind are quite level.

The left-hand end of the lathe should be unobstructed so that material may be passed through the live spindle. See also that there is enough room in back of the lathe to permit a circular saw to be used with effect. This is one objection to the use of a bench against the wall, as I have

it. I cannot use the saw table to the full advantage except for short pieces.

Set the lathe up with the largest screws that will pass through the holes in the feet, or, better still, use flat-head bolts passed through holes in the bench with nuts and washers underneath. Arrange all of your tools, attachments, etc., on ledges and shelves within easy reach, and bear in mind constantly in placing these shelves that the entire bench all around the lathe becomes literally snowed under with chips and shavings when you do wood turning. It is far better to have the tool shelves slightly beyond reach of the shower of chips, as it will save many minutes in cleaning up.

Make sure the lathe bed is parallel with the drive shafting. To line-up countershaft or line shaft pulleys with those on the lathe, simply tie a plumb line to the upper shaft and slide it along until the bob comes to a standstill directly beside the lathe pulley cone. If line shaft, countershaft and lathe have been properly mounted in parallel and perfectly level, you will have no trouble with belts running off. The final adjustment of the pulleys will make them ready for belting.

In placing belts, put the shiny side of the belt next to the pulley. The rough side will not pull nearly so well, as its uneven surface produces a myriad of air pockets which prevent traction.

To lace the belt ends, cut the belting with a sharp knife against a try square, as the ends must be square, cutting the belt $\frac{1}{4}$ -inch shorter than you can stretch it by pulling the leather over the pulleys. Then punch or drill three small holes in each belt end, making sure the holes are opposite each other. Pass a piece of soft iron or brass wire, of about No. 22 gauge for a one-inch belt, through one hole at the edge, then through the corresponding hole in the opposite end of the belt, making sure the belt is in position so that you do not find that you have laced it without having passed it under the cone pulley on the lathe. Draw up the wire and pass one end through the next hole, crossing over on the rough or outside of the belt. Pass through the opposite hole and over to the third pair, crossing again on the rough side. Draw up tight and pass through once more to give a double thick lace on the side next the pulley. Cross back to the center pair of holes and pass under again. Then cross to the first pair of holes, pass under and up through, and you will have two ends of wire to link together on the rough or outside surface of the belt. The smooth side, next to the pulley, will have no cross over laces to wear through after a short period of use.

The tyro will first perform the operation known as "scraping" by the skilled worker, who looks askance upon this form of turning. It is, however, safe and easy in the hands of the unskilled, although it is infinitely slower, less efficient and pro-

ductive of poorer results than the true wood turner's cut, which is more of a chisel or knife-edge cut. The latter is somewhat dangerous in the hands of a novice, as the tool is almost sure to "bite" or grab into the wood if it is not held properly. As this feature of woodworking is worthy of an article in itself, I cannot well cover it herewith and shall have to let the simple (and despised) scraping cut suffice for the present.

For scraping tools the use of old flat files ground practically square on the ends is recommended. Such a tool, when brought up to a piece of wood in the lathe and supported upon the tee rest, which should be just as close to the work as possible, will scrape off stock at an astonishing rate. For roughing off the surplus stock a turner's gouge is used as a rule. This tool may be used with comparative safety by the novice if he is careful to take the light cuts and to grip the tool firmly, using his forearm to hold down the long handle. The finishing cuts are taken with what is known as a skew chisel (the cutting edge is askew), but the use of this tool is not recommended unless the worker can get some instruction in its use. It will bite fiercely if not used properly, and if it does nothing worse, it may spoil a piece of nearly finished work.

These directions for the use of the turning tools are mainly suggestive. Those requiring further information may be supplied in another article.—*F. H. Smart.*

CONTRACTORS START OWN QUIZ ON HIGH COSTS

A committee to investigate the high cost of construction material, and, if conditions warrant, to request the assistance of the federal trade commission, was appointed April 24 by representatives of leading construction firms of the country at the conclusion of a two-day conference. The conference was called by the Associated General Contractors of America for the purpose of "getting to the bottom" of prevailing conditions.

W. A. Rogers, Chicago, president of the Associated General Contractors of America, said "the leading construction firms of the country have come to the conclusion that the contractors should no longer 'pass the buck' to the ultimate consumer, and therefore must take determined action."

Those who attended the conference include Alfred Bent, Los Angeles; Thomas Bentley, Toledo, O.; F. L. Granford, New York; J. H. Ellison, Minneapolis; Charles Folliott, St. Paul; T. T. Flagler, Atlanta, Ga.; A. P. Greensfelder, St. Louis; Noble F. Hoggson, New York; Edward Haupt, Chicago; G. O. Muhlfeld, Boston; E. J. Mullen, Cleveland; E. J. Thomas, Memphis; L. C. Watson, Boston; George Watson, Dallas; W. O. Winston, Minneapolis, and W. E. Wood, Detroit.

A CONTRACTOR WHO "TOOK HOLD"

Some years ago a contractor friend of mine was building a schoolhouse in a New York suburban town. Five miles farther up the railroad was a village which had lately passed through a real estate boom and been invaded by commuters. The villagers were chiefly old people, retired farmers and the like, owning their little homes, tilling their little gardens, and living comfortably on a very narrow margin. Their children had all grown up, married and gone away. The commuters were young people with children. The only schoolhouse was a fire trap, too small for the new arrivals.

The newcomers proposed a \$50,000 brick schoolhouse. This alarmed the old folks, who feared that such an expenditure would bring high taxes and upset their tidy way of living. Some actually believed that taxes would take their homes. The proposition came up in a village meeting. The old folks swarmed out and voted it down.

The commuters were discouraged. At this point my contractor friend stepped in, told them that in no instance had a community in that state ever refused funds for modern school buildings, and showed them a way in which the proposition could be brought up again in town meeting. By this time the old residents had got over their fright, knowing that they controlled the situation. At the second meeting the contractor spoke, showing by figures that the actual increase in taxes would not be alarming, and that moreover the new residents who needed this school were raising property values, so the burden would be widely distributed. The project then went through with a big majority. Incidentally the contractor got the construction job, but that was not his motive. As a citizen-at-large with practical experience in the problem that community faced he volunteered to help them with his counsel; and that, to my way of thinking, is real citizenship and real government. When the schoolhouse was finished the old residents were more proud of it than the commuters with children to educate.—*Saturday Evening Post.*

Electrician's Handy Book, by Prof. T. O'Connor Sloane, A.M., E.M., Ph.D.; 825 pages; 600 engravings. Semi-flexible leather binding, pocket book style. Price \$4. The Norman W. Henley Publishing Co., 2 West Forty-Fifth Street, New York. What "Kidder's" or "Walker's" is to the builder, "Sloane's" is to the electrician; the revised and enlarged edition of which for 1920 has been issued. It covers the entire field of electricity, from the A B C of the subject advancing gradually to the more advanced branches. It is written in a clear, easily understandable manner so that any reader of average intelligence can obtain a fair working knowledge of practical applied electrical science.

Miniature Buildings Show Farmstead Arrangement--By Ivan D. Wood

THAT you can show people more easily than you can tell them has been proven at the University of Nebraska, College of Agriculture, so far as the arrangement of farm buildings is concerned. A complete farmstead made up of miniature structures

of a monolithic concrete silo shows over the open shed.

Figure 2 shows the house in the distance. Cornice, porches, window frames, inside finish and even the lath have been carefully made and assembled by students. Looking

of the roof gives an idea of its size. Other buildings not shown in the picture are: The machine shed, the hay shed, poultry house and a combination granary and corn crib. Each is complete and is carefully bolted to a concrete foundation.

The grounds about the buildings are fenced with miniature fences and have been planted with shrubbery which is kept carefully pruned to keep it from becoming out of scale with the buildings. An orchard and vegetable garden are featured.

Thousands of people view the little farmstead each year. Figure 1 shows a farmer who had just finished a tour of inspection. He secured blueprints of several of the buildings from the engineering department and stated that he expected to build soon. The actual construction of the buildings gave hundreds of farm boys the elementary knowledge of carpentry which has proven of great value to them.

The Housing Book is the title of a new book of reproductions of workmen's homes, one- and two-family houses of frame, brick, stucco and concrete construction, and four-, six- and nine-family apartments, showing single houses, blocks of houses, groups and developments at Beloit, Wis.; South Philadelphia, Pa.; Claymont, Del.; West Collingswood, N. J.; Erie, Pa.; Akron, Ohio; Craddock, Va.; Bristol, Pa.; Bridgeport, Conn.; Truxton, Va., and Donora, Pa. It has 132 pages, 8½ by 11 inches; 150 illustrations and plans. Price, \$3. The William T. Comstock Co., 23 Warren Street, New York, publishers.



Plate 1—These buildings are on the campus of the University of Nebraska College of Agriculture. They are ¼-inch scale but are complete in every particular as models in equipment and arrangement on the model farmstead representing a 160-acre farm

has been built on the campus under the direction of A. A. Baer, who is in charge of woodwork and carpentry.

The arrangement of the farmstead represents that of a 160-acre, general purpose farm of the central west and is designed for a north facing. In making this arrangement many factors have been taken into consideration; such as the placing of certain buildings on the west and north side of the lots to form a protection and windbreak in the winter and the locating of the house so that odors from the barn will not reach it. Then there is the matter of proper slopes for drainage of yards and lots. A special study was made of the placing of each building with respect to the yards, feeding floors and other buildings, to promote efficiency in doing chores. The arrangement represented in this miniature farmstead is known as Nebraska Farmstead No. 1 and was developed by Professor L. W. Chase after an extensive study of the subject under actual farm conditions.

The little barn shown in Fig. 1 is made to a one-fourth scale but is complete in every respect. It is equipped with stalls, calf pens and feed rooms. None of the details have been slighted. The studding, siding, plates, floor joist rafters and all other framing are made to scale. The top

through the tiny windows one can see the interior arrangement, halls, closets, bedrooms and a stairway with a 1¾-inch rise and a 2½-inch run. The level siding and flooring were made by sawing larger boards into strips of the proper size. The finishing and grooving was done with planes.

In the foreground of Fig. 2 is shown the hog house. The cap hanging on the comb



Plate 2—This shows the hog house. The cap hanging on the comb of the roof indicates its size. The farmhouse is shown in the distance

Moving Picture Theatres

IN THE November, 1919 issue of NATIONAL BUILDER some features of moving picture theatre design were discussed. In that article reference was made to the location of the building and to safety measures, such as open courts, fireproof passageways and so forth. The present article will therefore begin with the planning of moving picture theatres.

In many respects the planning of moving picture theatres is quite similar to that of a regular theatre. There are, however, certain differences that should be consid-

ered. For one thing, the distance from the stage curtain or screen to the rear line of seats is, in the case of regular theatres, governed by the ear; while with picture houses the distance is governed by the eye. That is, the clear range of the average stage voice is limited to about 75 feet, while a projection machine has a "throw" of about 150 feet.

It should also be understood that the image on the screen is distorted when viewed from an angle, as from side seats, and that seats near the screen are less

desirable than are those farther back, where vibration and distortion of the image are less noticeable. Therefore, boxes and loges should be placed say 75 feet from the screen whenever practicable and should not be placed along the sides. No seats should be placed nearer than 10 feet from the screen. Generally speaking, the width of a picture house should not exceed one-half its length; on the other hand, a regular theatre usually approaches a square in plan. Thus it is evident that deep narrow lots such as are common to our business districts are especially fitted as locations for moving picture theatres.

Extremely long, narrow picture houses, however, are not desirable, as they usually have a tunnel-like appearance that is displeasing to many people. It cannot too forcibly nor too often be brought to the attention of owners that "feature" pictures alone will not make a picture house successful; the house itself must be suited to the convenience and the comfort of the public. If more attention were given to the proper design of picture houses there would be fewer failures in the business and also a larger number of movie patrons to serve.

In the ordinary theatre the greatest fire hazard is at the stage end of the building, practically all theatre fires originating on or about the stage. With the picture house, however, the location of this hazard is reversed, being located at the projection booth. For this reason some picture houses have been planned with the projection booth at the rear of the building, and the screen at the entrance end. Thus the audience, when seated, faces the entrances and the danger of panic arising from a fire in the booth is held to be lessened. This arrangement, however, is open to the objection that the attention of the audience is more or less distracted from the screen by the almost constant stream of arriving and departing "movie fans," who are passing through the entrances in front of the audience.

In view of the present efficiency of automatic doors and shutters with which all openings, in properly designed booths, are equipped in order to prevent any smoke or flames from being visible outside of the booth, it seems that the placing of the booth at the rear of the house has little to commend it except its novelty. It is the sight of smoke or flames, and not merely their proximity, that excites crowds to a condition of panic.

The Liberty Theatre, which is illustrated in this article, was designed by Frederic E. McIlvain, architect, and was built for the Overland Amusement Company of Kansas City, Mo., by the Swenson Construction



Plate 1—The Liberty Theater, Kansas City, Mo., Frederic E. McIlvain, Architect.
An attractive example of polychrome terra cotta design

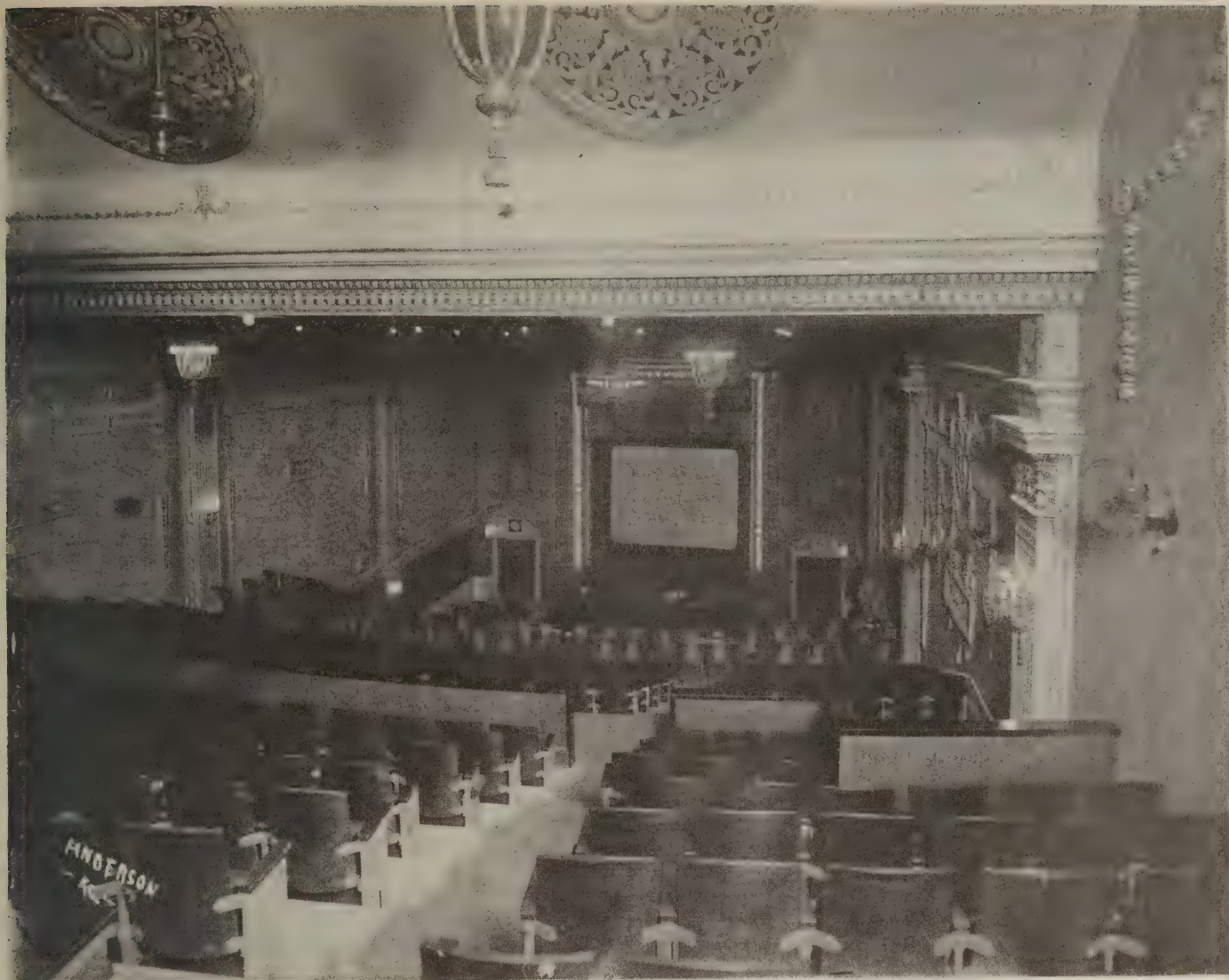


Plate 2—Interior of the Liberty Theatre. The photograph does not do justice to this well designed interior

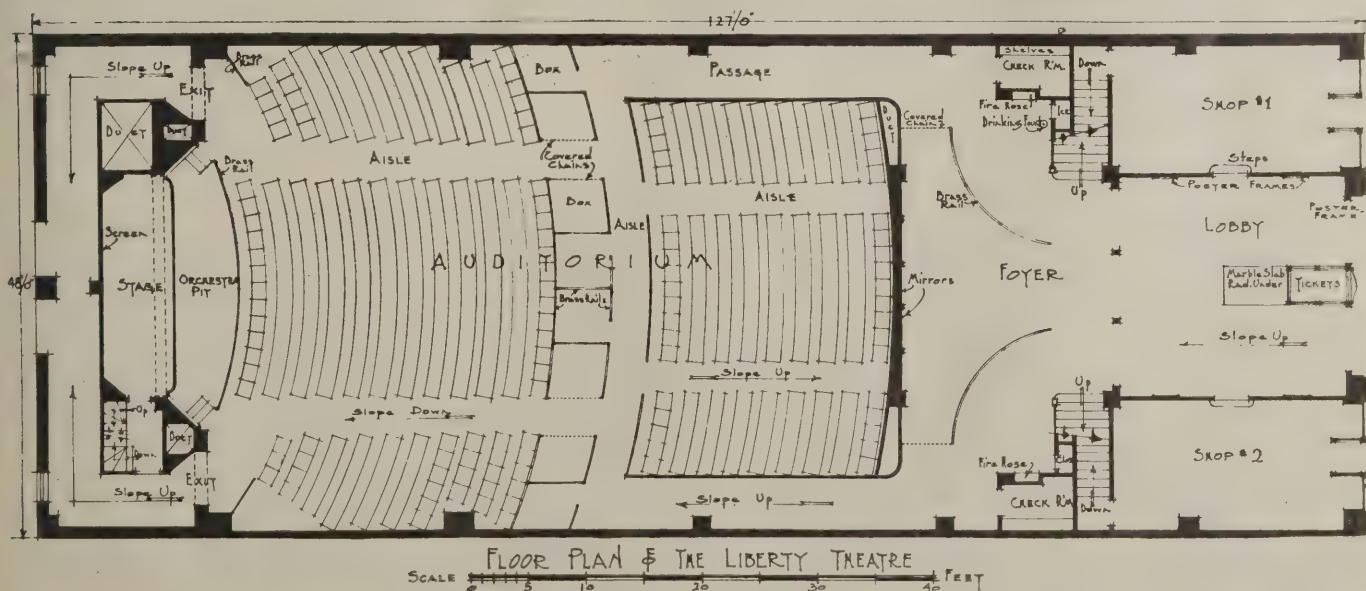


Plate 5—First floor plan of the Liberty Theatre

Company. It is an attractive example of a picture house of the better class.

The front is of ornamental terra cotta and is rendered especially interesting by the use of color. The body color is old ivory and is enriched by the polychrome ornament in which browns and greens predominate. The flame ornament in the arch panel is also of terra cotta executed in

red and yellow. The treatment of the upper portion of the wall, around the cornice, is very rich and effective, without appearing gaudy on the one hand nor too dignified on the other. This feature alone would give the building a distinctively Italian character.

The plan is arranged with a small shop on each side of the lobby. Small shops

such as these are in much demand by florists, candy stores and so forth. The lobby and shops have tile floors and marble bases. Poster frames are provided on the piers at the side of the entrance and on the walls of the lobby. This is a wise provision, as the average exhibitor is no respecter of fitness and is apt to spread posters promiscuously over every available surface.

The lobby leads into the foyer, which contains a small check room at each side. The foyer also contains a space where patrons may wait when the house is crowded. This space is surrounded by a brass rail and has mirrors against the wall. A space similar to this would be useful in a "family" theater for parking baby cabs.

The auditorium seats about 475 persons, including about 40 box seats. Emergency exits are placed on each side of the screen at the rear. The jog which appears in the main aisles would not be permitted by many building codes, most of which require that aisles lead directly to the main exits. It is also considered good practice to provide a cross aisle behind the rear seats.

The orchestra pit is two feet below the adjacent floor level and is provided with a wooden floor to preserve the musical tones. The stage portion is made only large enough to form a frame for the screen, with a small platform for the use of singers.

The stair at each side of the foyer leads to the mezzanine floor, which contains the manager's office, rest rooms for women, smoking room for men and a parlor. Tunnels with inclined floors lead from the mezzanine floor to the balcony.

The balcony contains about 375 seats with a row of boxes along the front. The projection booth is located at the rear of the balcony.

The interior is very attractively decorated with ornamental plaster, handled with more restraint than is common to most picture houses. This interior treatment is an example of the fitness of quality rather than quantity.

How to Use Cement for Concrete Construction, including formulas, drawings, and specific instructions, to enable the reader to construct farm and town equipment. By H. Colin Campbell, C.E., director editorial and advertising bureau Portland Cement Association, contributing editor to numerous farm, trade and technical periodicals. This work is authoritative. It is written in an easy, simple and explicit style, dealing with the subject matter in progressive, topical order, with a well-arranged and complete index. Mechanically the book is unusually well made, printing and binding expressing simplicity, utility and good taste. Its 380 pages are freely illustrated with reproductions from photographs, line drawings and plans. Stanton and Van Vliet Co., 501-509 Plymouth Place, Chicago, are the publishers. The price is \$2.

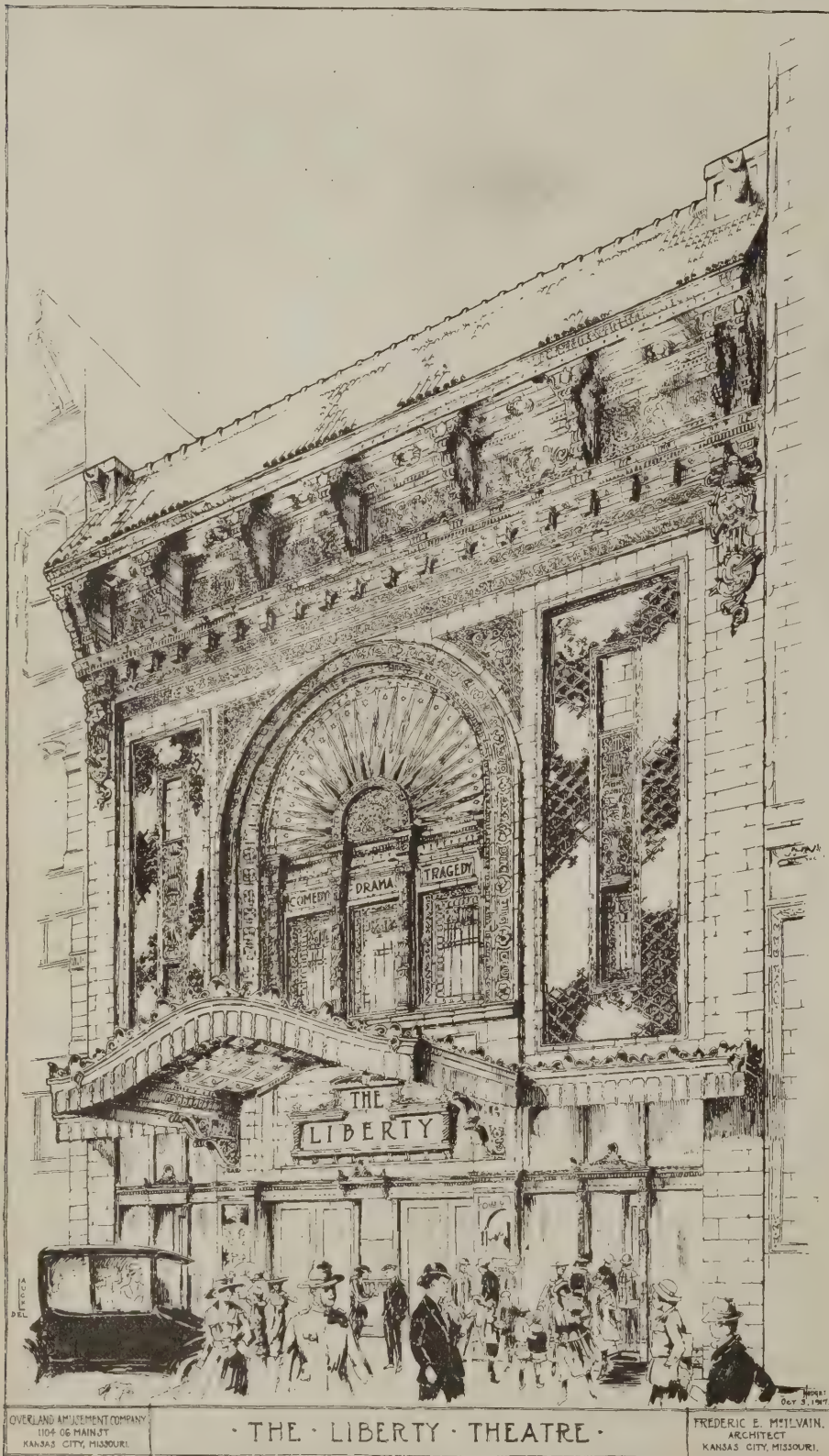
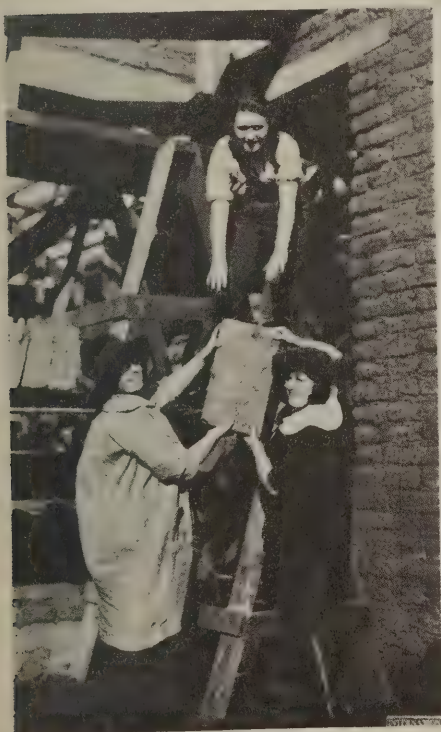


Plate 3—Much of the pleasing quality of this sketch is lost in the small reproduction. The original measures two by three feet

Adobe Houses

Copyright by International News Service



THAT sun-dried bricks, of which the old California mission houses were built, are practical in a dry climate, the existing types of these structures are said to prove. The illustration at the top of the page shows a structure of this material finished in stucco plaster. At the foot of the page is shown a building of adobe in process. Both structures are located in Huntington Park, near Los Angeles. The enterprising "movie man" has posed some of his girls as home builders. These young ladies are substituting for the regular workers, who possibly have gone to lunch or are helping the director to run the show at \$? an hour when they ought to be charged double time for the sake of the spectacle—though they can see the whole works, and some of the girls messing up the mud and straw to make the bricks at the movies, later on, for two bits plus the war tax.



Rate of Wages Per Hour

THIS TABULATION OF WAGES BEING PAID MASONS, BRICKLAYERS AND CARPENTERS IS TAKEN FROM THE COMPLETE TABLES COMPILED AND ISSUED BY E. M. CRAIG, SECRETARY OF THE BUILDING CONSTRUCTION EMPLOYERS' ASSOCIATION OF CHICAGO

City	Masons and Bricklayers	Carpenters	Laborers	Hod Carriers
Aberdeen, S. D.	m. \$0.90, bl. \$1.25	\$0.75, \$0.80	\$0.50	\$0.60
Akron, Ohio	m. 1.00-1.10, bl. 1.00-1.25	.75, .90	.45, .55	.60, .75
Albany, N. Y. (1)	.87½	.75	.50	.50
Alton, Ill.	m. .75, bl. 1.00	1.00	.62½	.70
Atlanta, Ga.	m. .65, bl. .90	.75, .85	.35, .40	.35, .40
Baltimore, Md.	m. .75, bl. 1.00	.80	.35, .40	.62½
Birmingham, Ala.	m. .75, bl. .87½	.65	.50	.50
Boston, Mass.	1.00	1.00	.62½	.70
Buffalo, N. Y.	1.00	.80	.40, .50	.40, .50
Burlington, Vt.	.75	.87½	.43 6/7	.43 6/7
Butte, Mont.	1.00	1.00	.62½	.87½
Cedar Rapids, Iowa	1.00	.87½	.47½	.58¾
Chicago, Ill. (2)	1.	1.00	(8)	
Cincinnati, Ohio	m. .80, bl. 1.00	.75	.40, .50	.65
Cleveland, Ohio	1.00	.90	.57½	.57½
Dallas, Texas	1.12½	.87½	.50	.50, .60
Danville, Ill.	.87½-1.00	.80	.40, .50	.50
Davenport, Iowa	1.00	.85	.45, .55	.45, .55
Dayton, Ohio	m. .80, bl. 1.00	.75	.45	.65
Decatur, Ill. (1)	.87½	.75	.40	.50
Denver, Colo. (3)	m. 1.00, bl. 1.12½	1.00	(9)	(9)
Des Moines, Iowa	1.00	.80	.52½	.62½
Detroit, Mich.	1.25	.90, 1.00	.70, 1.00	.70, 1.00
Duluth, Minn.	m. .90, bl. 1.00	.70, .80	.45, .50	.45, .50
East St. Louis, Ill.	1.25	1.00	.60	.82½
Edmonton, Canada	m. .90, bl. .95	.70	.50	.55
Fort Wayne, Ind.	1.00	.90	.57½	.62½
Galveston, Texas (4)	1.12½	.87½	.50	.50
Gary, Ind.	1.00	1.00	.65	.70
Grand Rapids, Mich. (1)	.85	.70, .75	.40, .55	.45
Great Falls, Mont.	1.12½	1.00	.62½	.87½
Hartford, Conn.	1.00	.87½	.60	.65
Indianapolis, Ind. (5)	1.00	.75	(10)	(10)
Kansas City, Mo.	m. .87½, bl. 1.00	.85, .90	.57½	(11)
La Fayette, Ind.	1.00	.70	.50	.70
Los Angeles, Calif.	1.00	.68¾, .75	.37½	.75
Louisville, Ky.	m. .85, bl. 1.05-1.10	.70	.35, .40	.55, .60
Memphis, Tenn.	1.00	.75, .85	.30, .35	.50, .65
Milwaukee, Wis. (1)	.90	.70	.50	.62½
Minneapolis, Minn.	1.00	.75	.50	.60
Montreal, Canada	m. .45-.55, bl. .60, sewer 70	.45, .60	.33⅓	.35, .40
New Orleans, La. (6)	.75	.70	.30	.40
New York, N. Y. (7)	1.06¼	1.00	.68¾	.75
Oklahoma City, Okla.	m. 1.00, bl. 1.25	1.00	.62½	.75
Omaha, Neb.	1.25	.90	.60, .65	.70
Peoria, Ill. (1)	1.00	.87½	.40, .50	.56
Philadelphia, Pa.	m. 1.00, bl. 1.10	.80	.40, .50	.55, .70
Pittsburgh, Pa.	m. .85, bl. 1.12½	.90	.50	.70
Pittsfield, Mass.	1.00	.75	.45, .50	.62½
Portland, Ore.	1.12½	1.00	.75	.87½
Providence, R. I.	1.00	.90	.50, .65	.60, .70
Racine, Wis.	1.20	.80, 1.00	.60, .75	.60, .75
Rochester, N. Y. (1)	.87½	.80	.50	.50
Salt Lake City, Utah (1)	1.00	.82½	.50	.68¾
San Antonio, Texas (1)	m. .87½, bl. 1.00	.75	.30	.37½
San Francisco, Calif.	1.12½	1.00	(12)	
Scranton, Pa.	m. .95, bl. 1.00	.70	.58	.58
Seattle, Wash.	1.12½	1.00	.75	.87½
Spokane, Wash.	1.12½	.87½	.62½	.75
Springfield, Ill.	.87½	.75	.45	.55, .60
St. Louis, Mo.	m. 1.00, bl. 1.12½	1.00	.57½	.70
St. Paul, Minn.	1.00	.75	.47½	.55
Tacoma, Wash. (1)	1.12½	1.00	.68¾	.87½
Terre Haute, Ind. (1)	1.00	.75	.40	.62½
Toledo, Ohio	.90	.85	.60, .65	.80
Toronto, Canada	.90	.75, .80	.40	.45
Troy, N. Y.	.87½	.70	.35, .45	.50
Vancouver, B. C. (1)	.87½	.75	.50	.62½
Washington, D. C.	m. .87½, bl. 1.00	.95	.40, .45	.62½
Wheeling, W. Va.	1.00	.95	.45	.56¼
Wilmington, Del.	1.00	.85	.45, .50	.60
Winnipeg, Man.	1.00	.75	.45	.55
Youngstown, Ohio	1.05	.90	.45, .55	.70

1—1919 rates. No returns for 1920.

2—Tile layers, \$1.02½.

3—Bricklayers ask \$1.25 for brick; \$1.37½ for tile.

4—Masons and bricklayers demand \$1.37½.

5—Masons and bricklayers ask \$1.25.

6—Masons and bricklayers ask 87½c; carpenters, \$1.00.

7—Masons and bricklayers demand \$1.25.

8—Building laborers, 70c; plasterers laborers, 76¼c.

9—Common labor, 50c; mort., 71¼c; hod carriers, brick 68¼c, plaster 75c.

10—50c, not organized; hod carriers, 60c; ask 82½c.

11—Hod carriers, brick 62½c, plaster 68¾c.

12—Common labor, 62½c; concrete, 87½c.

Simplified Housing



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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of National Builder published monthly at Chicago, Ill., for April 1, 1920.

State of Illinois, County of Cook, ss.

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared Geo. P. Miller, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the National Builder, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Trade Press Publishing Corporation; Editor, A. H. McQuilkin; Managing

Editor, A. H. McQuilkin; Business Manager, Geo. P. Miller, all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Trade Press Publishing Corporation, individual stockholders: W. D. Callender, T. J. Sullivan, Geo. P. Miller and N. C. Rockwood, all at postoffice address, 542 S. Dearborn St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of

the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

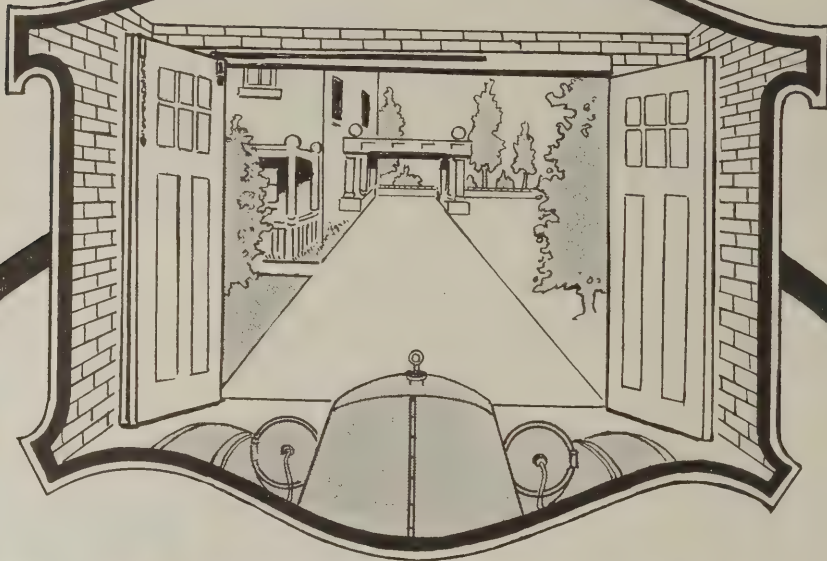
5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only.)

(Signed) GEO. P. MILLER

Sworn to and subscribed before me this 1st day of April, 1920.

MABEL OLSEN, Notary Public.

(My commission expires April 12, 1922.)
Form 3526.—Ed. 1916.



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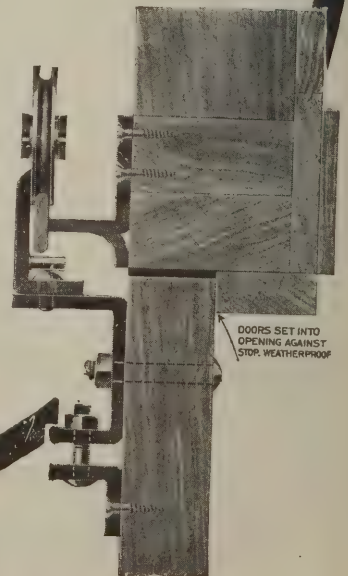
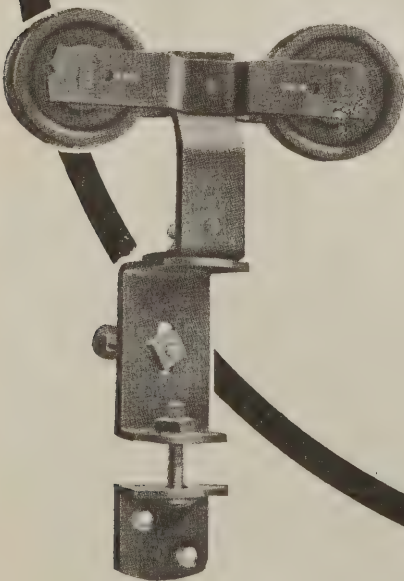
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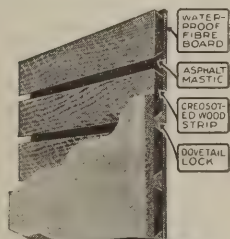
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NATIONAL BUILDER

Volume 63

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Number 6

The Situation

IN THE face of the almost insurmountable difficulties of high and unstable labor and material costs and shortages due to decreased production and inadequate transportation construction reports for April indicate an increase of 25 per cent over March and a gain of 115 per cent over April, 1919, residential projects leading.

In a carefully prepared review, Morton C. Tuttle, secretary of the Aberthaw Construction Company, of Boston, Mass., under date of May 18 gives statistics to prove that the enormous building program for 1920 far surpasses all previous records.

The April increase, notwithstanding rising costs, is obviously the result of the enormous demand. The policy of paying any price asked and passing the cost along to the consumer has been followed to the limit.

That limit is the refusal of bankers to loan money on construction work being done at inflated costs.

What is in the minds of builders and those who finance buildings is indicated by the views expressed in the interviews hereafter.

Building will go on more or less vigorously, for there will always be a considerable percentage of conditions in which cost is a secondary consideration to the need—to those who have the money.

Three Checks to Building Operations—Viewpoint of a Middle West Building Contractor

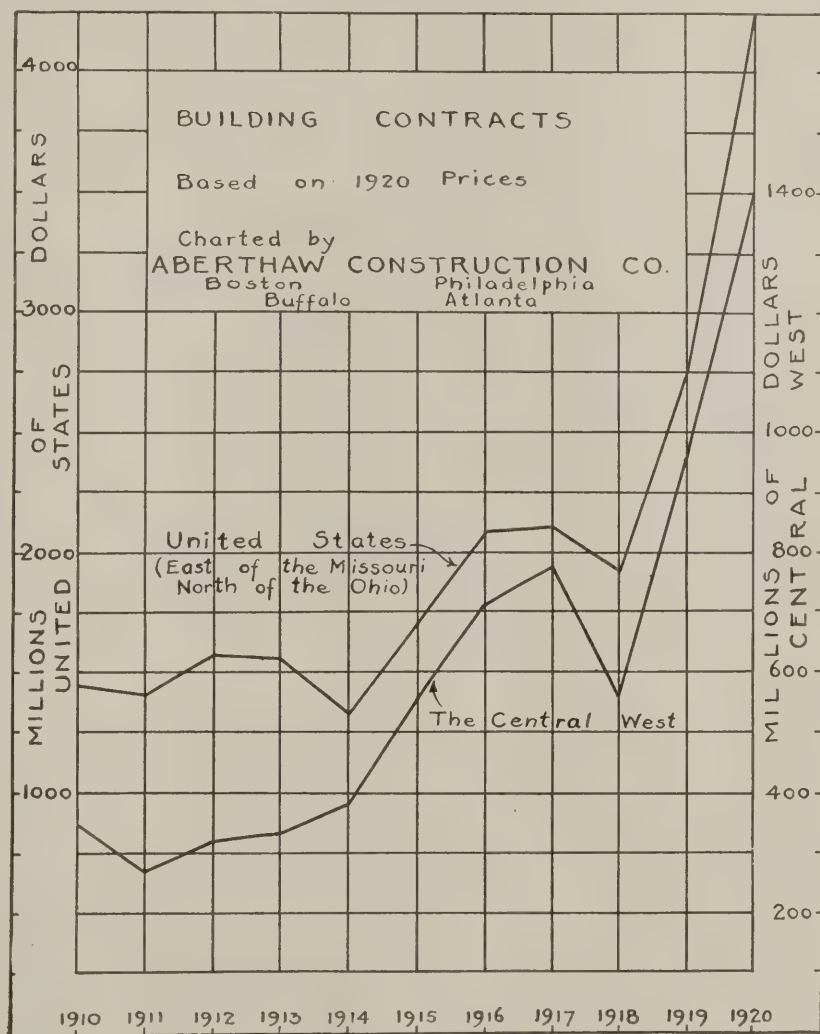
One of the biggest building contractors in the Middle West, one whose work is mainly the erection of structures costing hundreds of thousands of dollars or millions of dollars, said:

"No, I will not permit you to use my name at this time in an interview as coming from me. The situation in the building line is so delicate that anything I would say might come back to me and create an uproar among the other business men with whom I have to deal. Even a short truthful article in a daily paper the other day had that effect. Now is a time when every man connected with the building industry should take heed to what he says, and often it is better for him not to talk at all.

"As I see it, the present situation in building is due mainly to three things. One of these is the tyranny of the labor unions, which are making excessive demands and which precipitate strikes now in one line and now in another, till a building contractor is no longer able to estimate what any job will cost. The result is that things are kept stirred up and the whole building

or that is not, as they say, union made. That prevents us from buying material where we could buy it at a fair price instead of at an excessively high price.

"The third factor is the combination that exists among the dealers handling some lines of building material by which a uniformly high price is made, but it is always practically the same price. I have told



outlook placed in an uncertain state. While the effect on the men is to keep them in a mood to do less than a fair day's work, I am in favor of labor unions, but not in favor of many of the things the labor unions are doing.

"The second great thing is the fact that the union laborers will not handle material that does not come from certain companies

them in their meetings that this policy of fixing a price is all wrong and is also contrary to the laws of this country. I have warned them that they are laying themselves open to prosecution by the government for thus acting in restraint of trade."

"They reply that they want to make some money. Well, I want to make money also; but I want to do it in a fair way and in

accord with the spirit of our laws that are made to prevent this very practice of price fixing.

"The fact that these things are not secret, that they are generally known by the people, is one reason why it is so difficult to finance new building operations or get people to put money into buildings at the present level of prices for material and labor."

Some Problems in Financing House Building

One of the most extensive builders of houses in Chicago and vicinity is William Zelosky, who has been engaged in this work for more than twenty-four years.

"I have been building houses in Chicago since 1896," said he to a representative of NATIONAL BUILDER. "In 1897 you could build a good brick cottage for under \$1,400 and in the earlier years I put up cottages for that sum and down as low as \$1,250. Each cottage was about 21 by 34 feet on the ground, had several good sized rooms below and two finished off in the attic. The lot usually cost around \$1,000, making the whole cost about \$2,400. After those cottages have been lived in for twenty-four years, some of them are now being sold for \$4,000. The conditions existing at that time have a bearing on the present condition, when it is so extremely hard to finance the building of a house.

"For, in those days the people had a chance to build houses for themselves at a low cost. If the tenants of Chicago are now in a bad way for a place in which to live, many of them have only themselves to blame for it. During those years when they could have built, many of them were saying to us and other builders, 'We would not think of building; for it is cheaper to rent than to own a home.' Now the rents have gone up on them and the cost of building material and of labor is so great that many of the renters can no longer afford to build.

"With the increased cost of building has come increased difficulty in financing building operations. In the past it was our practice to take first mortgages to the amount of 50 or 60 per cent of the value of the property. The balance of the money was easily provided by the men for whom the houses were being built. In those years the market for securities in Chicago readily absorbed all first mortgages, provided they were not over 60 per cent of the valuation. But even during such years I made of my mortgages only 50 per cent of the valuation.

"But now all that is changed and the banks will not take mortgages that are based on more than 40 per cent of the valuation. That course is being followed not only by banks, but also by the individual buyers and the individual buyers are a big factor in the mortgage market.

"The reason for this decrease in mort-

gaging power is that builders expect to see building values come down about 20 per cent.

"Within what time?"

"That is the question; it may be two years; it may be five years.

"At the present time my mortgages are being made on 40 to 45 per cent of the valuation. People that buy mortgages at this time can't get away from the old idea of mortgages based on the values of three or four years ago. Until that psychological condition of mind is changed most building will be a cash proposition, as it has now largely become. Builders now have to pay cash for material, if they get it, and, of course, they have always had to pay cash for labor.

"I have built as many as 200 houses in a year, but at the present time we are building nothing. We have most of the building material for fifty houses, but we can't get any sand, in spite of the fact that the whole lake shore is a mass of sand. Most of the lake frontage is now owned by private people and they will not permit any sand to be hauled away. And this is a factor that enters into financing, for it is an unknown expense that cannot be foretold, and one of the great things that hurts the building work is the fact that builders cannot guarantee to construct a house at any particular price.

"In relation to the financing of building operations at present, one important point must be kept in mind, and that is: With the increased cost and the small amount of money that can be obtained on the first mortgage, a big gap is left in the money requirements, for all of this money must be provided for before the work can proceed. The inability to do this is a large cause in the stagnation in the building business.

"Some provision must be made for raising a part of this money by means of a second mortgage, either by government action or by a combination of banks. At the present time in Chicago there is no sale for second mortgages. This is due to the fact that values are considered too high to make a second mortgage safe for investment.

"In getting money for the building of many houses we are hampered by the fact that the Illinois law does not permit a corporation to own real estate in excess of its own needs. Therefore all business such as I am doing must be done personally; otherwise we might raise money for building by organizing a corporation and selling stock for the purpose of buying land and building houses on it. The law, of course, exists for the purpose of preventing the land passing into the possession of the big corporations; but, while it doubtless protects the people, it hampers the building of houses."

Underbuilding Residences: Overbuilding Factories

"There are many factors that are affecting the financing of house building at the present time," said H. J. Hoodwin, a building contractor of Chicago.

"Most of my building has been of residences, but I have done some factory work. The houses that I am building now are for people that do not have to be financed. They have the cash to pay for the work.

"The stuff you have to finance is hard to put through; because banks will not loan much more than 35 per cent of the present valuation.

"In the past, in financing building operations, I used to take not only first mortgages but also second mortgages. But I don't do that now. My experience is that you can't get the money.

"I used to be able to dispose of a first mortgage that was based on as high as 70 per cent of the valuation of the property, and we could then dispose of a second mortgage that represented 25 per cent of the valuation; so that if a man had a lot clear, we could about go ahead and build a house for him. But I can't sell second mortgages now at all. And this is on account of the feeling of insecurity as to present values. Most of the mortgages are for five years; and the banks are looking forward for five years and are uncertain as to what they see at the end of that time.

"As far as my observation goes, most of of the work going forward now is factory work. At least 90 per cent of all the buildings being erected now consists of factories or other buildings for commercial purposes. In many cases it is a case of charging the cost of building to the income tax. They had rather put the money into brick and mortar than pay it to the government. Many such buildings are being built that there is no need for at the present time. And that policy is one of the factors that is causing a shortage of building material for houses with resultant increase in price. Thus, factory maple, that was \$28 to \$30 per thousand feet in 1918 is now over \$200 per thousand. This directly affects the financing of house construction."

Twenty Millions to Loan on Housing

Walter Stabler, comptroller of the Metropolitan Life Insurance Company, has authorized the Dow Daily Service Building Reports, to inform the building trades that there will be no curtailment of the company's lending policy. The company has \$20,000,000 to lend on new small dwelling construction and new low-priced apartments. None of this money will go into replacement loans, alterations of old buildings or into commercial construction.

What Materials Are Best for Apartment Buildings

By Charles E. White, Jr.

APARTMENT buildings so far as materials go have become more or less standard. The experimental stage in which new materials and original methods of construction were first tried out has been succeeded by the fixed stage in which ma-

corporate in it all the latest in engineering and architectural details. Pioneers who blazed the trail have left behind them a complete record of their achievements, a record which can be appropriated by present-day builders and architects to the

"The proof of the apartment is in the renting"; by reason of a desirable location you might hold tenants in a poorly arranged, cheaply constructed building for a time, but in the long run they will leave you to go to more pleasing quarters. Your



"Texture" face brick was used in this large apartment building, with architectural terra-cotta trimmings. The latter is white-glazed and the appearance of the building is fresh and attractive

terials and construction are of some approved, tested type known to be economical, durable and safe.

Undoubtedly, it is better for the novice in apartment building design to adhere as closely as possible to reliable standards instead of applying new principles of design which may lead him into some intricate building project which may appear sane and practicable on the surface but will prove impractical in execution.

By studying apartment building types as designed and built by successful architects and builders the inexperienced designer can add greatly to his education. He can profit by the mistakes of his colleagues as well as by their successes so that when he comes to construct an apartment building for himself or a client, he can in-

advantage of apartment building owners and their tenants.

WHAT IS THE TEST OF A SUCCESSFUL APARTMENT BUILDING?

The ability to hold tenants is the final test of the success of any apartment building. When tenants of the class desired remain year after year in spite of increase in rents (made necessary by the upward tendency of overhead expenses) you may be sure your building is a success. If the competition of newer buildings fails to take your tenants from you it becomes fairly apparent that the internal arrangement and external architectural treatment of your building comes up to the requirements of your tenants.

flats should rent easily, at profitable rates and the upkeep should be commensurate with the income. Nothing enters more vitally into the problem than the materials used.

BRICK FOR APARTMENT BUILDINGS

More apartment buildings are built of brick than of any other material and there is a very practical reason why this is so. Brick is almost a universal material in the United States. It can usually be had in any section of the country and in most sections the source of supply is comparatively close at hand.

The first point about brick which commends it to apartment building owners is its extreme durability. No material seems



A building of cream, smooth pressed brick with Bedford stone trimmings. The trim is simple and inexpensive but very effective. Note the parapet roof of "Spanish" tile. The main cornice is of galvanized iron painted the color of Bedford stone. The first-story windows have stone mullions but above the first story mullions are of wood

to stand wear and tear any better and few materials remain as fresh and attractive after exposure to the weather.

So far as architectural adornment goes brick is the ideal material because it can be had in so many different colors and textures that the widest possible range of architectural style is possible. One can hardly imagine a type or mode of design for which some appropriate style of color of brick cannot be found. For this reason architects are prone to use brick perhaps more than any other material.

At the same time, from the standpoint of the owner brick is a valuable building material because it is popular with tenants. So many beautiful apartment buildings have been built of brick, and these have been viewed so frequently by tenants who now have what you might call the "brick habit," a good, modern, pressed brick front is expected by them as a matter of course.

ROUGH BRICK AND SMOOTH BRICK

A few years ago no architect or builder believed anything but smooth, pressed brick was suitable for a fine building. Even in those days when brick was a much cheaper material to produce than now, pressed brick of the best grade ("re-pressed") cost from \$35 to \$50 per thousand, a price in fact, considerably in advance of what the "face brick" most commonly used today, would cost.

Today the educated taste of experts as well as the every-day taste of the general public inclines toward "rough-faced" brick, or, as it is sometimes called "texture brick." It is the careful discernment of artists in the building line who discovered that rough-faced brick usually produces a more artistic effect than smooth brick that has brought about the revolution in brick ideals. These pioneers in design erected structures of rough brick to prove their assertions. The brick fronts did, indeed, prove more artistic than many of their smooth brick neighbors.

The NATIONAL BUILDER and other architects' and builders' magazines noted the facts and presented them to the readers. The public began to observe and soon a wave of "rough brick" went over the land.

Texture brick is no mere fad. It has come to stay and one of its most important characteristics is that it usually improves in appearance with age. The rough surface of the brick seems to take on pleasing tones as time goes on, and streaks and weather blemishes which might injure the appearance of smooth brick, is usually found lacking in rough brick.

The general predominating shades of texture brick are grey, brown, red and yellow. Of course there are infinite varieties of tones in each shade. For instance, in grey brick there are light, dark and intermediate tones. Brown brick comes in all shades from very light tan to deep, chocolate brown. Red and yellow brick have a wide

range of colors. In many of the most interesting designs the face brick is of four or more different shades, ranging from light to dark intermingling promiscuously throughout the surface of the wall.

should be carefully studied as many unique and artistic effects can be obtained with joints of different kinds.

The ordinary tooled joint produced by pointing with a tool about the size of a



Rough-texture brick with a minimum amount of Bedford stone trimmings. These brick are "random-run" with five shades of red, mixed, laid with a close, tooled joint in natural-colored mortar. This is probably the cheapest type of brick front that is at the same time, attractive

This is particularly true of red brick which can be employed in many different shades, mixed, and laid at random through the wall producing the beautiful color effects of an oriental rug.

The kind of joints to be used with brick

telephone wire gives the smoothest effect even when rough texture brick is used. At the same time this will be found the most economical joint in the use of labor and material.

A more expensive joint, but one which

gives a wonderfully artistic effect with many of the brands of texture brick, is the "raked out" joint, producing deep scored lines in the brick work tending to give the wall a rough-and-ready appearance very pleasing in some shades. If the raked-out joints are as wide as $\frac{1}{2}$ -inch to $\frac{5}{8}$ -inch it is necessary to use wood "rods" of the size of the joints for temporarily supporting the upper course on the course below. As each course of brick hardens, the rod is carefully pulled out, leaving a deep, square, scored line between courses. This wide raked-out joint is the most expensive of all and usually requires some gravel mixed in the mortar to produce a material sufficiently stiff to withstand the pressure of the brick.

Rough, "struck" joints are also used with good effect when texture brick is employed.

mounted with brick at the top. Then there are also endless possibilities in mixing Bedford stone with face brick, the latter, either rough or smooth texture.

ARCHITECTURAL TERRA-COTTA AS A TRIMMING MEDIUM

Some of the most beautiful buildings of all countries, the ones that sparkle so in the sunshine and give such a pleasingly "lively" appearance are trimmed with terra cotta.

Terra-cotta is a material molded from clay (mixed with other ingredients) and baked in a kiln, producing an excellent building material, impervious to weather; fireproof, strong, light and of any color.

Much of the terra-cotta trim for buildings is white or cream, usually with a

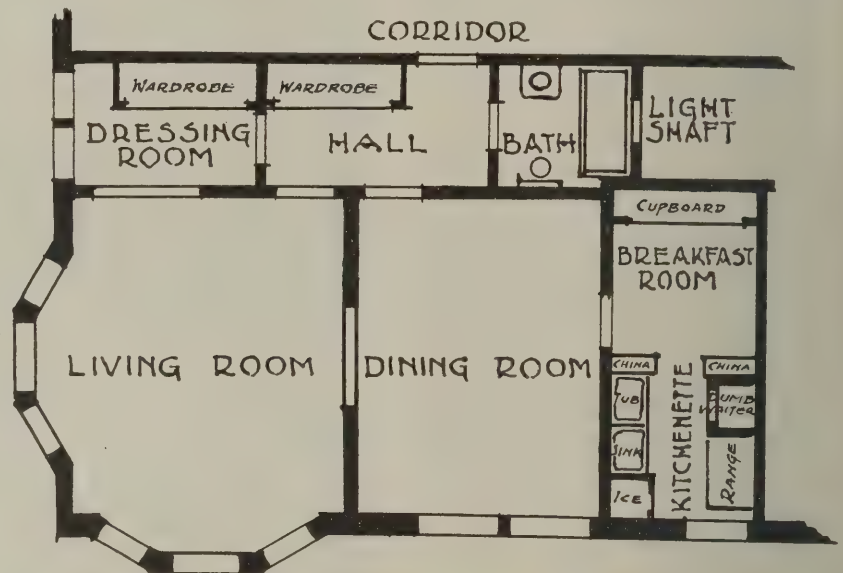
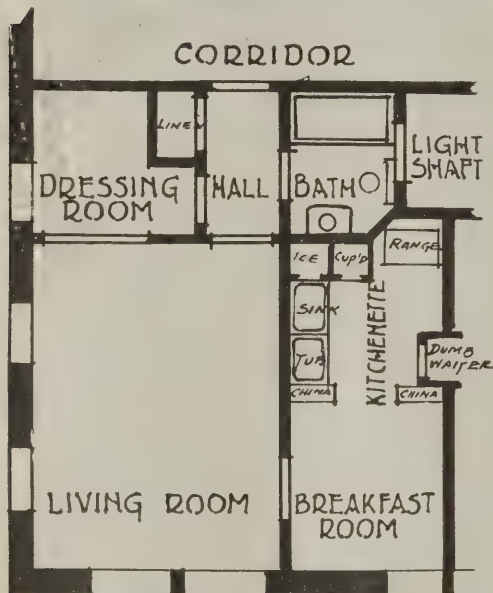
wrought iron rods, straps, bars or steel wire.

HOLLOW TILE AND CEMENT-PLASTERED APARTMENT BUILDINGS

Architects have introduced another element in apartment house design and the cement-plastered or (as it is popularly known) the "stucco" front is in evidence in many localities.

Deep-grooved hollow tile walls are built which are afterwards plastered on the exterior with cement-plaster, giving the "stucco" exterior so well known in residences, a type of construction which is perfectly practicable for apartment buildings as well.

Tile may be laid vertically or horizontally and come in sizes to fit any thickness of



In a fireproof building where floors are fireproof, interior partitions are not required to be directly over each other; in the building on the plan at the left the interior partitions are of hollow tile; floors of reinforced concrete and tile. The plan at the right shows a projecting bay. When bays project in many fireproof buildings each floor is made self-supporting by means of steel or reinforced concrete. Thus the bays get support at each story and do not rest, full weight, on the foundations.

BEDFORD STONE MAKES A GOOD FRONT

Bedford stone is coming more and more into vogue as an excellent material for facing apartment buildings. It is much more economical than many realize because it can be used in thin sheets of material (ashlar) not more than 4 inches thick. There is a dignified and quietly elegant appearance to Bedford stone which always makes its appeal, especially with tenants of the higher class.

Many architects use nothing but lime mortar for setting Bedford stone, as it has been found that ordinary cement mortar stains the material. When completed, however, the joints should be pointed up with "white" cement (non-staining) of which there are several good brands on the market.

Instead of an all-stone front a very agreeable design is made possible by using Bedford stone on one or more stories sur-

brilliant glaze similar to the glaze produced on ordinary kitchen crockery, but any color or tint can be obtained so there is a wide range of color possibilities. For this reason, terra-cotta is extremely popular with designers who are eager to get beautiful color effects in their buildings without sacrificing anything in endurance or strength.

Entire fronts of terra-cotta can be produced but most designs call for brick walls trimmed with terra-cotta, the latter in the shape of string-courses or moldings, cornices, architraves, friezes, ornaments and coping.

Terra-cotta can be made from the architect's designs or ordinary stock patterns may be purchased. The different moldings are made to order of the required size, and each piece is about the size of a similar piece of cut stone (or slightly smaller).

Terra-cotta is laid in mortar like cut stone, and overhanging courses (cornices) are anchored into the wall by means of

wall. They are laid by ordinary brick masons, producing a firm, light, strong wall impervious to moisture and vermin-proof.

Many structures having brick or stone fronts are also built of hollow tile, the former material being merely a thin veneer on the hollow tile walls. Indeed, this is usually considered a better type of construction than the old-fashioned solid wall, as the hollow spaces in glazed hollow tile make a warmer, dryer wall. The cost of the latter is no more than a solid wall.

APARTMENT BUILDINGS OF FRAME CONSTRUCTION

Does it pay to build a frame building in these days of high cost of lumber? Owners, architects and builders in small towns are up against this problem every time a small flat building is proposed. Formerly, it was customary to build small buildings of frame construction, a type which has

been latterly improved by using metal lath and plaster on the exterior, or some other durable type of "stucco" exterior.

In many small towns they are now finding that masonry buildings cost so little more than frame that it pays to use the former. In other instances it has been found that frame is still so much cheaper than masonry that it pays to build of frame.

In any event, cement-plaster can be used to good advantage on the exterior as it reduces upkeep and yields a pleasant type of design which is popular with tenants.

In addition to metal lathing for a plastered building, of which there are many reliable brands, there is now a material widely used, consisting of heavy fibre board to which asphalt mastic has been applied.

ter-board or metal lathing combined with cement-plaster is extremely useful in this field.

An old house overcoated with cement-plaster in this manner has a fresh, new appearance very attractive.

Metal lathing can be applied directly to the old siding and no furring strips are required in this type of construction. The same is also true of plaster board.

WHAT TYPE OF ROOF WILL YOU HAVE?

The standard type of roof for most modern apartment buildings is a composition, flat roof, covered with some brand of guaranteed roofing, ready-roofing or an ordinary "tar-and-gravel" roof. Many manufacturers make a specialty of roofing ma-

Composition shingles (asphalt shingles) can be used for apartments, having about the same life as wooden shingles though manufacturers claim a longer life. The best brands are guaranteed for 10 years, so these shingles have about the same life as a good composition roof which is usually guaranteed for from 8 to 10 years.

FIRE-PROOF CONSTRUCTION—OR WHAT?

Any building in which several families are to be housed should be fireproof if possible. This not only renders the building fire-safe but repairs will be much less than in cheaper types of construction.

In a fire-proof building floors can be of hollow tile or re-inforced concrete and steel, or combinations of these well known ma-



Unique type of fireproof floor consisting of ordinary steel pipe with wire reinforcement. This Chicago apartment building has an entire steel frame of pipe, encased in masonry

Attached to the board are creosoted wood strips (like laths) placed a slight distance apart to form a key for the cement-plaster. The wood strips are dovetailed so that the plaster flows into the interstices, and clinches.

This "plaster-board" is nailed directly to the framework of a building, thus saving the cost of sheeting or under-boardings. Cement-plaster is applied to the exterior in the customary manner.

CEMENT-PLASTER IN REMODELING

Many old houses are being remodeled into modern apartment buildings and plas-

terials and the safest way is to specify the brand desired and then you have a manufacturer's guarantee behind you in case anything goes wrong.

In some exclusively residence towns and in some sections of large cities where a building is to be of the highest possible class a tile, slate or asbestos-shingle roof is used, at least, in the form of a parapet across the front. For a masonry structure, of course, the roofing material should be at least as good as the walls. There are many styles and brands of good roofing tile and asbestos-shingles worthy any building. Ordinary slate is well known and is always reliable when properly laid.

terials. Interior partitions can be of hollow tile, pyrobar, magnesite (or some other similar material) or steel-stud and plaster.

A cheaper type of building is what is known as "mill construction," consisting of a complete framework of heavy timbers veneered with thin masonry. Then there is the ordinary masonry construction with wooden floor joists and studding.

Anything short of fireproof is forbidden by the building ordinances of many cities where apartment buildings are built to house more than two families. Any cheaper type of construction is not only dangerous for tenants but the owner's investment is also subjected to increased hazard.

A Doctor Becomes a Builder

During the Years 1918 and 1919, G. A. Nichols, Inc., Built and Sold About Two Hundred Houses—an Aggregate Business Estimated at Three Millions of Dollars

ABOUT the year 1912 Dr. G. A. Nichols, a practicing dentist of Oklahoma City, contracted the building fever. The attack was mild at first, but gradually developed in intensity until the doctor was forced to give up his dental practice and submit himself to a long course of treatment. At the present time the patient exhibits no evidence that the progress of the fever will ultimately be arrested. In fact, he resists any such suggestion, and says that in his case the action of the fever has been innocuous and beneficial rather than otherwise. The history of the case certainly seems to bear out this assertion.

It is not known in just what manner the doctor contracted the disease. The year 1912, as most of us remember it, is not conspicuous by reason of an epidemic of building fever. On the other hand, conditions seemed rather against such an epidemic. Construction work was slack; money was tight; almost every community had a surplus of vacant dwellings and business buildings, and many self-styled "experts" ventured the opinion that we had reached—if not entirely overreached—the saturation point, in so far as new construction work was concerned.

ever, had probably long been dormant in Dr. Nichols' system and became active and evident by reason of cumulative effects.

In Dr. Nichols' case the fever took the course of building houses and selling them. Within a few months it became a chronic condition and at the present time is steadily gaining in intensity.

During the years 1918 and 1919 G. A. Nichols, Inc., built and sold nearly 200 houses, the aggregate value of which is



Dr. G. A. Nichols

with the construction work. In this manner it derives an advantage not only in cost, but in speed of construction, as the stocks are kept full and complete at all times and the jobs are not held up on account of delayed shipments, and so forth. In connection with the lumber yard there is also a woodworking plant, in which the sash, frames and other millwork is manufactured. This plant serves a double purpose in that it not only provides millwork promptly and at low cost, but also furnishes a means of keeping a large number of men steadily employed when it becomes necessary to lay them off on outside work. The men who cannot be utilized on the job during bad weather or other lay-off periods are shifted to the mill and kept busy until outside work again opens up. In this manner crews are kept together and are more contented and efficient, and surplus stocks of frames, and so forth, are always promptly available.

At the present time mule teams are used for hauling, but two automobile trucks have been ordered to replace them.

The business of the firm is divided into three groups. Mr. A. L. Christenberry has charge of the architectural department;



Business offices of G. A. Nichols, Inc.

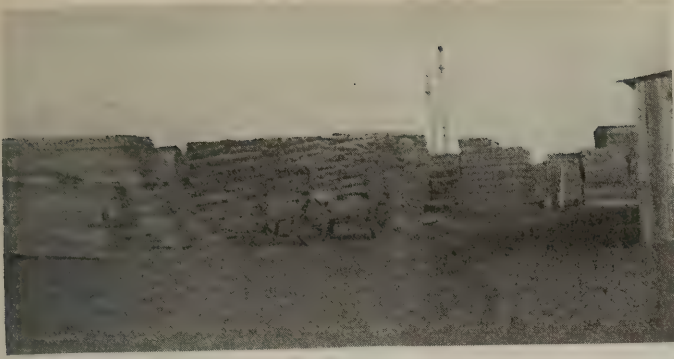
This evidence gave weight to the often expressed theory that the building fever had run its course, would rage no more, and among the members of the building profession there was much doleful head wagging at the prospect. The germ, how-

estimated at around three million dollars. The business for the year 1920 promises to exceed that of any former year.

The concern buys most of its materials in carload lots and operates a lumber and building material business in connection

Miss Goodwin is office manager, and Mr. R. E. Albee is the superintendent of construction. Thus Dr. Nichols is relieved from many petty details and is free to guide the concern's activities as a whole.

The method of accounting was planned



Supply yards of G. A. Nichols, Inc.



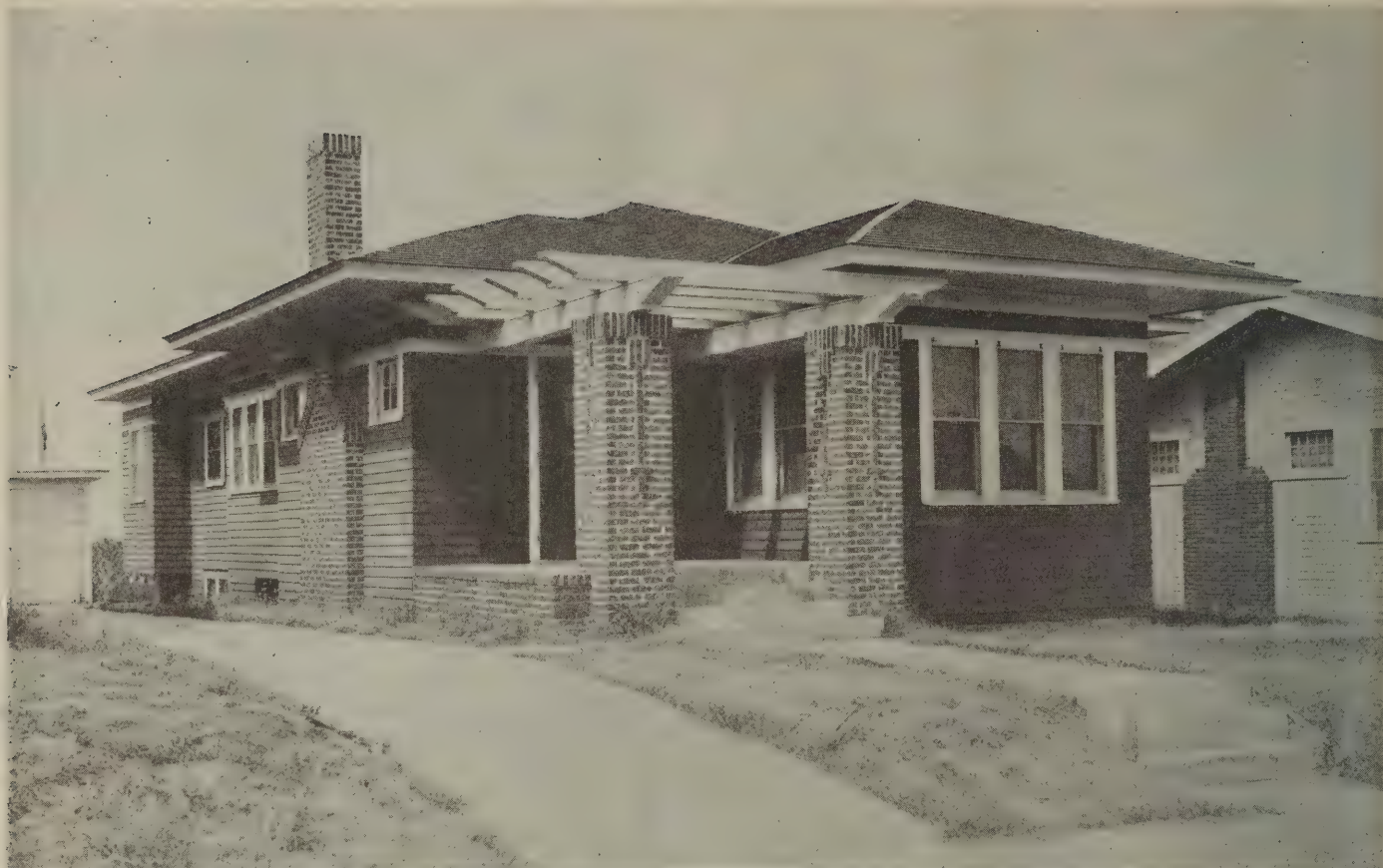
A few of the houses built by the company

and put into execution by an expert accountant who was called in for this purpose. The system of printed forms and other aids is complete and insures accuracy as well as reducing the number of employees necessary for the office work.

A feature that is out of the ordinary for such a large concern is that no itemized

estimates are made preliminary to the erection of a building. This seems revolutionary until one considers the fact that the buildings are not being built under contract, but are built for sale, from materials that are taken from the builders' permanent supplies. Thus there is evidently no reason for taking off the quantities

from the plans. Of course, an accurate account is kept covering the materials and labor entering into a building during its construction, and at its completion there is a positive method of determining the cost and selling prices. It is true that it sometimes happens that of two buildings of almost identical type, one will cost more



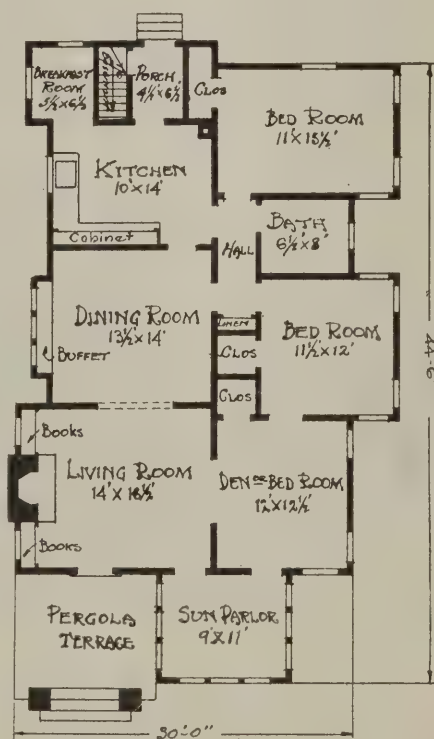
An eight-room bungalow

than the other. In such cases the difference is divided among the buildings, as it is held unfair to handicap the building that is rendered more expensive than another merely by reason of circumstances beyond ordinary control. The method of keeping separate accounts for individual buildings also facilitates the determination of the progress that is being made.

The individual features of the houses which illustrate this article will not be touched upon. Whatever differences of opinion may be held as to their architectural worth should be tempered by the fact that these houses have been accepted by the public for whom they were designed. They are a strictly commercial product, offered for sale in a legitimate manner and are apparently filling a genuine want. If some purists are offended by the artistic qualities of the houses, no argument will be forth coming until their theories as to the most desirable manner of designing and building houses for the bulk of the American public are put into practice. In other words, if some individual or group of persons desire to prove a theory that most home buyers buy what is offered them rather than what they really want, then almost any city or town offers an opportunity to test out such a scheme.

"Don't sell goods for what they will bring, but sell them for what they are worth," is the advice of Harry A. Wheeler

to the wholesale lumber dealers—and others.



FLOOR PLAN

Proposed Contract Provisions

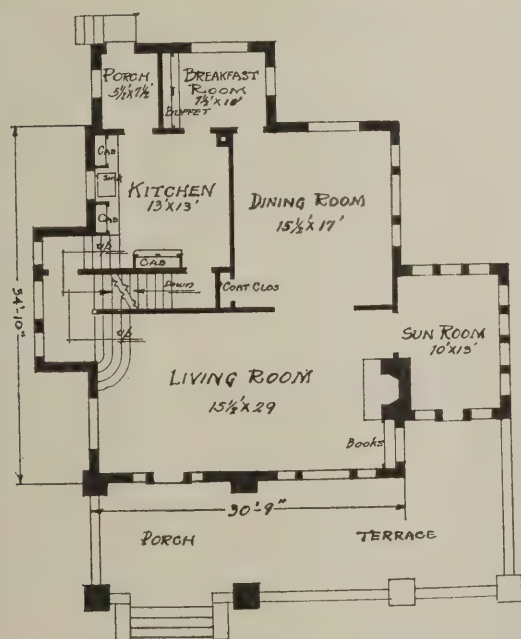
AN analysis of income tax returns shows that contracting is the most hazardous industry in the country. They show that the amount of loss for every dollar of profit made by construction corporations is eight times as great as it is in manufacturing, agriculture, or personal service corporations; five times as great as in transportation and public utility corporations; over three times as great as in mining and quarrying; and nearly twice as great as in banking.

The reasons for this condition are due to the unusual number of doubtful elements in construction with which a contractor must work. It is unnecessary to enumerate them. They are all too familiar. It is sufficient that the more such uncertainties can be eliminated, the lower will be the costs of construction to the owner, the more satisfactory will be the relations of the architect, the engineer and the contractor, and the more will contracts be awarded on a basis of skill, integrity and responsibility. Never was this more true or action on it more needed than at the present time.

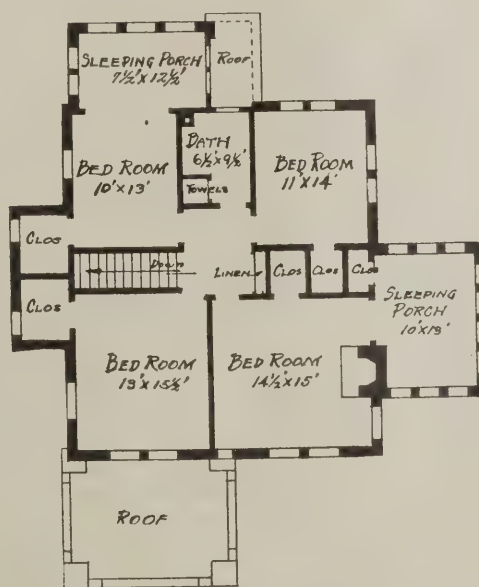
From the very nature of construction many of these uncertainties can never be eliminated. They must either be assumed by the contractor or the owner. Some



A brick residence



FIRST FLOOR



SECOND FLOOR

which are now assumed by the contractor ought by right to be assumed by the owner. Other uncertainties may be eliminated entirely to the advantage of both parties. The improvement of present contract provisions is one of the simplest solutions for this problem.

With these thoughts in mind the Committee on Contracts of the Associated Gen-

eral Contractors of America during the past year has made a study of 113 different forms of contracts of various types. The committee is not prepared at this time to submit a complete form of contract embodying every provision which should be included in a good contract. They have, however, approved the following provisions which they recommend be included in every

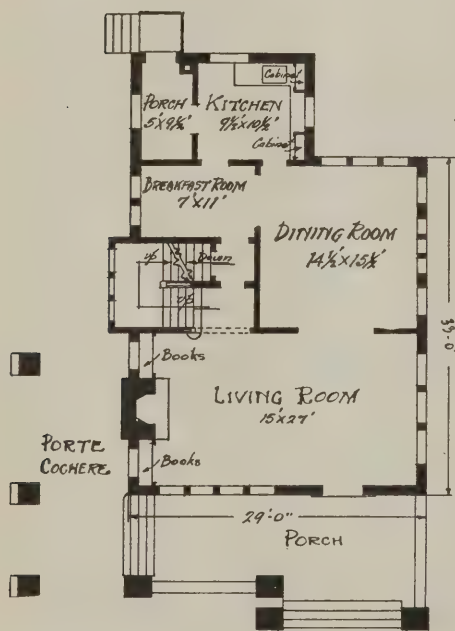
contract made by members of the Associated General Contractors of America. Additional provisions will be submitted from time to time:

1. Action on Bids

Bids should be submitted with the provision that they must be acted upon within a reasonable time.



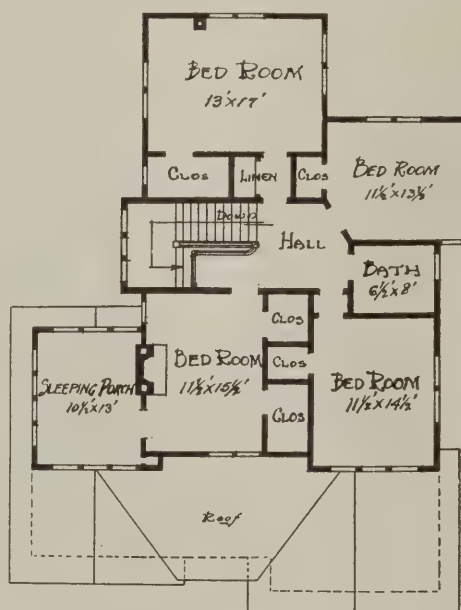
Brick and stucco



FIRST FLOOR PLAN

2. Freight Rate Changes

Bids should be submitted on the basis of existing freight rates, with the provision that in case a change in rates should occur between the time bids are received and the date fixed for the completion of the contract, the contract price should be increased or decreased accordingly.



SECOND FLOOR PLAN

3. Wage Scale Changes

Bids should be stated and be submitted on existing wage rates, with the provision that the contract price shall be increased or decreased in accordance with any change in such rates before the date fixed for the completion of the contract.

4. Material Price Changes

Bids should be submitted on the basis

of existing prices for materials f. o. b. the producer's plant or distributor's yard, with the provision that the contract price shall be increased or decreased in accordance with any change in such price that takes place within the time allowed the contractor to purchase and fabricate his materials.

5. Monthly Estimates

Monthly estimates should include materials delivered and suitably stored as well as materials incorporated in the work.

6. Partial Payments

Certificates should be prepared and delivered to the contractor between the first and tenth day of each month, showing the proportionate part of the contract price earned during the preceding month. These certificates should be paid by the owner by the tenth day of the month. Interest on deferred payments should be paid the contractor at the prevailing rate.

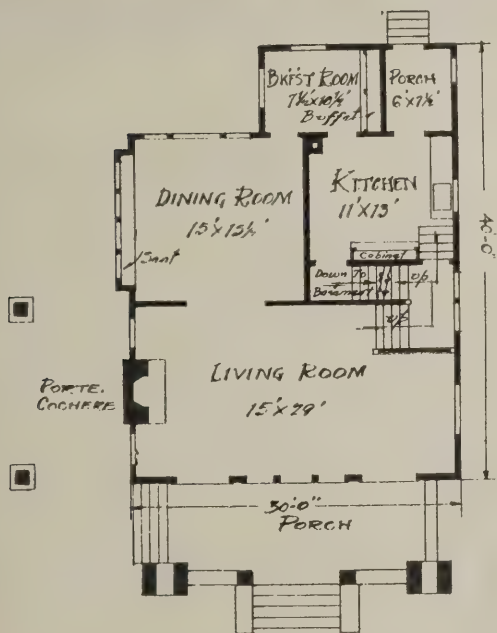
7. Contractor's Right to Stop Work

Under the following conditions the contractor should have the right to stop work or terminate the contract upon three days' written notice to the owner and the architect, and recover from the owner payment for all work executed and any loss sustained upon any plant or material and reasonable profit and damages:

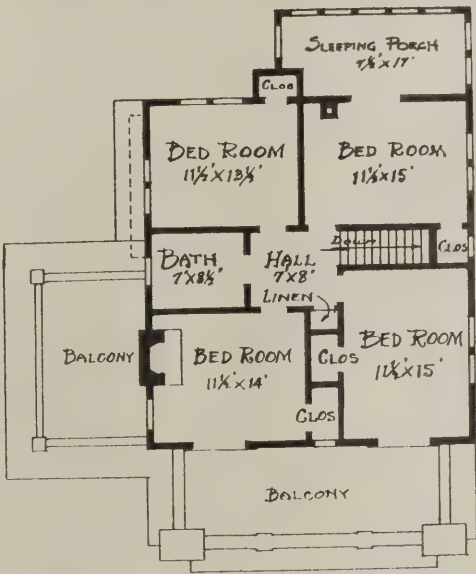
(a) If the work should be stopped under an order of any court, or other public authority, for a period of three months,



Wood siding and brick piers



FIRST FLOOR PLAN



SECOND FLOOR PLAN

through no act or fault of the contractor or anyone employed by him;

(b) If the architect or engineer should fail to issue the monthly certificate for payment in accordance with the terms of contract;

(c) If the owner should fail to pay the contractor, within seven days of its maturity and presentation, any sum certified by the architect or engineer or awarded by arbitration.

(d) If the owner does not permit the contractor to proceed with construction

within a reasonable time after signing the contract.

8. Retained Percentage

The retained percentage should be based on 100 per cent of the work performed and should never exceed 10 per cent. When the amount retained reaches a total sum, which shall be mutually agreed upon by the owner and the contractor, no further reduction from payments should be made.

9. Surety Bond

Where a surety bond is given, it should

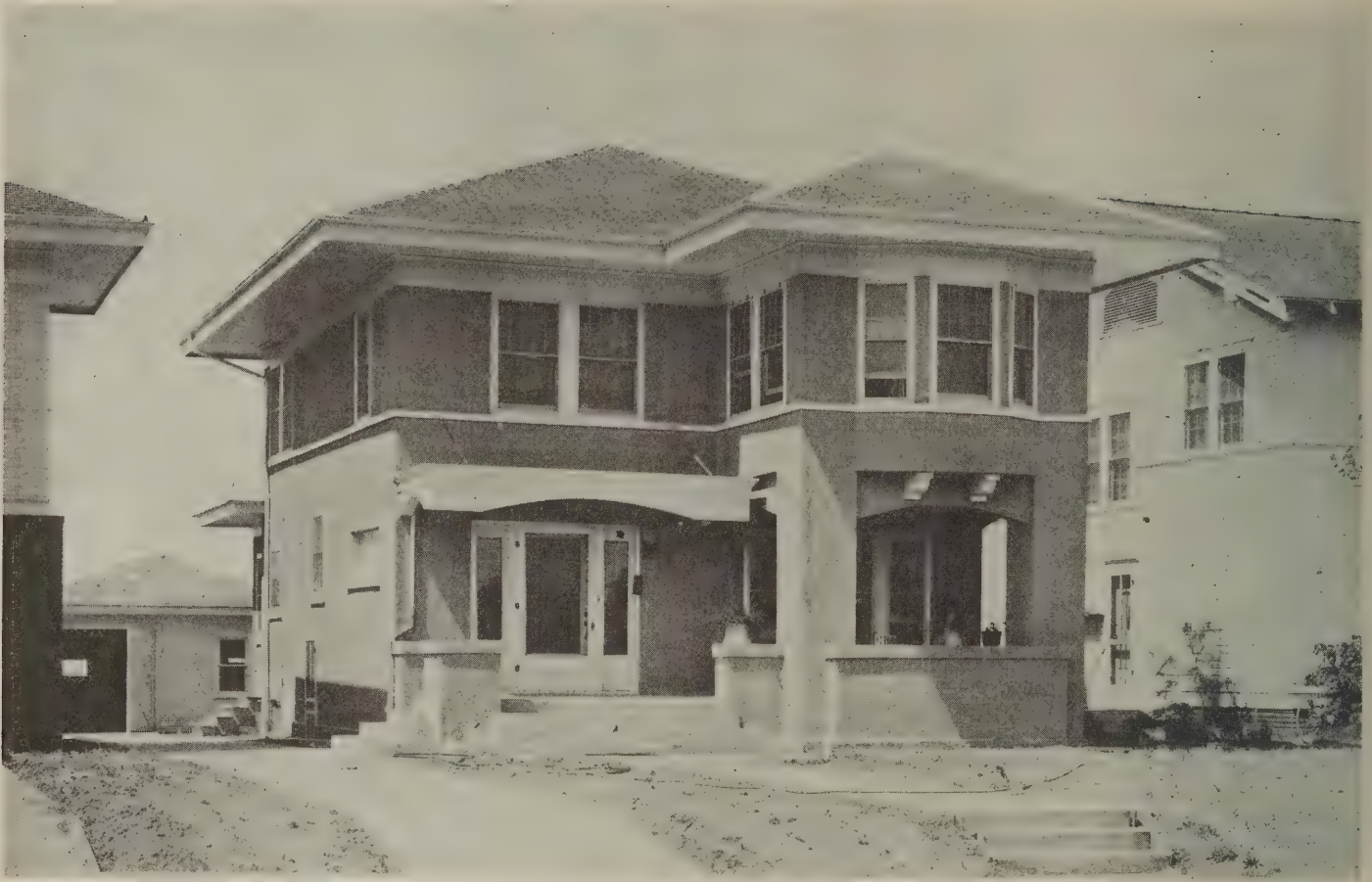
be reduced at agreed intervals so as to cover thereafter only work uncompleted.

10. Penalty Clauses

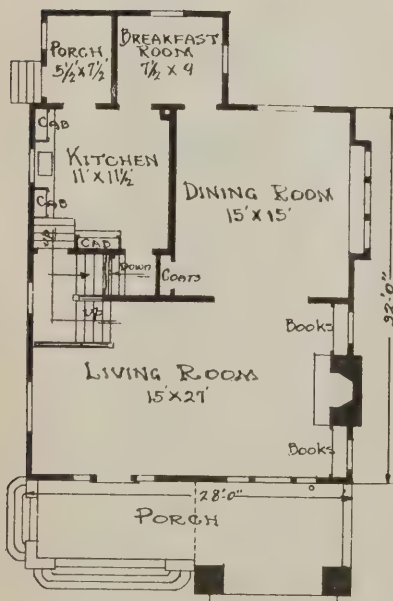
Wherever any provision is incorporated in the contract for a penalty against the contractor (including liquidated damages), there should also be inserted a provision for a bonus of like amount.

11. Acts of God or Public Enemy

The contractor should not be held liable for results arising from the acts of God or a public enemy.



A stucco residence



FIRST FLOOR



SECOND FLOOR

12. Time Allowed for Completion of Work

The time allowed for the completion of the work should be based on "weather working days" instead of on elapsed time, and, if necessary, allowance should be made for time spent in performing unproductive work made necessary by floods or other

natural causes beyond the control of the contractor.

13. Inspection

Where practicable, materials should be inspected at the source so that costly delay may not result from the rejection, at the site of the work, of materials furnished in good faith by the contractor.

14. Force Account Work

Payment for force account work should be made on the basis of the total actual costs of the work, including the actual labor and material costs, rental on equipment, liability insurance, etc., plus a reasonable percentage to cover overhead and profit, total to be not less than 15 per cent.

15. Change in Quantities

In case the actual quantities of any item in a unit price contract are less than the estimated quantities by more than a certain fixed per cent, the unit price paid the contractor for that item should be increased by an amount to be agreed upon. Similarly, a decrease in the unit prices should be made in case the quantities are increased over the estimate by more than a certain fixed per cent.

16. Arbitration

In no case should the engineer or architect be made the final judge as to the interpretation of the drawings and specifications or the performance of the contract. All decisions and interpretations should be subject to prompt arbitration at the choice of either party to the dispute.

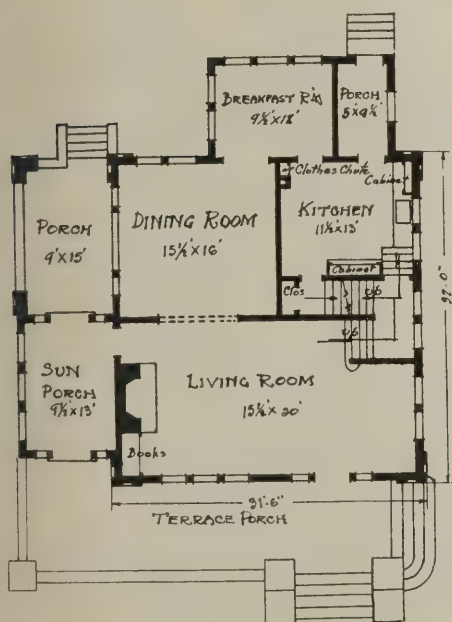
Committee on Contracts is composed of: J. W. Cowper, chairman, John W. Cowper Co., Buffalo.

Arthur Bent, Bent Brothers, Los Angeles.

M. L. Cunningham, Municipal Imp. Co., Oklahoma City.



A stucco house. G. A. Nichols, Inc., builders



FIRST FLOOR PLAN

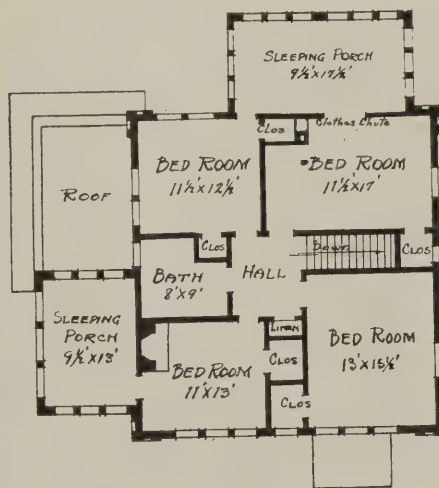
Avery Brundage, Chicago.

V. T. Goggin, Fred T. Ley & Co., Inc., Springfield, Mass.

L. S. Oakes, Winston Brothers Co., Minneapolis.

J. W. Rollins, Holbrook, Cabot & Rollins, Corp., New York City.

E. Stanley Holland, Bates & Rogers Construction Co., Chicago.



SECOND FLOOR PLAN

Simple Way to Get Lengths and Cuts of Rafters

I have seen from time to time in NATIONAL BUILDER also other mechanical papers about the difficult problems of roof framing and of getting the length and cuts of rafters, calling the pitch $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{4}$ and C & C, and I'll admit it is difficult to do it in that way for I used to do it so myself. But quite a number of years ago I discovered a new way to solve the problem of getting the lengths and cuts of the common hip and

valley rafters, which makes it quite simple, and practically requires but very little figuring, so that anyone that has but a little knowledge of geometry can readily frame them.

Now, when I make my own plans, I always have figures for the pitch or rise of the roof (regardless of $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{4}$, etc., pitch), from a flat roof of 2 in. to 12 in. up to 12 in. to 12 in., or more than 12 in. to 12 in. If I desire a very steep pitch, 9 in. to 12 in. makes a good average pitch for a roof. Now take the square, lay the tongue on the edge of the rafter at 9 in. and the blade at 12 in., and if the building is 20 in. wide, go 10 times with the square at 9 in. rise, 12 in. run, and it will give you the plumb-cut and heel cut and length of the rafter. If ridge board is used, take off from top of rafter one-half of the thickness of the ridge board. For hips and valleys, use the same figures for the rise and 17 in. for the run, and go the same number of times as for the common rafter; 17 in. run for hips and valleys must be used as that is the diagonal for the square. If width of building is a fractional part of a foot, use one-half of the fractional part. If I have an architectural plan and there is no pitch given, take the bevel and put it on the plan, and get the bevel of the pitch, and put the bevel on a board and mark the pitch, and apply the square, and it will always give the figures for the rise and run. Use them on the rafters one-half times the width of the building and



Some of the interiors of houses built by G. A. Nichols, Inc.

you have the length and bevel cuts for the rafters. And if you have different pitches, as it sometimes occurs on each side of the same building, apply the square to the requirements of the case.

I have just put on a roof where there were four hips, two valleys and one gable. The building was as long again as the width and the ridges were all on the same level and it made the end pitches different from the side pitch.

I have had 52 years' experience in the building business and find my explanation the most simple, quickest and correct way of roof framing, and if it would be of any benefit to some brother and they do not know of it, I would like to have them try it. —Alvah H. Pierson, Clinton, Conn.

Roof Framing

M. W., a Kansas City builder, submits the following on roof framing. "I run my steel square once over a 2 by 4 or 2 by 6—one long enough for the longest timber in the roof. On this pattern I lay off the length of the common rafter and all of the jack rafters at one running, and then lay off the hips and valleys. I lay off the top, level and side cuts and then put my steel square away and forget it. I then use two bevel squares, set to the cuts on the pattern rafter, for laying out the other rafters. One bevel square handle is marked "S" for side cuts and the handle of the other one is marked "T," for top cuts. The level

cut is made with a block or else by means of the pattern rafter.

That Nail Argument

Here's another jolt from a Missouri reader. He says, "Drive a wire nail and a cut nail into a green board, just out of the mill, leave them 24 hours, and then try pulling them. The cut nail will come right out, but the wire nails surely hold."

Cut Steel Nails Will Rust Quicker Than Wire Nails

J. P. Wells, carpenter and builder, Lane, Kan., takes a hand in the debate on cut nails and wire nails, and says:

I noticed what Mr. Jensen had to say about wire nails and also Mr. Black's answer. I guess Mr. Black is looking for me and a lot more in this part of Kansas. I have not been driving nails for fifty years for a living. Commenced in '79 and been at it ever since. Wire nails came into general use here about thirty years ago, so we have had time to try them out. I have reshingled many houses and barns that were built when we used cut nails, and always found many loose nails, and always had to go over the roof and renail the sheathing. Now I have reshingled many roofs where wire nails were used and always found the roof in much better condition than when cut nails were used. I have read a good deal about wire nails rusting out and the

shingles blowing off. I don't say it is not so, but I do say it has never occurred to my knowledge on a roof I have put up. I believe the wire nail will rust out sooner than the old iron cut nail. I know they will. But I don't believe it will rust any worse than the cut steel nail will. I can show many houses I have built in the last thirty years nailed with wire nails throughout and never had a complaint about the nails coming out or rusting out. In 1895 I built an addition to a one and one-half story farmhouse. I sent the owner to town to get 3d wire nails to shingle with. He came back with 3 fine (or what we call lath nails), and I used them. Fifteen years later I was called on to reshingle the old part of the house and I had to tear off a few of the shingles on the roof I had put on fifteen years before with 3d fine wire nails. I took pains to see what kind of shape they were in. Bright as a dollar and not a shingle off the roof that I did not tear off. They will outlast the 5-2 clear cedar shingle for me. And that is good enough.

Licensing Builders

A Missouri subscriber says that a license law for builders would be a good thing. He says in part, "I wish we all had to pass a stiff examination before being allowed to superintend work. Lots of the superintendents of today would go by the board, and lots of the others would take enough interest to read up a bit."

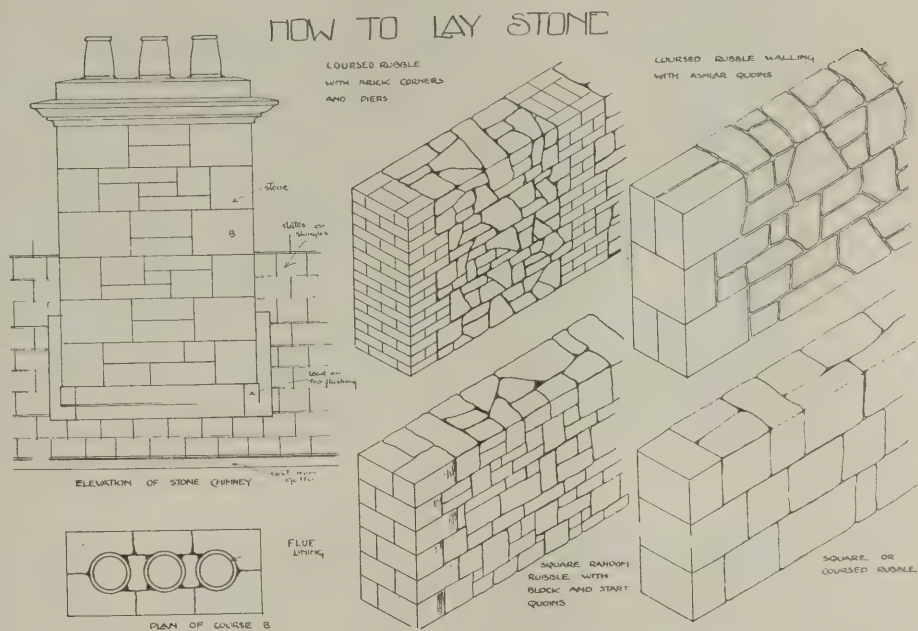
Laying Stone--By John Y. Dunlop

THE strength and imperviousness of a rubble wall depends very much on the mortar used. Rubble work which is built with stone or boulders of an irregular shape and size is laid with irregular joints and is called random rubble. In this type the stones are arranged to fit into one another as closely as possible without too much tool work and should be well bedded in good hydraulic lime mortar or cement mortar.

Rubble work is also built in courses and is known as coursed rubble, which has the great advantage that the back and front part of the wall can be better tied together than in random rubble work.

In the sketch exemplifying coursed rubble walling with ashlar quoins. The height of each course is 15 inches and the stones are laid on the broadest face with the natural beds horizontal and placed so they cover the joints of the course below. This particular type of walling might also be called hammer dressed brought up to 15-inch courses.

The work is kept in a straight line by means of line pins and a cord stretched over them, the corner stones being built in advance of the other work. Where there are no corner stones the plumb rule or level would be brought into use for the ends of

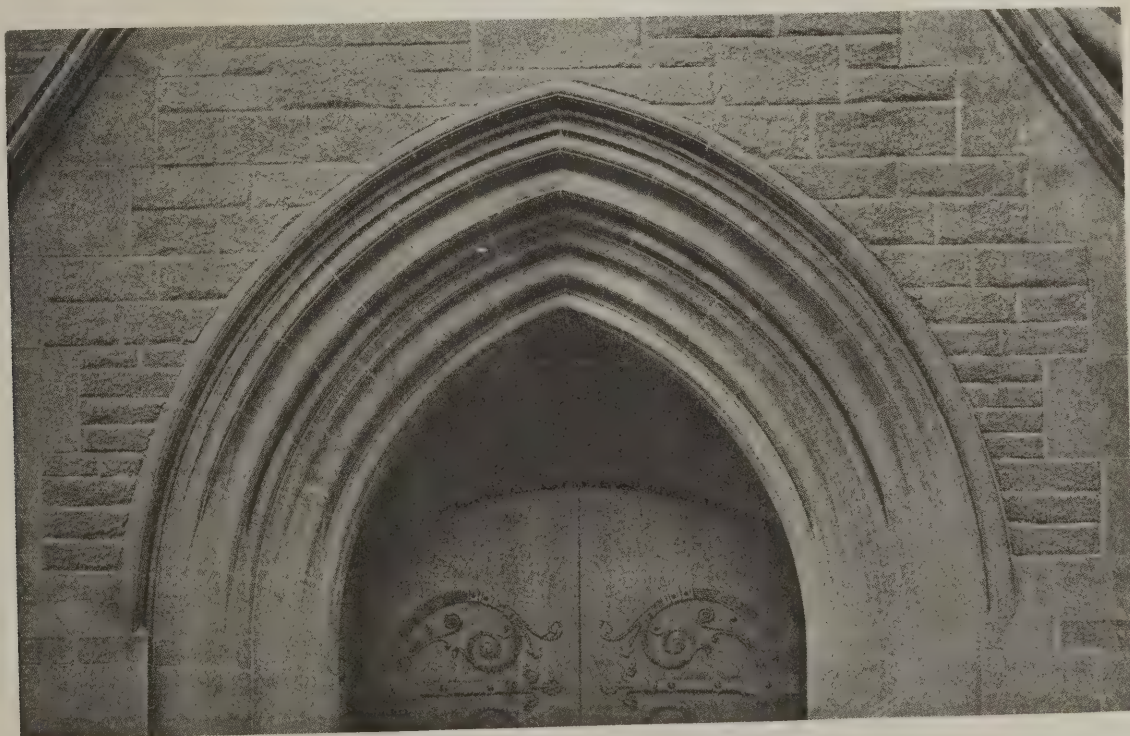


shown with brick corners and piers in which the courses are 10 inches high.

Very often in building rubble walls the stones are extra heavily bedded, with the result that if the joints when pointed are made to project slightly past the line of the wall, the heavy meshwork of mortar

a village church is a good example.

Very often in building rubble walls the stones are cut roughly to a square shape. This type is shown in the line drawing under square rubble. Square rubble gives a better and neater kind of wall than random rubble.



Coursed rubble with a Gothic arched opening

the wall, the rule being held as near the blocks as the rough face of the stones will permit.

Another example of this type of work is

gives a distinct character to the surface. Work of this kind is very common in the Kentish areas of England and the halftone illustrations of the exterior and interior of

Frequently, as is the case with some of our sandstones, the rock splits naturally along the planes of bedding, giving anything from a 4-inch to a 7-inch stone. These



A village church built of random rubble with stone dressings at the openings



Rubble wall with stone dressings and Gothic arch

strips are very often selected to give one height and are built into what is called square dressed coursed rubble. An exam-

on its natural bed. Otherwise the face of the stone is likely to crumble or flake off. The ordinary mason is very fond of

joints, but in ninety-nine cases out of a hundred the large stone must be laid on edge with the natural bed of the stone



Granite church showing irregular coursed or snecked rubble

ple of this class of work is shown in the halftone illustration of a Gothic arch.

Another variety of square rubble is shown in the stone chimney in the line drawing. This type is known as irregular coursed or snecked rubble.

This method of constructing a stone wall consists in using stones of different depths, all laid with horizontal beds, with large stones breaking the courses of the other wall stones at irregular intervals.

Another type of straight jointed rubble is that which is known as polygonal rubble. In this form of walling the edges of the stones consist of five or six sides which are laid irrespective of the horizontal or the vertical joints. Of course work of this kind entails a great amount of labor, because apart from every side-stone having to be jointed, at least two beds always have to be cut to fit the uppermost side of the stone below.

A great many domestic and public buildings are built of ashlar, which requires the use of hammer and chisel on bed, face and joints. The beds and joints of all ashlar stones are evenly dressed on the bed and joints while the finish of the face varies from the rough rock faced to the finest tooled and the smoothest rubbed.

The rougher the surface the more opportunity it affords for the lodgment of dirt and water, and the more likely it is to lead to the decay of the stone.

Stone should, as far as possible, be laid

using one large stone in place of several smaller ones, thus saving labor in beds and

vertical, whence comes decay.

The vertical joints of hand-made ashlar



The walls on this house are built of polygonal rubble with stone dressings at the opening and corners



A country house built of polished ashlar

wall stones are seldom squared back far enough. Frequently the joints are only squared for one inch and the rest of the joint scamped. Unless such joints are completely flushed up with good mortar driving rain is sure to penetrate the wall.

The beds are often worked in the same way, a fault which may lead to the cracking of the stone on account of the weight being concentrated on the edge, and also helping to permit the ingress of water by forming a sloped joint into the wall.

In the days before hollow walls were used and before railways and good roads brought everything everywhere, our forefathers were sorely tried to build dry walls of porous material. Amongst the hills which form the boundary between Lancashire and the West Riding of Yorkshire (hills whereon fierce, wet west winds play until the trees take a permanent set to the east). The chief building stone of the district, though hard and durable as it seems, is undoubtedly porous, so porous sometimes that rain is driven through the bond stones and bubbles out on the inside. Having learned by bitter experience the folly of those scamped joints, the old builders went to the other extreme, and not content with level beds, often laid the stone with joints inclining slightly outward.

Ashlar stone walls are a superior kind of stone work used for the face of the walls while the remainder of the wall is built of rubble. These, so far as construction is concerned, are composite walls and to insure equal settlement the rubble backing should

be bedded as thoroughly as possible with thin joints and the rubble should be brought up to courses at frequent intervals.

Houses Built Like a Refrigerator

Built on the principle of a refrigerator, with its walls insulated to keep the cold out, a new idea in construction of residences is being tested in the cold country in Canada. The residence has been used for a year, being occupied by the designer and his family. It was tested severely during the last winter when temperature ran to forty below zero, but it stood the test and was heated throughout with electrical heat during the hardest weather. The walls were designed to keep the cold out and appear to have done so.

The walls are hollow, the outer walls being cement plaster on metal lath with a top coat of stucco. Back plaster is placed between the metal lath and the studding. The outer wall is a sheet of concrete one and one-half inches thick. The inner wall is of two layers of asphalt paper with wood lath and plaster on top. The airtight space in the wall is filled with insulating material, granulated cork with a mixture of planer shavings. The theory on which it is built is to prevent the movement of warmed air toward a cold surface.

The cost of construction was given as 10 per cent above ordinary methods. The purpose of the test in construction was to learn how greatly heat conservation might

be developed. On the cold prairies of Saskatoon the conservation of heat and fuel in winter is an important item. The test house has attracted much attention from construction and heating engineers.—*Improvement Bulletin.*

Burglar-Proof Show Windows

It is seldom one picks up a newspaper nowadays without seeing a report of a burglary of a jewelry store. The bandits drive up to the curb in an automobile, smash the show window with a hammer or brick, grab the most valuable pieces (usually diamonds) and speed away.

If jewelers would be satisfied with show windows made up of smaller panes, instead of the prevailing large single pane of plate glass, it would be possible to hand these auto bandits the surprise of their young lives and send them away from the window empty-handed. And these panes need not be unduly small either; they can be made 20 in. by 50 in.

There is being manufactured at present in this country an article known as safety glass. It is intended chiefly for automobile windshields and windows.

Instead of a single sheet of ordinary plate glass it consists of two sheets of fine glass welded together by a pyroxylin plastic sheet between them. Thus there are three layers—glass, transparent sheeting and glass—welded to form a single unit, resilient, impenetrable, non-shattering.

Even when struck a heavy blow, as with a hammer for instance, the resilient central sheet remains practically intact and holds the glass on either side of it firmly. The glass cracks but no hole is made through which a burglar could extend his hand and rob the display.

Of course, the windows could be pounded to pieces in time, but it would take so long to do it, the bandits would be interrupted in their work long enough to foil them.

Mechanical difficulties in manufacture make it impractical at present to make the pane of safety glass larger than 20 in. by 50 in. However, a show window made up of panels of that size would not be so bad. The smaller panes would not impair the attractiveness of the display in the window; neither would the almost imperceptible color tint in the glass.

It is said jewelers are seriously considering the use of safety glass in ways suggested. They must do something to stop the losses caused by window-smashing bandits. Their windows are their best salesmen; they cannot abandon their window displays. Therefore, the only practical thing to do is to make the displays safe.

THE forest fire loss in this country is about \$28,000,000 every year, and the area burned over is ten times greater than the devastated areas of France.

The Value of "Standard" School Houses--By Charles E. White, Jr.

AUTOMOBILES have become "standard." After a considerable number of years of experimenting during which time the manufacturers of different cars introduced all sorts of novelties in their product in the endeavor to beat competitors, designs are now made on the same basic lines. Though individual improvements in mechanical parts and body design may be claimed by each automobile builder all cars are "standard" in a general way.

The standardization of automobiles is now as complete as the standardizing of locomotives or steel bridges; machinery for

ones which have been found to work out well in actual practice are retained and impracticable notions have been cast aside. School houses are now "standard" and to build a new building without incorporating the most advanced thought and practice in "school-house standards" would be as illogical as to construct a battleship which did not include new points suggested by our experience in the late war.

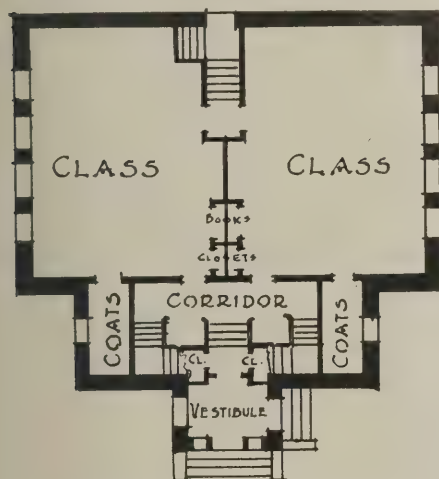
WHAT IS A "STANDARD" SCHOOL HOUSE?

One of the first things to be realized by experts studying the school-house problem in a coldly critical and scientific way, was the fact that a building used for school purposes is nothing more or less than an educational factory. It is of chief importance that children and teachers shall have a healthful building in which work, conveniently arranged, constructed of safe and enduring materials; a structure well lighted, completely warmed, thoroughly

ventilated. Of lesser importance (experts have grown to believe) is architectural adornment.

This does not mean that schools need necessarily be ugly in design nor is it necessary or desirable that they look like factories. Many architects who have given the problem the closest attention have demonstrated that a school building may be wonderfully attractive in external appearance, but they have brought out the point that this can best be accomplished in a very simple manner. "Magnificence" has no place in a standard school. Extravagance is indicative of the poorest taste. Over-ornamentation is entirely uncalled for and unnecessary.

On the other hand the most practicable size of rooms, height of stories and width of corridors as proven by statistics of failure and success in thousands of school buildings built in this country and abroad are rigidly insisted upon in the standard school. The size and number of windows,

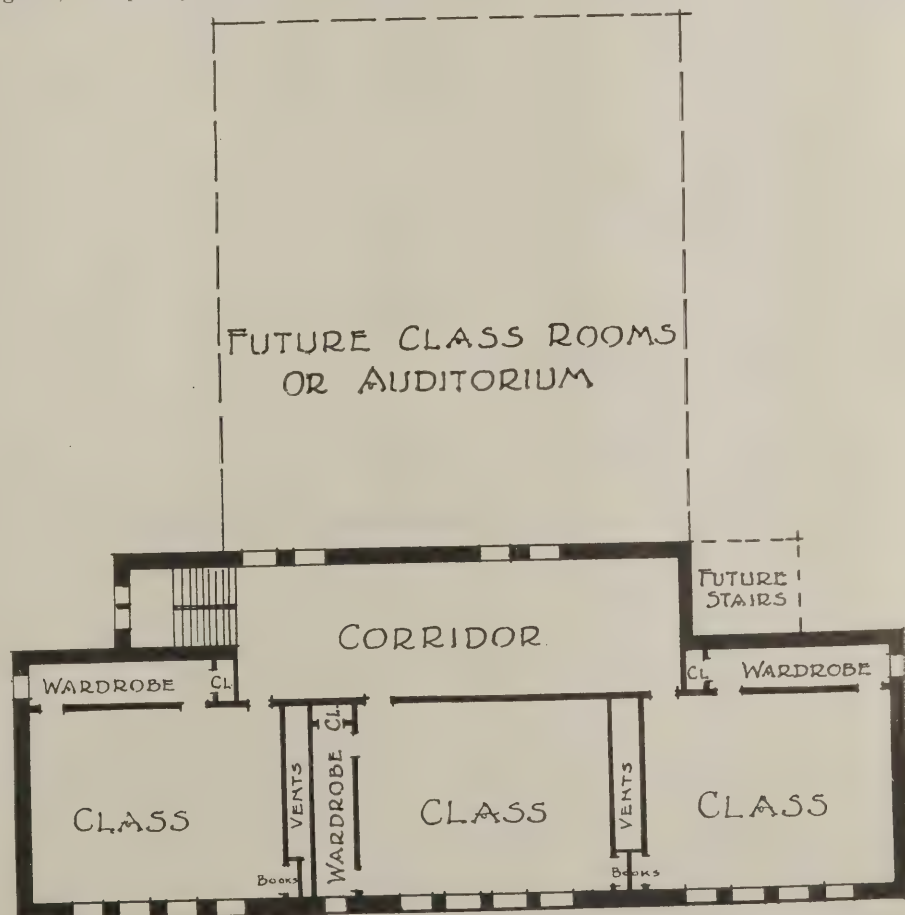


A small 2-room school building which may be increased to 4-room by adding a second story at some future date. The small town may be a big town some day, so it is always wise to provide for future growth

the manufacture of cotton and woolen goods; general methods of frame house construction and countless other processes which have been standardized by eliminating the worst and incorporating the best of every system.

School-house design and construction until a comparatively recent date has been more or less of a haphazard proposition. Each architect and builder who attacked the problem contributed something to the general welfare of school-house design but there has not been until recently a thoroughly general practical system.

Recently, Boards of Education, Superintendents of Schools, architects and builders, school experts everywhere have been comparing notes. Pilgrimages have been made to progressive centers where recent school houses have been built; many ideas presented in design or construction have been carefully studied and criticised. The result has been that the better ideas—the



In building a one-story school building it is comparatively easy to build it in such a way that a second story can be added later. Then, if you will also provide means for a future auditorium, your building will contain, potentially, all the elements of a larger building, later

their height from the floor and, even their distance from the children's desks have been reduced to a mathematical formula. The size and shape of pupils' desks' width of aisles, location of the teachers' platforms, arrangements of wardrobes and closets, size and capacity of bookcases and cupboards, size and shape of entrance doors, width of stairs, type of building construction and methods of heating and ventilating are of grave importance. These points are all standardized in buildings of the better class and although the standards vary in detail slightly in different cities where "standard" school buildings are the rule, they will be found to be fundamentally alike.

Thus it is possible to reduce standards almost to the terms of formulae. School-house designers should be familiar with this technique. While it is true that exceptional designers may from time to time introduce improvements in the standards, it is probable that now, after years of experience of highly skilled experts, many such innovations would prove immature and impracticable.

Just as it is in the designing of *hospitals* architects and builders interested in *school houses* will do well to confine themselves to the basic principles of "standard" design and leave to more brilliant members of the profession the inventing of new methods. School house architecture has suffered so much in the past by the efforts of well meaning but impractical architects that it is a safer rule, now, to adhere as closely as possible to the program of our most modern standard schools.

THE CLASS ROOM IS THE VITAL UNIT

School houses are built primarily for educational purposes though an examination of some of the old-timers might lead one to think otherwise. Thus the class room itself, in which pupils study and recite, is the keynote to the entire building. Everything should be subordinated to its arrangement and the most advanced ideas as to size, shape and location should be incorporated in the design.

In standard grade schools as exemplified in Boston, New York, Philadelphia, Chicago, St. Louis, Indianapolis, San Francisco and other cities large and small where experience has demonstrated the advantage of "standard" schools, the class room unit is designed to seat from 30 to 40 pupils, as it has been found this is the largest number a teacher can effectually instruct. In a room of this size there should be not less than 15 to 20 sq. ft. of floor area per pupil and an allowance of from 216 to 260 cu. ft. (volume) per pupil.

In standard practice this results in a slightly oblong room with the teacher's desk at one end and a blank wall at the other. Such a room is about 32 by 25 ft. and from 12 to 14 ft. high in the clear, these dimensions varying slightly in differ-

ent cities. In Indianapolis, where school standards are very good, the standard unit (seating 40) is 23 ft. by 31 ft. 6 in.

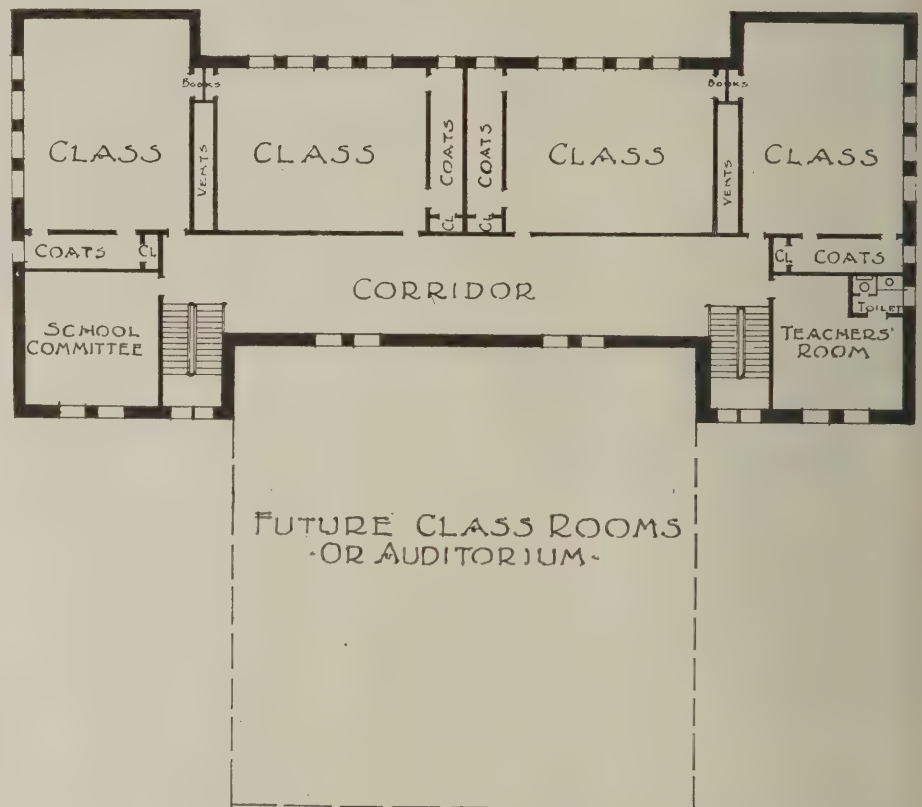
School rooms should have light from but one side, and a moment's thought will suggest why. With windows on two sides, as was formerly the custom, either teacher or pupils must face a row of windows, which is very trying on the eyes. It has now been found that school rooms are better lighted from one side and pupils' desks should be arranged so that the light comes from the left side. Thus right-handed writers cast no shadows on their desks.

Standard school room windows are about $3\frac{1}{2}$ to 4 ft. from the floor (so pupils will not be disturbed by outside traffic) and 6 in. from the ceiling. The total area of windows should be about 40 or 50 per cent of the total area of the window wall; another rule

supervise the cloak rooms. Two doors open into the class room, one at each end, and a window is provided for light. Whether the teacher's desk shall be at the cloak room end of the room or opposite is an open question, but it is probably best to have the cloak room open behind pupils' backs, which is less disturbing.

In some schools general cloak rooms are provided in the basement instead of adjacent to class rooms, but the prevailing custom in standard grade schools is to install a cloak room for each class room as better discipline can be maintained in this manner.

Corridors in the best standard schools are frequently not less than 10 to 12 ft. wide. Minimum corridors are 8 ft., depending, of course, upon location, size of the



One of the newest ideas in a war memorial is to build a Community Memorial Hall in conjunction with a school building. In this case, the memorial hall might well be placed at the front of the building, with separate entrances for the general public who may thus use the building without conflicting with class rooms

is 20 per cent of the room area. It has been found that these formulae provide good light on the row of desks farthest removed from the window. Desks are frequently arranged with six rows of seven each, and rooms are made long and narrow so that good light will reach to the far side. There should be artificial light for cloudy days.

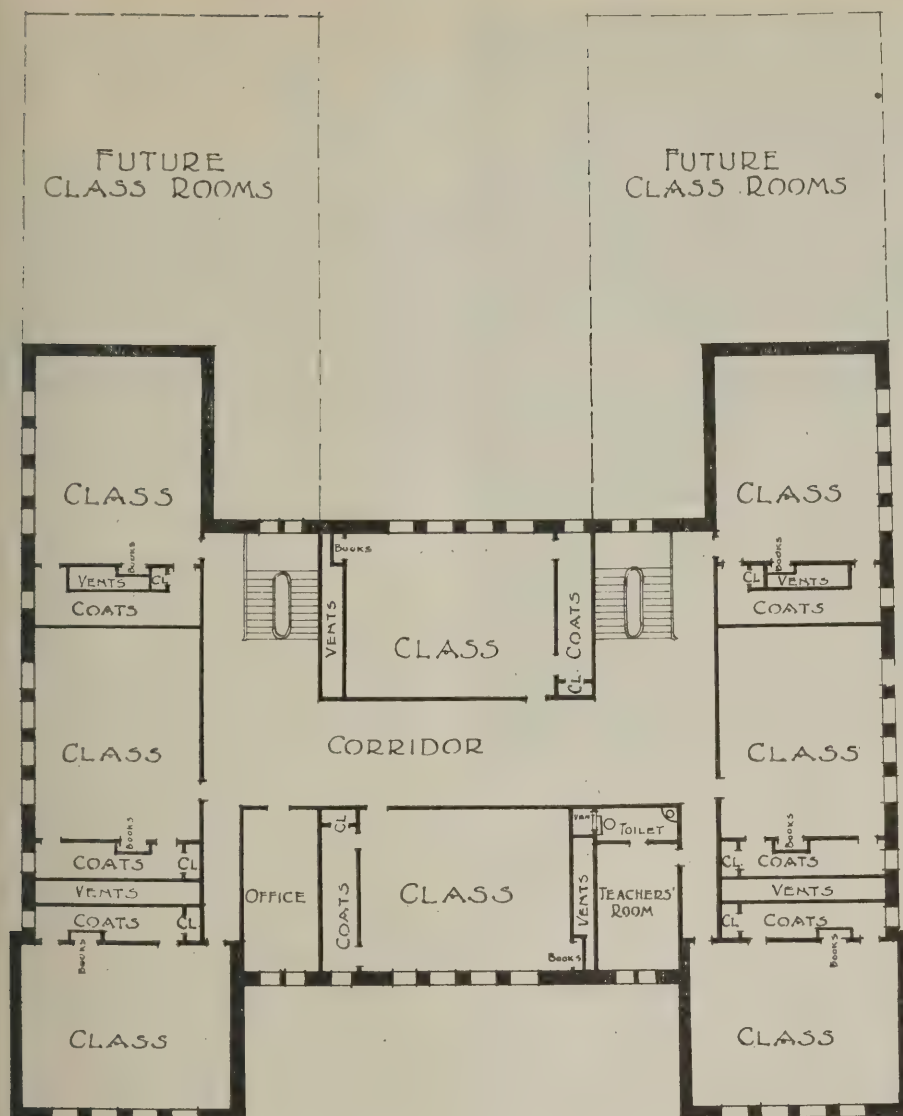
CLOAKROOMS AND CORRIDORS

In the most modern practice in grade schools the cloak room opens directly from the class room and not from the corridor. This, of course, is so teachers can properly

building and number of pupils accommodated.

Stairways are very important, and no other point has been more vigorously standardized in modern buildings. Practically all danger of panic is eliminated (when fire drill is used) with one stairway provided for each group of six class rooms, stairways should be 5 ft. to $5\frac{1}{2}$ ft. wide, which permits two files of pupils with a file for teachers between. There should be two runs of stairs to each story and stair landings should be the full width of the stairs.

In high schools and other large school buildings a late and very good practice is



A good type of large school building, providing for future growth in a growing town containing but a single school building. It is often possible to have the grade schools, high school and joint community auditorium in a single building like this, at less expense than separate structures. Separate entrances can be provided for segregation of pupils of different grades

to build "ramps" (inclines) instead of stairs, leading on a moderate incline from landing to landing. These require considerable more space than a staircase but are much easier to climb.

THE ASSEMBLY HALL

Not every school house has an assembly hall, but a hall is always an ideal desired in modern school houses. The assembly hall is not merely for the use of pupils, but for their fathers and mothers as well. In a community the use of assembly halls by citizens as community centers is a most desirable custom, as nothing contributes more to the general welfare of any town. Community spirit is fostered in this way. The recent war has taught Americans the value of community team work and the school house, with its assembly hall, proves a most important means of bringing this about.

The least desirable place for an assembly hall is on the top floor to which all must laboriously climb. The best place, of course, is on the ground floor. There is an increasing demand for community buildings and many cities, towns and villages will undoubtedly build community halls attached to present school houses. They can be built in the form of wings and will prove useful for pupils or the general public. An excellent idea has been advanced recently by the board of education of Oak Park, Ill., for a "Community Memorial Building" built as a wing attached to a standard school building. The plan of erecting a purely useful building as a memorial for local men who gave up their lives in the service of the army or navy is ideal and should be greatly favored by taxpayers, who appreciate practicable war memorials instead of mere monuments.

THE SIZE AND CHARACTER OF STANDARD SCHOOL BUILDINGS

In many towns and cities the standard school house of two or three stories, or two stories and "English" basement has been adopted. The latter type provides an entrance on the ground level directly into a weather-proof vestibule, from which stairs lead down to the basement (if there is one) and up to the first floor. It has been found undesirable to build grade school buildings more than three stories in height though in some crowded portions of cities where land is restricted it has been found necessary to erect taller and more compact structures. Many experts believe two-story buildings to be the most ideal type.

Toilet rooms are provided in the basement or on each floor (or in both places) and all plumbing and heating apparatus is, of course, absolutely of the first quality.

Fireproof construction in which floors are of hollow tile, gypsum blocks, reinforced concrete or a combination of each are urgently recommended. Walls should be of hollow tile, gypsum blocks, cement blocks, poured concrete or some other type of fireproof construction. With fireproof floors partitions can be changed in later years to suit varying conditions at minimum expense.

Even when concrete floors are employed class rooms are more comfortable with hardwood flooring on top. Corridors, however, may remain with a cement finish, though tile, mastic, composition, terrazzo or other similar material is better.

School houses which are one story in height have proved practical in many places but from purposes of economy it is considered wise in a growing community to build them in such a way that a second story may be added later, if an increase in population requires it. In many instances one-story buildings have been successfully equipped with sky-lights which, of course, preclude adding a second story at some future time.

It has been the experience of many communities that constructing school buildings without considering future enlargement is a waste in the long run. With the idea in view of possible future needs it is not difficult to design a building which may have future stories or wings and provide for that contingency in the original plans. This adds little to the original cost of the building, but saves much when the time comes to enlarge the building.

HEATING AND VENTILATING

Like other factors in the modern school house, heating and ventilation have received the attention of experts, and various methods are now standard.

Many fail to realize that *heating* and *ventilation* are two separate matters and should be considered separately, though heating and ventilation may be combined in a single, comprehensive system.



An example of poor lighting. Room is too short and wide. The windows at the end of the room glare in the teacher's eyes

Heating may be by means of hot-air furnaces (gravity) in the smaller schools; hot-air (blast) or steam (direct or indirect), the latter may be ordinary steam or vapor or vacuum.

Many experts pronounce that a vacuum system with direct radiators in every room is the best system for large buildings when the ventilation consists of a fan-system forcing fresh, washed, humidified (warmed)

air in sufficient quantities to each room.

The so-called "plenum" system of ventilation is still considered the best by many. Roughly speaking, it consists of a stack into which fresh, washed (humidified) air is introduced and after being warmed (to take off the chill) is forced to the rooms by means of a fan. There are various by-passes for introducing any proportion of fresh air required, depending upon weather

conditions, and the amount of air delivered at each room can be regulated locally, by hand or automatically. Foul air is carried off through foul air ducts. Thus, with a separate direct heating system and a separate ventilating system the greatest elasticity in results is possible.

Heating and ventilation for any building, large or small, should be designed by experts and no general rules can be laid down as each building presents its own problem. The general requirements of standard schools is that each pupil should be supplied with 30 cu. ft. of fresh, clean air per minute and the heating apparatus should be capable of warming rooms to 72 degrees in any weather.

REMODELING THE SCHOOL-HOUSE

Every year a great deal of school house building is undertaken and much of this consists in remodeling existing structures.

Many old buildings, of course, are antiquated and the school board is then confronted with the problem whether to follow the design of the old building or not. It has been the experience of others that so far as modern school standards go, it is less expensive and much more satisfactory in the long run to build the new work in strict conformity with the latest practice. As time goes on the older portion of the building may be torn down and rebuilt along more modern lines. To follow out the design of an out-of-date type in a new structure is usually the height of folly though often the design of the latter can be modified in appearance so as to harmonize with the original structure.



Type of three-story grade school adopted in several towns, in which an auditorium is built in the ground floor, directly in front of the main building



A two-story school building with the ground floor entirely above ground. This is a very practicable type of building; the boiler room is usually in a separate wing

HIGH SCHOOLS

High school buildings are in a type by themselves, though they follow somewhat the standards of modern grade school construction. It is not possible within the limits of this article to go into the high school situation, but a future article will be devoted to this important topic.

Jurisdictional Awards

The National Board of Jurisdictional Awards at its meeting at Washington, D. C., on April 26, made the following awards:

Asbestos Plastic for Boiler Rooms, Etc.

The insulation and finishing coat on ceilings with asbestos and other insulating material, where the ground work has been prepared and installed by the asbestos workers, shall, including the application of insulating material on boilers, tanks, vats,

etc., be awarded to the asbestos workers.

"Best Wall" Substitute for Lath and Plaster

In the matter of "Best Wall," jurisdiction shall rest with the carpenters where material is paneled or used as sheathing; when cut, filled and pointed, jurisdiction shall be with the plasterers.

Asbestos Shingles, Prepared Roofing, Etc.

Jurisdiction over asbestos shingles, prepared paper roofing, asphalt rolled roofing, was awarded to the slate, tile and composition roofers. Asphalt shingles and strip shingles awarded to the carpenters.

Erection of Scaffolds

The erection and removal of all scaffolds, including trestles and horses used primarily by lathers, plasterers, bricklayers and masons, shall be done by the mechanics and laborers in these trades, as directed

by the employer. Self-supporting scaffolds over 14 feet in height, or any special designed scaffold, or those built for special purposes shall be built by the carpenters. The making of horses and trestles, other than temporary, is the work of the carpenters.

The dispute between the sheet metal workers, architectural iron workers and carpenters over metal trim, etc., was deferred to the next session of the Board, which is scheduled to meet at Atlantic City on Monday, August 2.

Changes in National Electrical Code

Action taken by the Electrical Committee of the National Fire Protection Association following the public hearing on March 23 with regard to recommended changes in the National Electrical Code:



This Chicago school building is a good example of dignified design and sensible construction. The elaborate cornice is more expensive than would be possible in small towns



An excellent type of good, straight-forward school house design in which architectural simplicity is carried out in good taste. The flat roof is the most practicable type for the modern school house

The limit of low potential systems was fixed at 600 volts instead of 750 volts, as recommended in various sections of the bulletin discussed at the meeting.

The proposal to require polarity identification in all wires installed on and after January 1, 1921, was modified to require that beginning July 1, 1921, twin wires for conduit work and twisted pair wires for armored cable in sizes Nos. 12 and 14 B and S Gauge provide the means for continuous identification proposed in the Bulletin for Rule 26a. Rule 77 on Fixtures to be revised to require identification markings by the fixture manufacturers of the wire connected to the screw shells of socket.

A committee is to be appointed to consider requirements for the installation of concealed extensions from existing wiring in building of fire-resistive construction.

Chances of Reduction in Lumber Prices

No appreciable reduction in the prices of lumber may be expected, judging from the information regarding labor conditions, wages and increases in pay in the lumber industry of the South as contained in a summary recently compiled by the Southern Pine Association from answers received to a labor questionnaire covering the month of January, 1920.

The replies to the questions received from subscriber mills of the association showed that in the woods department the increase in wages for January, 1920, over

January, 1917, ranged from 72 to 147 per cent, the schedules of pay in January last ranging from 32½ cents an hour for common labor to 93 cents for foremen.

In the plant department the wage increase for January, 1920, over the same month of 1917 ranged from 71 to 125 per cent, with the schedules of wages ranging from 32 cents an hour for common labor to \$1.20 for foremen.

All of the mills replying to the questionnaire operated on a ten-hour day basis. For the crews working in the woods, about two hours are consumed each day in going to and from the woods, in most of the plants.

Ten out of fifty mills in February, 1920, reported they were paying bonuses to their employes in addition to their regular wages. Out of 62 mills, 42 paid in cash, 14 by check, six by check in plant and cash in woods; 24 mills had weekly paydays; 27 paid semi-monthly, 10 paid daily and two monthly. Fifty out of 62 mills reported they had sufficient labor for present requirements, the others were from 10 to 50 per cent short.

Information obtained from lumber mill owners from various parts of the South indicate that the present efficiency of labor in production is only about 75 per cent of what it was in the period prior to America's entrance into the world war. In other words the labor in the industry is turning out about 25 per cent less lumber than the same number of workers produced prior to 1917.

The "Duplex" Apartment

It was pointed out by Leon C. Weiss, New Orleans architect, some time ago that the word "duplex," used so generally in that city to describe a form of two-apartment within a regular apartment building was a misnomer. The true form of a "duplex" is a two-story apartment within a regular apartment building. That is, when a given apartment is planned to occupy two floors, just as a two-story house is, instead of having its rooms placed all on one floor, it is technically called a duplex, and this is the term applied to it in New York and other cities where such a type exists. In New Orleans the word is used to describe a building having two flats, one above the other.

It is not to be regretted, however, that the word in New Orleans has taken on a new meaning. It describes very well what it is intended to; and it gives a dignified appellation to a type of structure that otherwise would have become known by the less euphonious (and certainly no more correctly descriptive) term "two-family flats." The word duplex is so well ingrained in New Orleans through customary usage that it is apparent that it will become the final term for this kind of apartment, and affords a flexible means of accurately describing somewhat larger apartments as "quadruplex," etc., or, as is already the case, the latter are being called "four-plex." The cost of building has made all houses an impractical rental investment where the number of apartments is less than four or six.

Business Buildings

THE commercial advantage which an attractively designed business building has over a poorly designed one has long been recognized. Banking institutions were probably the first to fully develop this idea and may be said to have pointed the way for other lines of business. For a generation or more the average bank building has been designed with an idea of expressing strength and dignity and thus attracting patrons. Of course, a few business men yet cling to the idea that any sort of building is suitable so long as the location is good. This idea is not borne out by the facts, however, and many men have seen their trade dwindle merely because a competitor had the good sense to house his business in an attractive building.

Plate 1 shows the Bank of Wisconsin of Madison, Wis. This is a combination banking and office building of the type sometimes known as a "baby skyscraper." It is seven stories in height and of skeleton steel construction. The first three stories are dignified by a stone treatment which employs a modification of the Doric order. The friezes of the base portion and of the cornice are ornamented with medallions, triglyphs and other carving. The upper stories of the building are faced with gray brick. This type of building is quite popular among bankers, as it is held that the income from office rents pays for the upkeep and use of the entire building and at the same time gives a fair return on the investment. In other words, the bank obtains its rent free.

Plate 2 is a telephone exchange building in a suburb of Dallas, Texas. It is a simple design in brickwork with terra cotta trimmings. At the present time the design of telephone buildings involves more features than were considered necessary a few



Plate 1—Bank of Wisconsin Building, Madison, Wis.

years ago. In order to attract efficient operators it has been found desirable to include certain features to add to their comfort, lunch rooms, rest rooms and even



Plate 2—Branch telephone exchange, Dallas, Texas



Plate 3—Store and flat building, Chicago

gymnasiums and rooms for dancing are often provided. It is perhaps not far fetched to venture the statement that before many years have passed every new office building of any pretension will also include

to live in a flat above their store. The corner piers of the first story of this building are open to criticism on account of their narrowness. They should be a foot wider.

ings are usually of heavy duty construction so that they may be utilized as factories, ware houses, printing shops, garages, and so forth. Tile, gypsum or other light materials that are easily built and removed may



Plate 4—Store building at Firestone Park, Akron, Ohio

similar features for the use of the employees of the tenants. Several banks have already taken the lead in this respect and report highly satisfactory results.

Plate 3 shows a combination of a store



Plate 5—Store and office building, Oklahoma City, Okla.

and flat building. The construction is of brick with terra cotta trimmings. This combination type is a very popular one in cities, as many merchants find it convenient

Plate 4 shows a small store building in the Firestone Rubber Company's housing development at Akron, Ohio. This building is of brick with stone trimmings and contains two store rooms. It is an attractive building, not overdone in treatment—the wide corner pieces are especially good and are a vast improvement over the "skinny" appearance that is so noticeable a detail of many modern business buildings. Of course, narrow piers allow the use of wider sheets of plate glass in the show windows, but it should also be considered that a few inches in the width of a pier often makes all the difference in the world between a good looking building and a cheap one. It should also be remembered that modern merchants are beginning to see the value of displaying only one or two objects in a show window instead of trying to exhibit the whole stock at one time, thus the space required is not so great as formerly. Window decoration has become an art. It is said that the decorator who has charge of the show window decoration of one of the great retail stores receives a bank president's salary per year for his services. A feature of his designs is simplicity, seldom more than one or two objects or products are displayed in a window. With such a method it is of course necessary to change the display frequently.

Plate 5 shows a combination store and office building. This front is faced with terra cotta and shows the suitability of this material for small buildings.

Plate 6 shows an automobile sales room with lofts above. The floors of loft building be used to divide the floors into suitable

sizes for the accommodation of several tenants if desired.

A Sound-Proof Room

Glass enclosed, sound-proof rooms for babies is one of the features of the Park moving picture theater at Austin, Minn. The mothers can enjoy the show, the babies exercise their lungs, and the theater patrons keep happy.



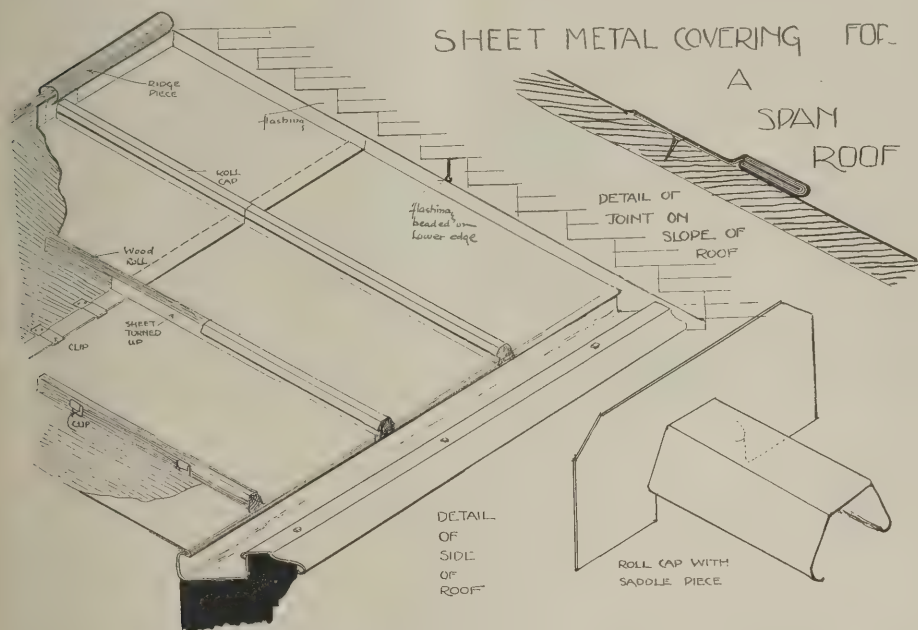
Plate 6—Store and loft building, Oklahoma City, Okla.

Roll-Seam Metal Roofing

By John Y. Dunlop

AS METAL expands or contracts in accordance with the rise or fall of the temperature, sheet metal, such as tin, zinc and lead used for roofing cannot simply be nailed to the roof boards as felt, shingles, and so forth, are secured, but must be

wooden rolls about three feet apart. Being doubled over the upturned edge of the sheet, the clips hold them down without hindering the movement due to expansion and contraction under changes of temperature.



allowed free play. Otherwise the covering is almost sure to be torn sooner or later.

The common method is to secure the sheet metal by means of clips, one end of which is nailed to the roof boards and the other end folded into the seam between the sheets. These methods are known as the flat-seam method or the standing-seam method, depending on whether the seams are left standing above the roof surface or are folded down flat. A variation of the standing-seam, known as the roll-seam, is discussed in this article. The roll-seam method is especially adapted for use on conspicuous roofs where the heavy rolls provide a certain decorative effect.

The framework of a sheet-metal roof consists of wood joists or rafters covered with roof boarding carefully dressed to a uniform thickness. The roof boards should be tongued and grooved to prevent warping and laid with their length in the direction of the slope of the roof.

Wood rolls are used for the longitudinal joints, or those parallel to the fall of the surface. The metal sheets run lengthwise down the slope of the roof, their side edges being turned up against the rolls.

In Sketch 1 a section of one of these rolls is shown, in which the shaded portion represents the clips, which are strips of sheet-metal two inches wide, fixed to the

pointed piece of sheet-metal two inches long by about an inch wide, one end of which is soldered to the inner surface of the cap at the top, the point remaining free. As the cap slides onto the roll the points of these forks slip in between the hooked portion of the clip and the side of the wood roll, thus preventing the cap from flying off, without impeding its expansion and contraction in the direction of its length.

The upper end of the roll caps, which in Sketch 2 is against the ridge, and in Sketch 1 against the circular wall, are prepared with a saddle piece which, when in position, is dressed up against the upturned end of the sheet.

At the lower or gutter end the cap is cut on the sides flush with the end of the roll. The projecting part is then flattened out and cut to the shape of the end of the roll, plus one-eighth of an inch on each side for forming the joint.

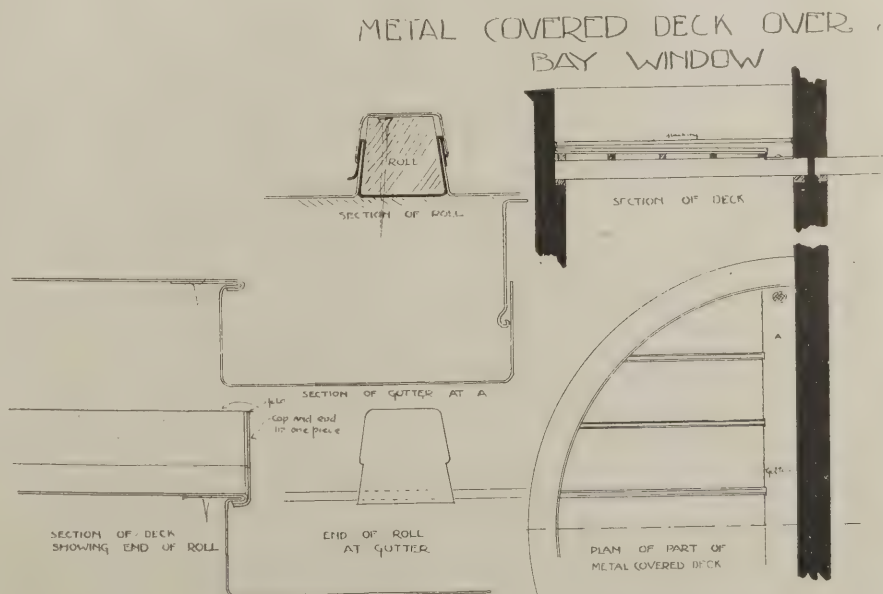
The end should then be folded over the end of the wooden roll and the side edges malleted down to the sides of the cap and soldered, or the edges of the end piece may be bent under the cap. The lower edge of the end piece should be bent around the drip formed by the upstand of the gutter and the roof sheet. This arrangement does away with soldered joints and allows perfect play under expansion and contraction. An ordinary flat seam, as shown in Sketch 2, is used to connect the sheets between the rolls.

The junction of metal roofs and gutters with walls and chimneys must be carefully made by means of sheet-metal aprons and

After the sheets are laid the top of the rolls are covered with the caps, also formed of sheet-metal, and doubled down, as shown.

In very exposed situations the clips may be made much longer and after being turned down may be turned up and bent over the top and fastened there.

The cap piece of the roll may be secured by a simple connection consisting of a



step flashing secured into the joints of the brickwork with cement mortar.

Snow boards should be fixed over all gutters that abut parapet or other walls. These consist either of longitudinal bearers to which transverse laths are nailed or, better still, of transverse bearers arched on the underside to allow the passage of water down the gutter and covered with laths laid in the direction of the length of the gutter. The laths should not be more than one-fourth of an inch apart. The object of the snow boards is to keep the snow quite clear of the gutter and so afford a free passage for the water during a thaw.

Although lead is seldom used as a roof covering any more, Sketch 3 shows how a roll-seam roof may be constructed with this material.

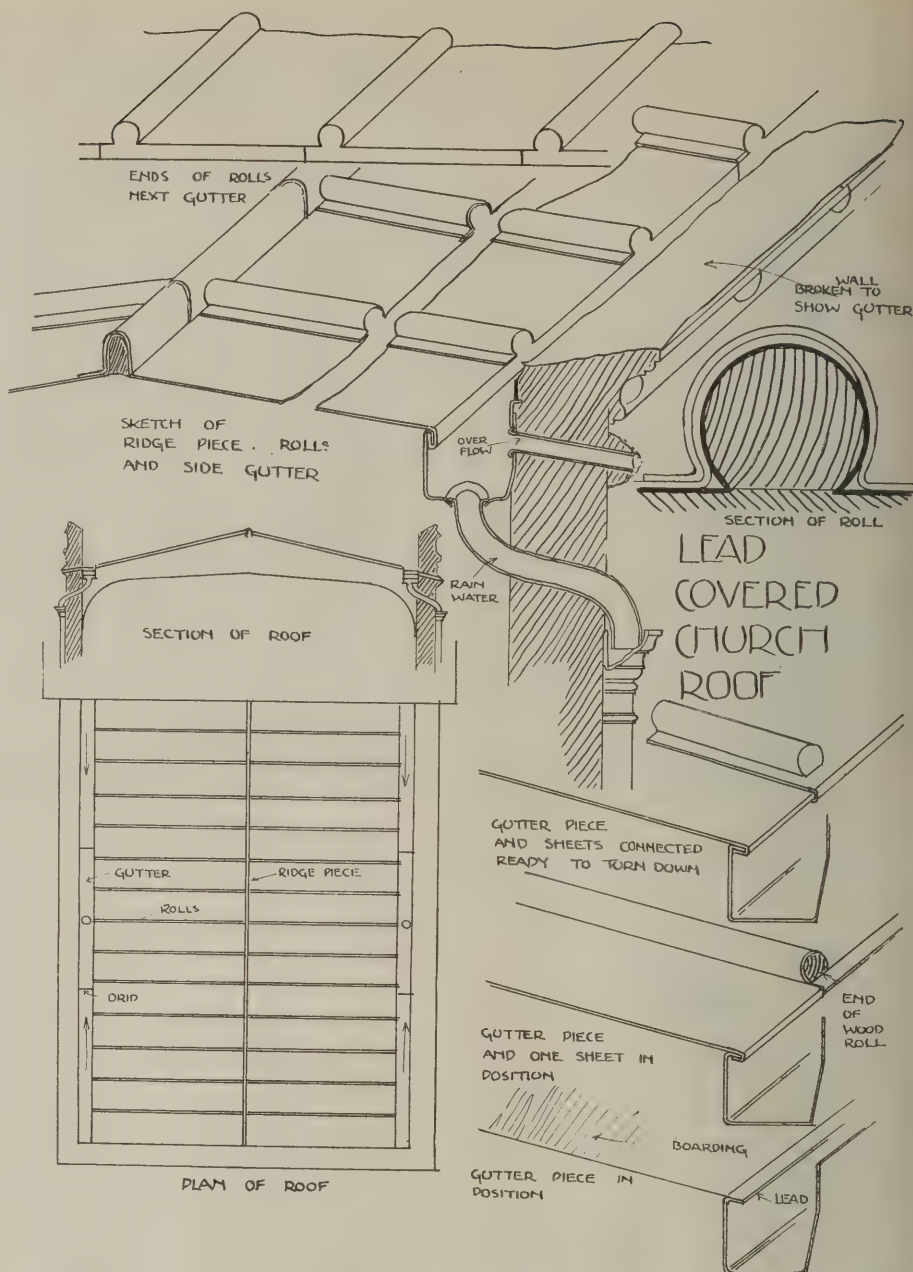
One edge of the sheet-lead is nailed to one of the wood rolls, the other edge being dressed over the next roll, but is not nailed or fixed in any way.

Wood rolls are usually 2 or 2½ inches in diameter and the spacing the rolls is generally regulated by the width of the sheets, the size of the rolls and the overlap of the lead. Thus sheets 8 feet wide are often cut into sheets 2 feet 8 inches wide. If 4 inches along one edge of each sheet be dressed up to form the overcloak and the splash-lap, the flat portion of the strip will be 1 foot 9 inches wide and this gives the distance apart of the rolls which will therefore be 1 foot 11 inches from centre to centre.

The fall or slope of flat lead covered roofs should not be less than 1½ inches to 10 feet. A fall of 3 inches in 10 feet is only one in forty. Not by any means an excessive slope for the conveyance of dirty rain water and melting snow.

In Sketch 3 the joint where the upper ends of the sheets meet is formed by a wood ridge roll. This ridge roll is 4 inches high and the cross-rolls butt against it. The ends of the sheets are wrought over the ridge in the same manner as the edges of the sheets are secured to the cross-rolls. Of course there is some difficulty in working sufficient lead forward into the corner at the ridge in order to get sufficient material to form the junction of the two rolls and at the same time cover the ridge.

At the lower end of the sheet the wood roll is cut flush with the side of the gutter and when the sheet which forms the splash lap or under cover is wrought over the wooden roll it is trimmed off flush with the end of the roll. The edge of the sheet next to the gutter is then secured to the up-standing edge of the gutter with a lock seam. The sheet which is to form the overcloak is now laid in position, and as it is dressed over the roll it is also wrought around the end of the roll. The edges around the end of the roll are then trimmed off with the lead knife and the projecting edge of the sheet is turned around the edge



of the gutter piece, as shown in the top sketch of the gutter.

The upstand of the gutter next to the roof is dressed up flush with the roof boarding, where it is turned out for one inch in a horizontal position ready to be seamed to the lead covering of the roof. On the wall side the upstand should be dressed up for at least four inches and counter-flashed, and at no point in the length of the gutter should the top edge be below the centre line of the overflow pipe. Otherwise in the case of a choked rain water pipe the gutter might overflow behind the back of the upstand before it had reached the level of the overflow pipe.

The connection of the overflow and the rain water pipe to the gutter is shown in the line drawing, in which the end pipes are shown slightly flanged and soldered to the gutter. The overflow is, of course, taken through the wall to discharge on the outside.

National Federation of Construction Industries

The National Federation of Construction Industries is engaged in a vigorous campaign to enlist new members. The main purpose of the Federation is to co-ordinate the various national construction associations, of which there are approximately 200, in a program for the improvement of the industry.

This program includes efforts to increase the efficiency of transportation of building materials, improve the financing of building operations, and better construction practices.

The programmes laid out by the Federation are of national scope and the work to be accomplished would be impossible by any other than the united agencies comprised in the Federation.

A Housing Development

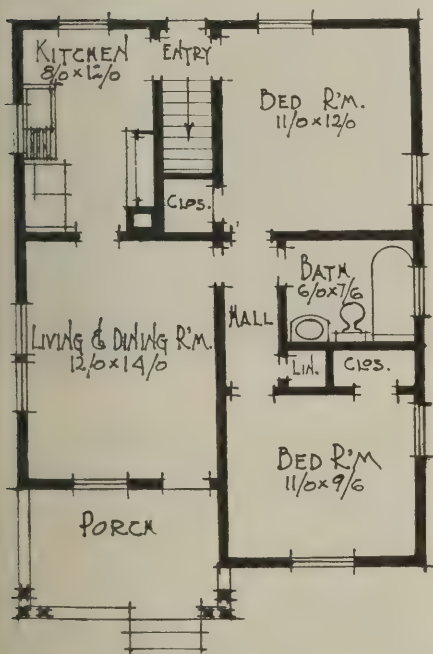
A FEW of the houses built by the U. S. Housing Corporation in Rock Island, Illinois, are shown in the illustrations

boards for finishing the walls. Sometimes the two materials were combined on a house.

This type of house is usually most effective when built on a corner lot, as was done on this project.



Plate 1—House D 1. A double house with a pleasing roof outline



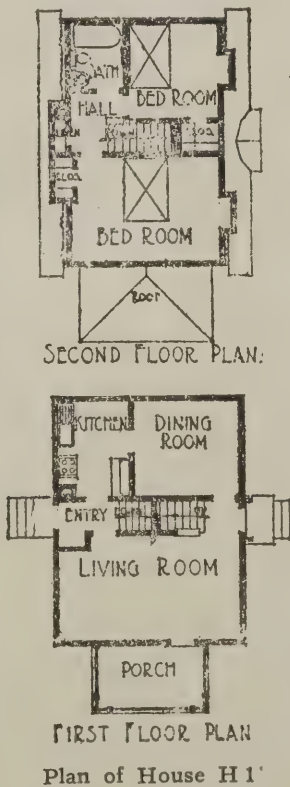
Plan of House C 1

herewith. Cervin & Horn were the architects in charge of this work. The project involved 217 dwellings, 34 of which are provided by semi-detached or double houses.

Only eight separate types of plans were used, but seventeen types of elevations were provided. Thus in some cases a single plan was provided with a choice of three different elevations.

Further variety in the exteriors was obtained by using either stucco or clap-

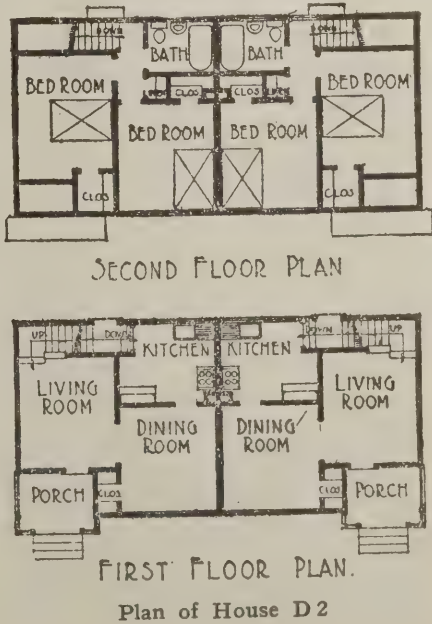
Type D 1 is a double house having four rooms in each half. Plans of this house are not available. The living room runs the full width of the house and is separated



Plan of House H 1'

from the combination kitchen and dining room by a central stair. Upstairs are two good sized bed rooms and a bath room.

Type C 1 is a four-room cottage of the bungalow type. A small hall leads from the combination living and dining room to the two bed rooms and the bath room. A feature of this plan is the relation of the kitchen to the larger bed room, making it possible to use this room as a dining room if desired. The arrangement of the rear entry and basement stairs is compact and convenient. Ample closets are provided for the bed rooms and for linen and all rooms have cross-ventilation. The roof is hipped and has louvers for ventilation. This latter feature is often omitted, but it should be



Plan of House D 2



Plate 2—House C 1. A bungalow with a combination of stucco and clapboards on the walls



Plate 3—House H 1 in the foreground. House D 2 on the right in the background

remembered that a free circulation of air in an attic space means a decided difference in the temperature of the rooms below. They can be designed so they may be closed during cold weather.

Type H 1 is a Dutch Colonial cottage having five rooms. The living room extends across one end of the house, with the kitchen and the dining room at the other. The entrance is from the side and opens into the hall, which contains the stair to the second floor. A porch adjoining the living room extends across one end of the house. This porch could be glazed if desired, thus rendering it available for year around use. The exterior details, such as the entrance, dormers and porch, are well proportioned and interesting.

Type D 2 is a double house having five rooms and a bath room. The exterior appearance of this house is almost identical with that of D 1, the principal differences

being the use of a gambrel roof and a recessed porch on D 2. The floor plans of D 2 are very compact. On the first floor the stair rises from the end of the living room. The living room and the dining room open into each other through a cased opening and the kitchen is provided with a grade line entrance that is convenient to the kitchen stair. The bed rooms may be criticised for the lack of cross-ventilation.

Compared Building Costs

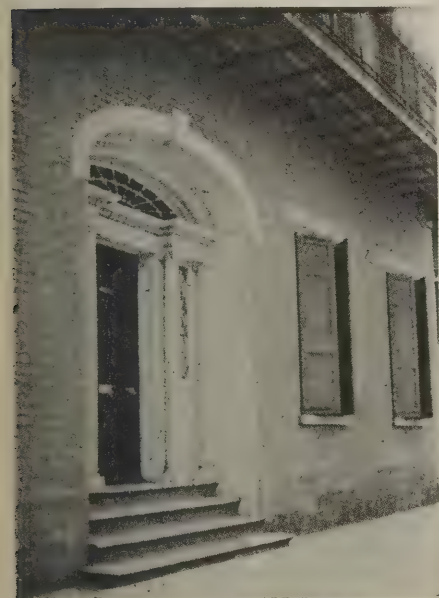
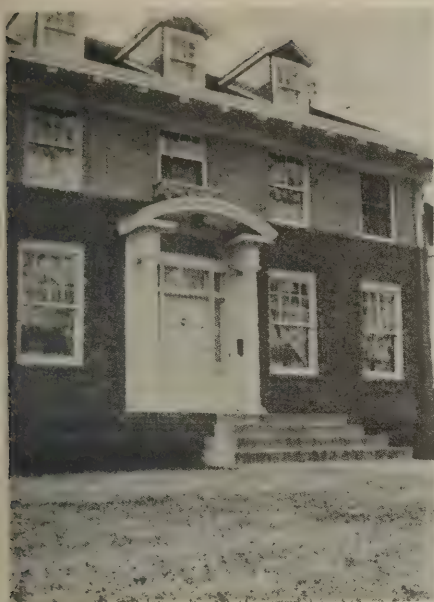
Members of the National Association of Real Estate Exchanges have secured, compiled and submitted figures to the Chamber of Commerce, according to the Colorado Springs Telegram, showing the comparative prices of building materials in Colorado Springs and about fifty other cities.

Figures were secured from leading cities of Colorado, Ohio, Georgia, Pennsylvania,

Maryland, New York, Alabama, Iowa, West Virginia, Illinois, South Carolina, Michigan, Indiana, Kentucky, Arkansas, Tennessee, Wisconsin, Minnesota, New Jersey, Louisiana, Rhode Island and District of Columbia. The figures are as follows:

Colorado Springs—Common brick, \$14; sand per ton, \$1.50; gravel per ton, \$1.50; cement per barrel, \$3.10; lime per barrel, \$2.85; sheathing, \$54; finish white pine, \$142; shingles, wood, \$8.75; flooring, yellow pine, \$167; maple, \$205; oak, \$285; lath, \$20; framing, yellow pine, \$68.

Comparative prices elsewhere—Common brick, \$14 to \$31.50; sand, \$1.25 to \$5.18; gravel, \$1.50 to \$5; cement, \$2.40 to \$6.75; lime, \$1.75 to \$4.10; sheathing, \$45 to \$143; finish, white pine, \$100 to \$142; shingles, \$8 to \$15; flooring, yellow pine, \$90 to \$190; maple, \$140 to \$275; oak, \$152 to \$350; lath, \$16 to \$27.50; framing, yellow pine, \$45 to \$100.



ENTRANCES

How to Estimate Cornice Lumber and Outside Finish

By I. P. Hicks

TO FIGURE the cornice lumber and outside finish required for a building is sometimes quite a job, this is particularly true where there are two, three or more different widths and forms of cornice such as are to be found on most residences that are now being erected. Although the cornice may all be similar in design, there will be variations in the widths of the members so that it is necessary to order correct widths of materials in order to facilitate the work and make it easy of construction.

Many times the gable cornice will vary from the level cornice. Sometimes the gutter forms the crown mold on the level cornice and crown mold is needed only for the gables, but the bed mold will be needed for both the level and gable cornice. Cornice for the dormers will usually be a little smaller than the cornice for the main building. Cornice for bay windows will also be a little different. Porches, too, will always be a little different. All these tend to confusion in making the estimate, and the result is that many will just make a guess at it instead of carefully figuring out the amount of the different items that will actually be required.

There is an old saying that "Everything is easy to the one who knows how." There is a world of truth in this old saying and to make it easy for one and all to accurately estimate the finish lumber for cornice, base, belt courses, corner boards, etc., we will give a system that anyone can follow with the greatest of accuracy.

Remember, it is always best to add to the actual measurements from one to two boards of each kind to make up for the waste in cutting and the unforeseen places that may require some finish lumber. On some parts where everything is clear and you positively know that you are right, you need add nothing. This will apply to gable verge boards, it is easy to figure the exact number and length of these, also in figuring porch frieze. But if in any doubt always add a little to the length. It is always better to have a few feet left over than to lack a few feet.

THE WAY TO DO IT

Take the plans and go over them and write down the lineal feet of each kind of cornice, stating the number of members and the dimensions of each as follows:

Level cornice, 110 lineal feet. One 6-inch member, one 10-inch ceiling planer, 2 feet

wide; bed mold, No. 8016.

Gable cornice, 96 lineal feet. One 8-inch member, one 2x10 verge member; ceiling planer, 2 feet wide, No. 8016 bed mold and No. 8285 for gable crown mold.

Dormer cornice, 40 lineal feet. One 8-inch member, 20 feet; one 6-inch, 20 feet; one 2x8-inch member, 20 feet; ceiling planer, 1½ feet wide, bed mold No. 8016, crown mold No. 8285, both level and gable.

Porch cornice, 40 lineal feet. One 1x12-inch member, one 1x10-inch, one 1x6-inch, one 1x4-inch; ceiling planer, 1½ feet wide, bed mold No. 8016. Porch ceiling mold, 64 feet.

To this figure the porch rail as shown by the plans. If a sided rail, figure the mold around the rail both inside and outside. We are merely giving the system; the estimator will of course be governed by the plans he has.

Outside base, 120 lineal feet. One member, 1x8; watertable No. 8284.

Porch base, 40 lineal feet. One member, 1x8.

Porch steps, four 1½x12x6 feet.

Risers, three, 1x8x6 feet.

Cove mold for base and steps.

Corner boards, 6 corners, 16 feet. Two members 1½x4 inches, with quarter round.

We will now proceed to show how to estimate from the data which we have taken down and which we will suppose has been taken from a plan. From the plans we take the actual measurements, and in figuring the quantities we add for waste in cutting and for possible contingencies.

THE ESTIMATE

Level cornice, 10 pieces, 1x10x12 feet.

Level cornice, 10 pieces, 1x6x12 feet.

Bed mold, No. 8016, lineal feet, 120 feet.

Ceiling, square feet, 280.

Gable cornice, 7 pieces, 1x8x14 feet.

Gable verge, 4 pieces, 2x10x12 feet.

Bed mold, No. 8016, lineal feet, 96.

Crown mold, No. 8285, lineal feet, 96.

Ceiling, square feet, 240.

Dormer cornice—

2 pieces, 1x8x12 feet.

2 pieces, 1x6x12 feet.

2 pieces, 1x4x12 feet.

2 pieces, 2x8x12 feet.

Bed mold, No. 8016, lineal feet, 40.

Crown mold No. 8245, lineal feet, 40.

Ceiling planer, square feet, 80.

Porch—

2 pieces, 1x12x12 feet.

1 piece, 1x12x16 feet.

2 pieces, 1x10x12 feet.

1 piece, 1x10x16 feet.

2 pieces, 1x6x12 feet.

1 piece, 1x6x16 feet.

2 pieces, 1x4x12 feet.

2 pieces, 1x4x14 feet.

Bed mold No. 8016, lineal feet, 42.

Porch ceiling mold, lineal feet, 64.

Ceiling planer, square feet, 80.

Outside base, 8 pieces, 1x8x16 feet.

Watertable, No. 8284, 128 feet.

Porch base, 1 piece, 1x8x16 feet.

Porch base, 2 pieces, 1x8x12 feet.

Porch steps, 2 pieces, 1½x12x12 feet.

Stringers, 1 piece, 1½x12x10 feet.

Risers, 2 pieces, 1x8x12 feet.

Cove under floor and steps, 72 feet.

Corner boards, 12 pieces, 1½x4x16 feet.

Quarter round, 6 pieces, 16 feet long.

What we have given has been to show the correct method of estimating and if those who have estimating to do will take the plans and go over them in the manner described and set forth in this article, they will find that they can arrive at very close results and probably not consume any more time than they have been doing in their usual way of doing the work of estimating.

At any rate it is worth a little time to know that you are right. Try this system on your next estimate. It will apply to many more parts of estimating than we have mentioned. If you will try it out you will have many things come to your mind where you can use the system much to your advantage in making estimates.

The Big Trouble With Building Construction

At the last analysis, the utter demoralization and breakdown of our transportation system will be found to be the primary cause not only of, in a large measure, the increased cost of building construction, but will be found to be the real reason why so much important construction work has been abandoned.

At no time since the armistice has the transportation system of the United States functioned even at 50 per cent of its pre-war activity, and at the present to say that it is supplying even 10 per cent of the actual demand will be stating the facts most optimistically.—*Bulletin Illinois Society of Architects.*

A Distinctive House

ONE of the most difficult problems which a designer faces is to impart distinction to a house and at the same time retain a homelike feeling combined with good taste. It is simple enough to do something "different" in the way of design—any half fledged draftsman can evolve a design the like of which was never before seen on earth nor in the heavens above. But when it comes to combining distinction, charm, good taste, economy and the many other virtues that go into the making of a successful design for a home, then is when common sense, training, and that more or less elusive faculty known as talent, are called into play.

Too many people consider that making a design (especially one of a house) consists of drawing a few lines on paper to indicate the rooms; inventing or "borrowing" a varied assortment of knick knacks to trick it out with and then standing back to say, "Oh! See the pretty house I made." If these people could see a conscientious designer "sweat blood" over his work, or overhear the more or less personal remarks which he frequently addressed to his creator their ideas that designing is a parlor game would no doubt be changed. In fact, it might become evident to them that real designing has quite a close resemblance to good, old-fashioned, hard work.

The house which is the subject of this article was designed by W. Gibbons Uffendell, architect, for Mr. A. L. Pedersen of Chicago. It is a charming example of the French and perhaps the English styles adapted to an American plan. The house has a solid character seldom seen in houses of this size, and it makes one think that here is a home worthy of being handed down to future generations and becoming a family heritage.

The exterior is a simple and straightforward piece of brickwork, relying almost entirely on good proportions for its effect. The details are restrained and well studied and placed. The carved stone and the brick panels, the show rafters and the beader courses add just the right touch of interest to the plain walls, and the well designed entrance dominates the front of the house without becoming unduly conspicuous.

The parapet walls at the gables add to the apparent solidity of the building and are responsible for much of its distinction. The use of brick copings is generally avoided, but when they are pitched as steeply as on this building they cannot retain water and will probably never prove to be a source of trouble.

Casement windows with small panes are used almost exclusively in this house, thus affording the maximum of ventilation as

well as adhering to the style upon which the design is based.

The property extends down to the bank of the North Branch of the Chicago River and the appearance of the rear thus becomes quite important. Trellises and seats have been added around the rear entrances and a terraced garden is being put in from the house to river bank.

The basement has concrete walls and floor slab and extends under the entire main body of the house. The slope of the grade is toward the rear, making it possible to use large windows in one wall of the basement and avoiding the use of areas or

A full page illustration of this house and complete set of the building plans reproduced from the original drawings are shown on the following pages.

windows in the other walls. Laundry tubs are provided in the basement and a clothes chute with a door in the bottom terminates about five feet above the floor and near the tubs. A sheathed partition separates the laundry from the boiler and coal rooms and the latter is provided with a coal chute near one corner.

On the first floor the entrance is through an open vestibule or loggia which is paved with brick. The living room extends across one end of the house and has a fireplace near one corner. French doors balance the fireplace near the other corner of the room and open onto the brick paved porch.

Opposite the cased opening which opens from the hall into the living room are French doors leading to the dining room. A long window in the dining room and the fireplace in the living room terminate the vistas through these openings.

The pantry is fitted with shelves and a built-in cabinet and has an outside icing refrigerator in one corner. A short passage leading to the hall makes it possible to reach the front door without passing through the dining room. A toilet and a coat closet also open from the passage. The pantry is large and a slight rearrangement in this corner of the house would make it possible to include a breakfast alcove in one end if desired. Breakfast alcoves are convenient, both for family use and for the use of servants.

The kitchen is placed in a small wing and has an outside door and small porch in one corner. The arrangement of its windows is excellent, giving direct cross ventilation. A cupboard is built into the angle formed by the stair which leads to the maid's room above, and under the stair is a storage closet. The outside steps to the basement are under the kitchen porch.

The main hall runs entirely through the house and a glazed door and side-lights are placed in the end overlooking the river. A stair under the main stair leads to the basement. Midway up the main stair is a landing which has a seat and also overlooks the river.

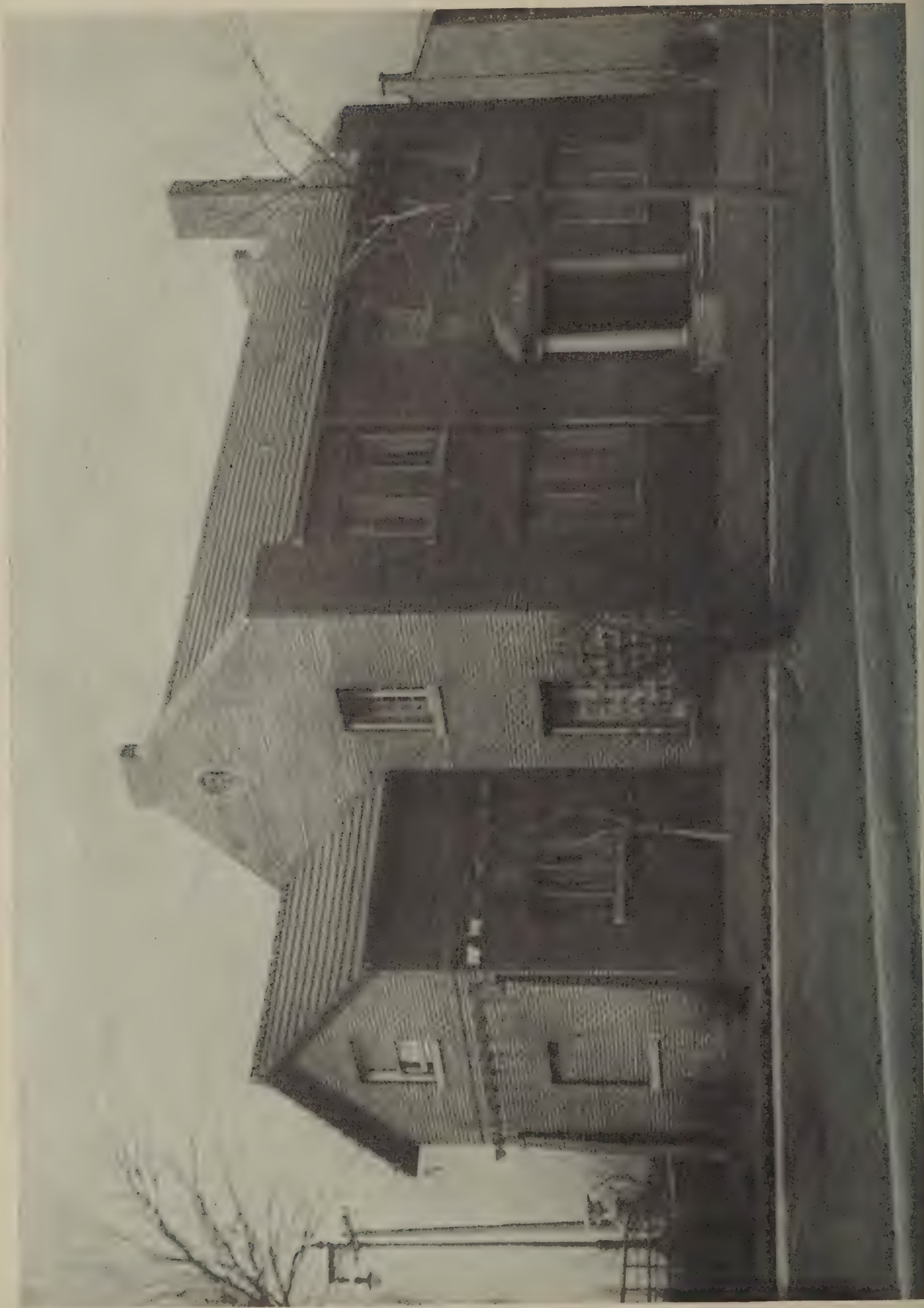
The second floor has a large hall well lighted from the windows on the landing and forming a convenient up-stairs sitting room. The bathroom is placed across one end of the hall. The main bedroom extends across one end of the house and has two roomy closets, one of which contains a built-in safe. Each of the closets has mirror doors. French doors lead from this room onto a sleeping porch.

At the other end of the house are two smaller bedrooms, each of which has large closets. One of these bedrooms opens into the maid's room, thus making it desirable for the use of children.

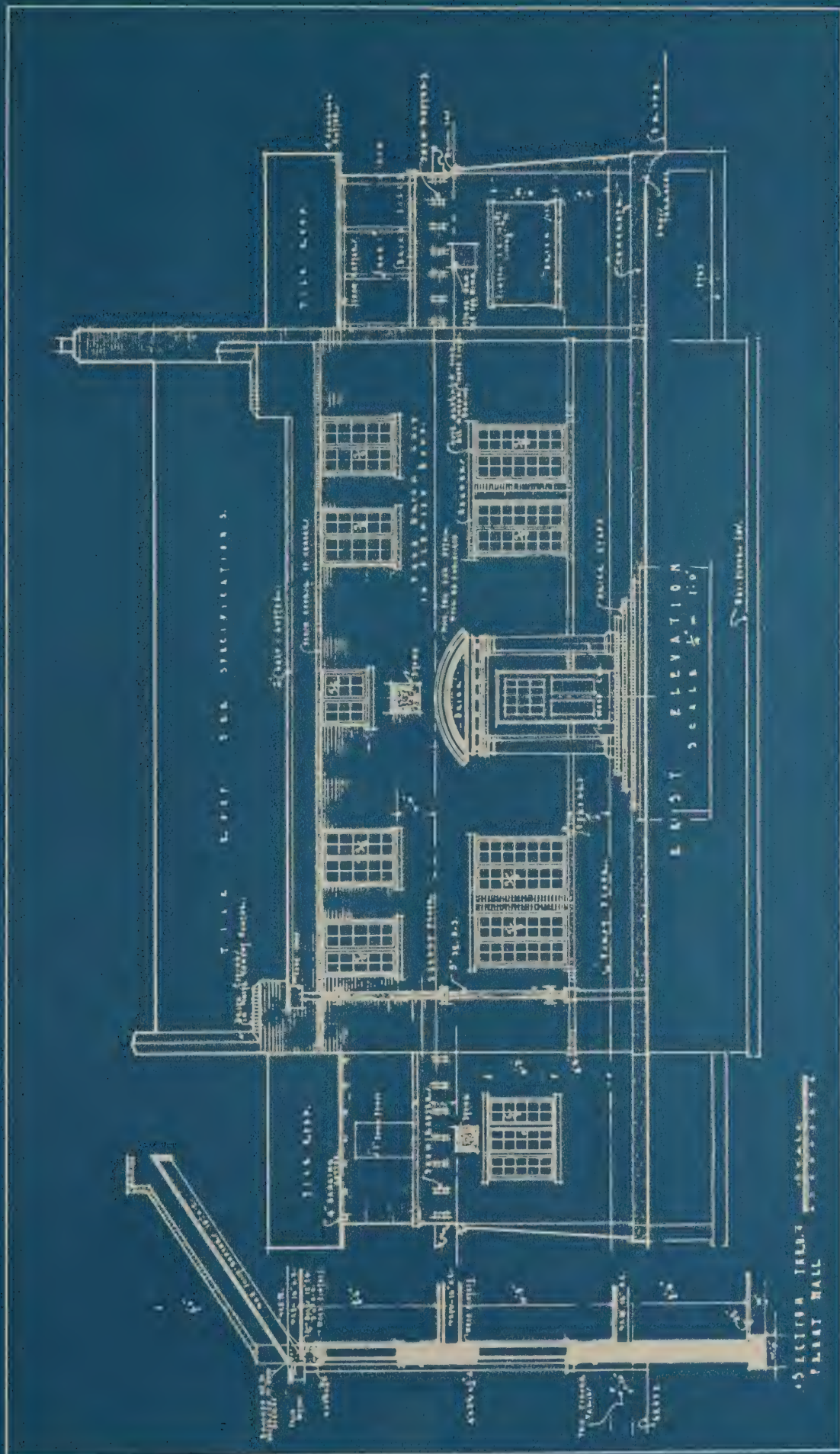
The absence of a bath for the use of the maid is a feature that would not be accepted by every one. Linen space is also cramped, but both of these faults could easily be corrected.

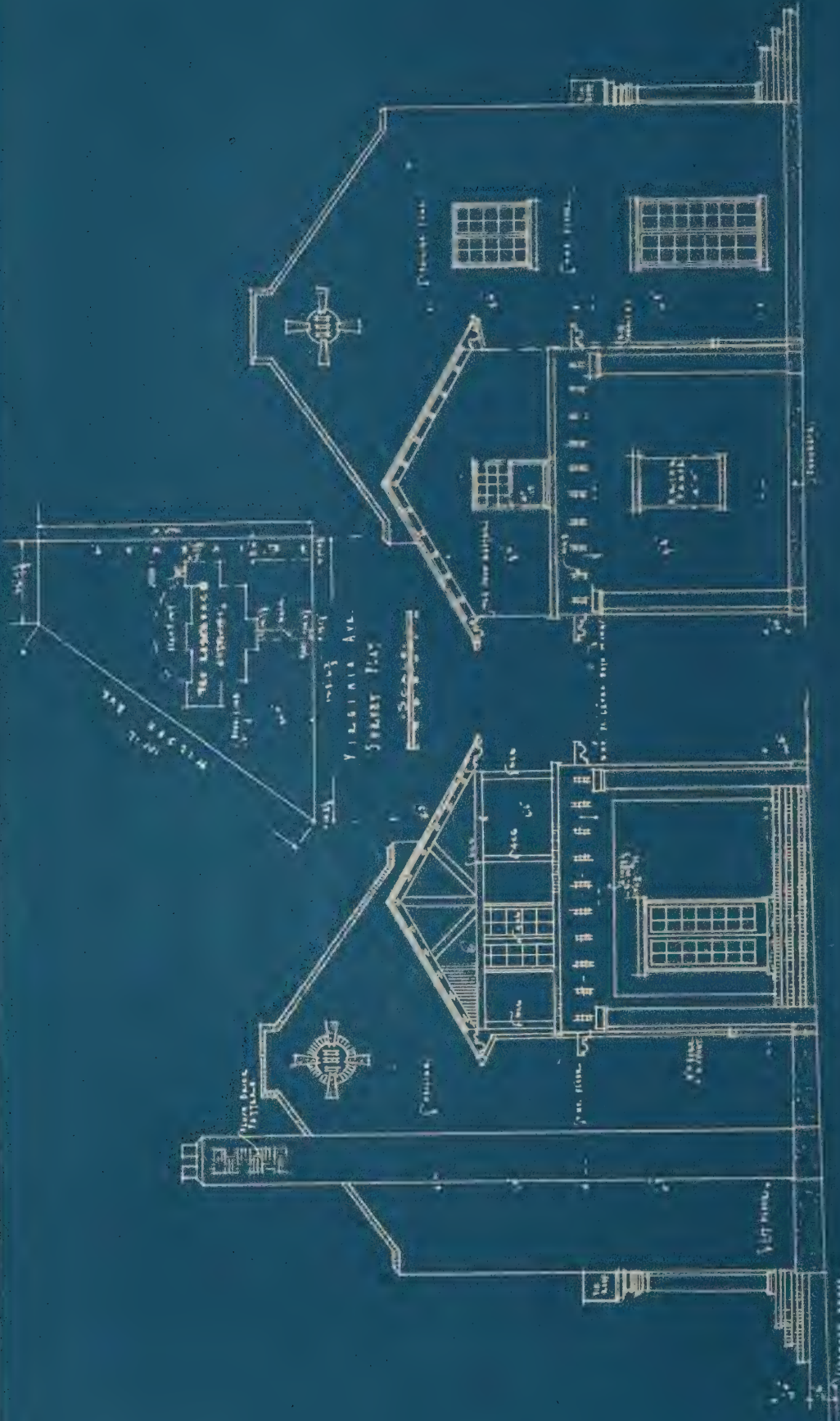
Note that the clothes chute terminates at the second floor level and is reached by means of a small door near the landing. This is a good scheme for saving space in the closet above it.

This house is by no means intended to represent an ideal home suited to every one. In fact, there is no such animal as an "ideal home." Tastes and requirements differ too much to make such a thing possible or desirable. Like tailor-made clothing, a well designed house suggests the personality of the owner. This house, however, combines simplicity, charm and a livable quality that should appeal to the owner throughout his lifetime.



• DISTINCTIVE HOUSE—Residence of A. L. Pedersen, Chicago. W. Gibbons Uffendelle, architect. See descriptive article on preceding page. Complete plans reduced from original drawings on following pages

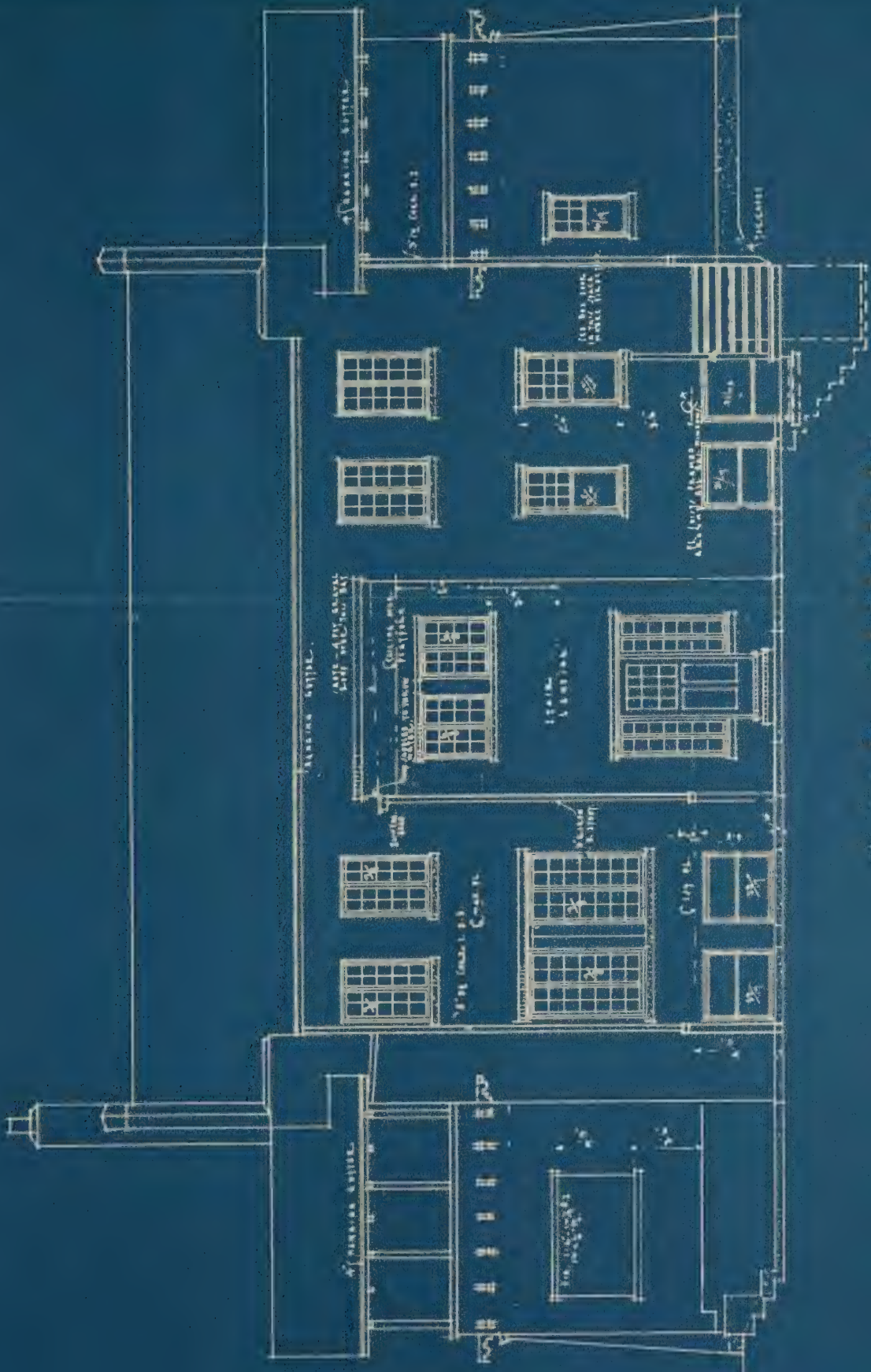




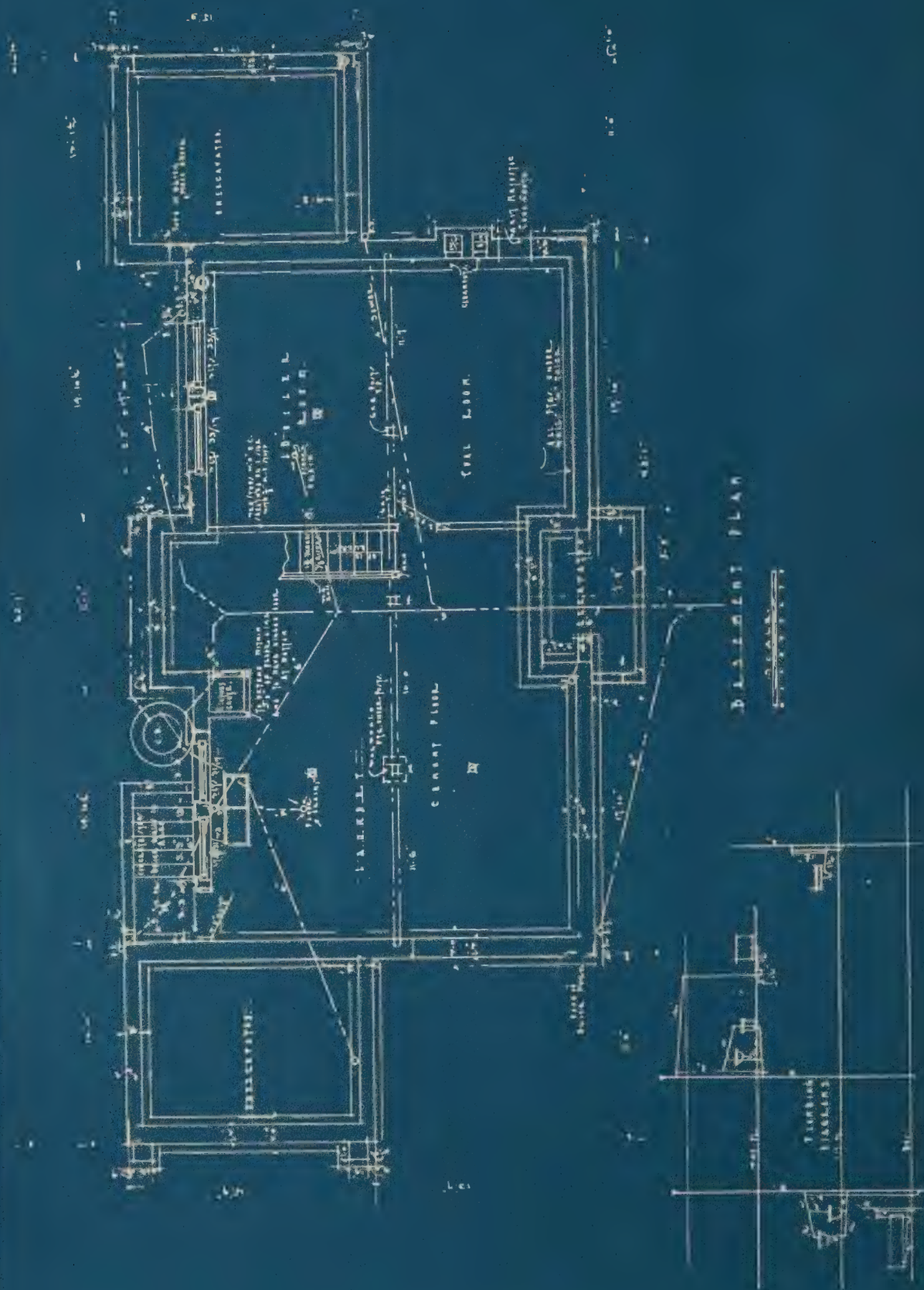
SOUTH ELEVATION

NORTH ELEVATION

1/4" = 1' SCALE



REAR ELEVATION



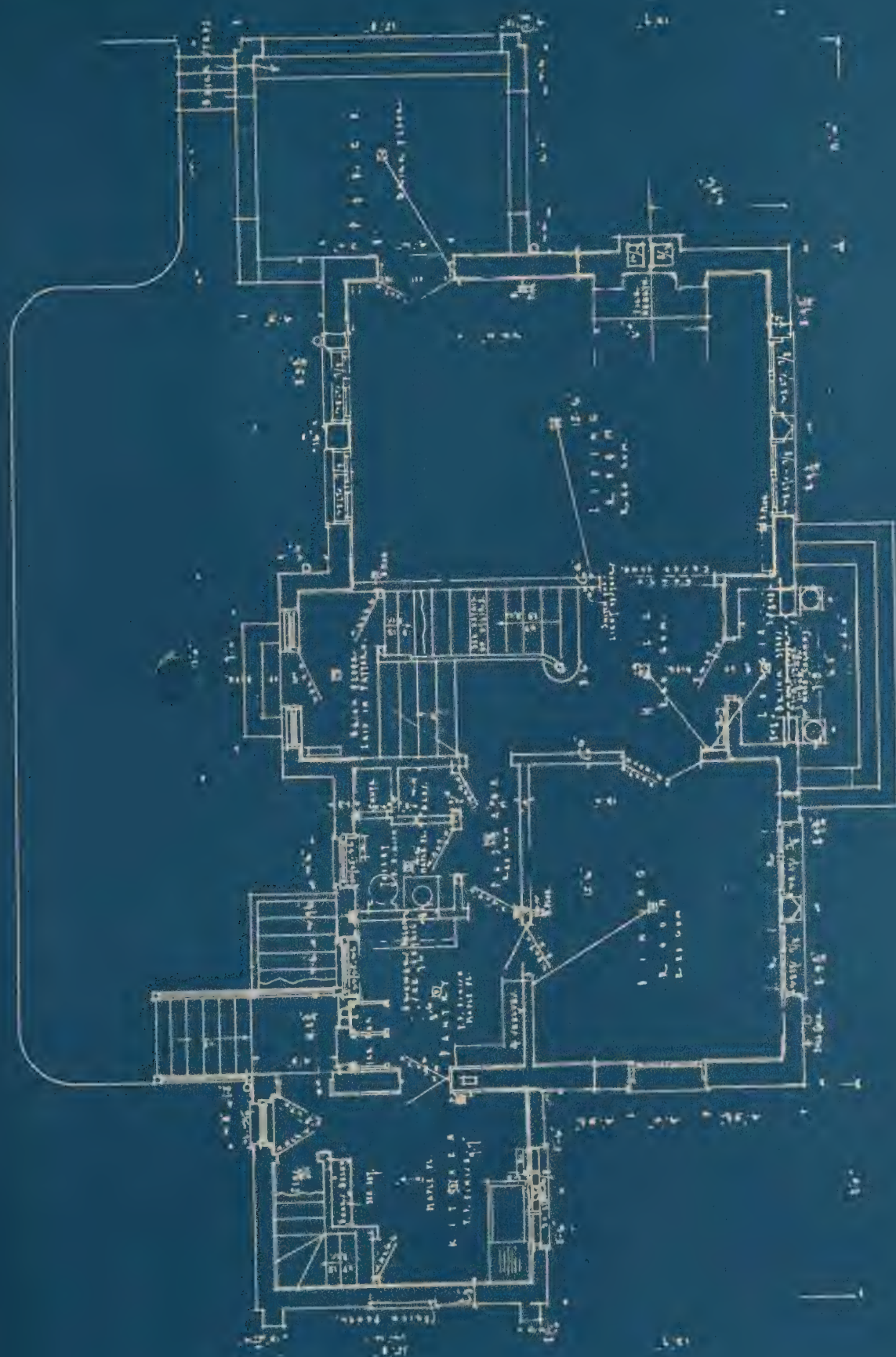


FIG. 5 T. 1110 B.



Moving Picture Theatres

Third Article

THE legal requirements governing the planning of picture houses vary somewhat among the different states and municipalities. There are, however, certain well defined principles that are considered more or less standard, one of which is the distinction that is usually made between small houses and large ones.

In most cases the rules governing the planning and construction of picture houses are less rigorous than those governing larger houses. It should be remembered, however, that these laws are merely the *minimum* requirements for safety and that they are often ill advised, at least in part, and that in case of a holocaust a conscientious man would be apt to find small comfort in the fact that he had complied with all the requirements of the law, at the same time realizing that he had been tempting chance.

Any picture house which contains movable stage scenery is usually subject to the regulations governing regular theatres. Houses seating more than a certain number of persons (varying from 300 in National Board of Fire Underwriters' Code, to 1,000 in Chicago Code), even though containing no stage, and used for the exhibition of moving pictures only, are also usually classed as regular theatres and must be built accordingly.

In picture houses, not subject to theatre regulations the stage is often restricted in size to a small open platform. The Chicago Code limits the size of this platform to an area of 72 square feet, and further states that such buildings shall contain no proscenium wall nor scenery of any description. In the National Board of Fire Underwriters' Code any picture house containing a balcony is subject to all of the regulations governing regular theatres.

The common practice of placing small stores or shops in front of the auditorium and flanking the lobby is sometimes carried to an extreme. When the frontage is narrow this space is often more valuable for increasing the seating capacity than it is for other business purposes. That is, in a narrow front with stores on each side of the lobby, the latter is usually made too narrow and is deeper than necessary, thus unduly cutting down the seating capacity. If the stores are omitted entirely and the lobby carried entirely across the front and made wide and comparatively shallow instead of narrow and deep, the increased revenue from the additional seats will usually prove greater than the rent from one or two small shops. Wide lobbys are favored by most managers and the omission of shops often makes a more attrac-

tive front for a narrow building. The two schemes may be compared by means of sketches showing the difference in seating capacities, thus determining the relative value of each scheme. It is, of course,

understood that the laws in force in many localities governing the minimum width of picture house entrances often automatically rule out the use of shops in narrow fronts.

Of course, where the picture house has



Plate 1—Newman Theatre, Kansas City, Mo., A. J. Drake, architect. A very attractive design in terra cotta. The absence of a large sign disfiguring the front is commendable



Plate 2—Paramount Theatre, Chicago, John Ahlschlager & Son, architects. A combination theatre, store and apartment building. Brick with terra cotta trimmings

a broad frontage, the placing of stores in the front is justified and offers a means of utilizing space that would otherwise be wasted. If the theatre has no balcony, the upper portion of the front may be utilized as offices or as a public hall for lodges and so forth. Living apartments are sometimes placed in this space, but modern building codes usually specify that sleeping rooms shall not be built in any portion of a building used as a theater, unless the projection booth and the auditorium be entirely cut off from such rooms by means of fireproof floors and walls.

Where the picture house contains a balcony the sloping space between the balcony and the ceiling of the first floor may usually be advantageously used as a mezzanine floor for rest rooms, toilet rooms, smoking rooms, manager's office and so forth. Most codes provide that such rooms shall have direct access to a corridor leading directly to an outer exit without passing through any other rooms.

Where a lobby is flanked by stores, display windows are often placed in the dividing walls between the lobby and stores. This arrangement is of course highly desirable from a merchandising standpoint, but building codes sometimes specify that the walls of every room and passage devoted to the use of the audience shall be of fireproof construction.

A scheme that is becoming quite popular

is to build a large building combining a picture house and a row of stores and offices. The entrance to the picture house is usually placed in the middle of the row and is flanked by a half-dozen or so stores

on each side. The stores usually have offices or living apartments above them. This scheme is usually very effective, as the treatment of the entire row is similar and forms a harmonious group. The en-



Plate 3—Central Theatre, Chicago, architect unknown. An inexpensive and pleasing design for a small theatre. Brick with wooden trimmings

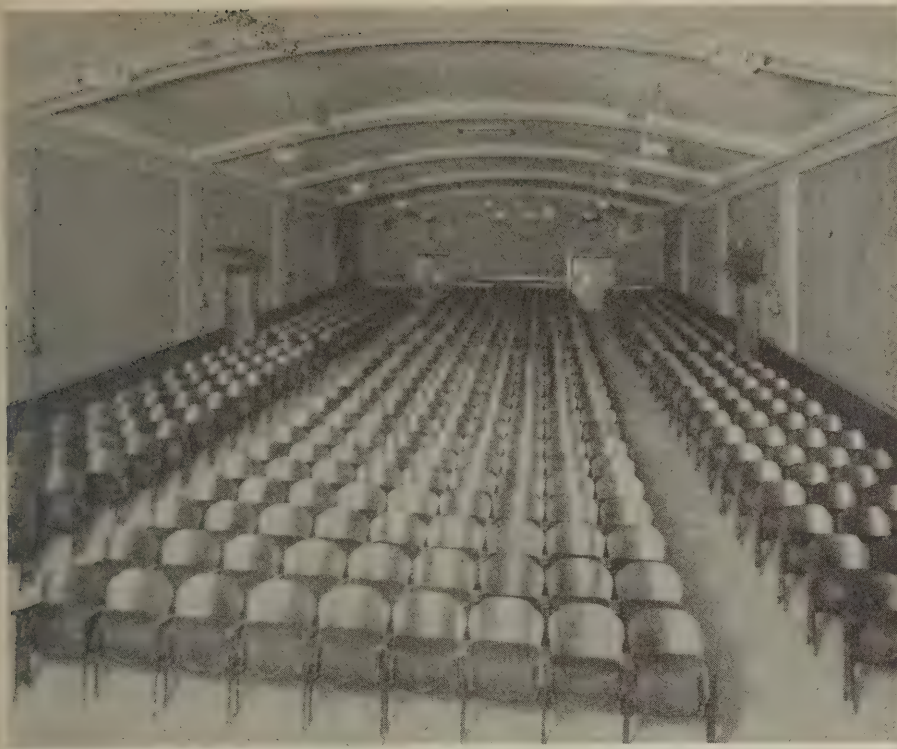


Plate 4—Interior of Southern Theatre, Oak Park, Ill., architect unknown. About the simplest type of interior. Note the four exits, there are two additional over at the screen end

trance to the picture house usually receives a more elaborate treatment than the remainder of the building and dominates the whole. In many cases the picture house and the row of stores on one side are built first, and the stores on the other side are not built until the addition is justified.

The exterior designs of picture houses are in many cases superior to the interior. This is true from a standpoint of planning as well as "looks." The average manager is willing to allow the architect more or less freedom in the design of the exterior, but when it comes to the so-called practical features of planning and so forth, the manager often feels that he is especially fitted to dictate. This has sometimes resulted in plans and arrangements that are unsafe as well as unduly expensive. A designer of picture houses should master at heart the local laws governing their construction. He should also obtain a clear knowledge of the mechanical or practical features, so that he will be prepared to immediately recognize the impracticable or faulty nature of any suggestions which a manager may propose. This, of course, does not mean that a manager's suggestions are necessarily of no account. A well trained manager's criticisms and suggestions are of vast assistance in laying out a satisfactory scheme, but the designer should not blindly permit absurdities to creep into the design merely because he respects the manager's practical training in theatre work.

Even in the preparation of preliminary sketches care must be used to comply with the legal and practical requirements. Nothing is better calculated to destroy an own-

er's or manager's confidence in an architect than for them to accept a sketch plan only to find that certain features which it shows must be omitted from the building because the designer failed to properly consider the legal or practical requirements until the preparation of working drawings was begun or construction started. All important features such as right lines, seating, exits, passages, stairs and so forth, should be carefully considered in the sketch. If, for instance, the number of seats is only a rough estimate, attention should be called to the fact, as seating capacity is the life blood of most picture houses, and if the sketch indicates a thousand seats and it is afterward found that only 900 can be provided, the average manager will go on the warpath.

Economy in Bungalows

In their effort to arrive at the lowest cost of building homes for working-class families, English architects and housing reformers have made a number of discoveries. In this connection the English publication *Survey* refers to the latest contribution which comes from Barry Parker, the well-known architect. Retained by the Joseph Rowntree Village Trust to investigate the latest experiments in cottage construction, he found, first that in the particular locality where houses were to be built, brick was still the cheapest material—because it can be handled more quickly than others—that much cost could be saved by standardizing every part to the utmost extent (he calls it building on the Ford car plan), and that

at the present cost of labor and timber, bungalows are cheaper to build than two-story houses. He says in a recent issue of *Housing*:

"We decided on bungalows, because we weighed the relative cost of labor, and the difficulty of getting labor, against the increased amount of material which there is in a bungalow over a two-story cottage giving the same accommodation.

"Our view was that by eliminating the staircase we reduced considerably the labor needed; and by practically eliminating scaffolding we further reduced the labor needed, avoiding as this did almost all running up and down of ladders, as well as the labor entailed in erecting scaffolding, and, in addition, one laborer could attend on more bricklayers working on the ground level than he could working on the first floor and roof level of a two-story cottage."

He further mentions the advantage of more rapid roofing and the amount of time gained thereby during which the men can work under cover. The chief difficulty, however, was to design a floor plan permitting the greatest possible uniformity, yet permitting different location of rooms and windows so as to get the best light for each house, whatever its aspect. This was so successfully solved that with four of the bungalows arranged in a square, only one bedroom is sunless and all larders have north exposure. One of several structural innovations is a kitchen range which can be heated from the open fire in the living room or alternately from its own grate.

The idea that the taller house is cheaper because of saving in land, has long been exploded in England, where investigations have proved that the price of land invariably follows the type of development and absorbs the intended saving.

Lumber Tragedy of the United States

1. The New England states are no longer self-supporting in a lumber way.

2. The Lake States, once our greatest producers of lumber, are now importing lumber to keep alive the many wood-using industries in that section.

3. The center of the lumber industry is fast moving to the Pacific Coast, which means long hauls and high freight rates.

4. The lumber people of the Southern States admit they are through in fifteen or twenty years, as far as yellow pine is concerned.

5. The forest fire loss in this country is about \$28,000,000 every year, and the area burned over is ten times greater every year than the devastated areas of France we have heard so much about. This must stop.—U. S. Agricultural Department.

Two Attractive Houses

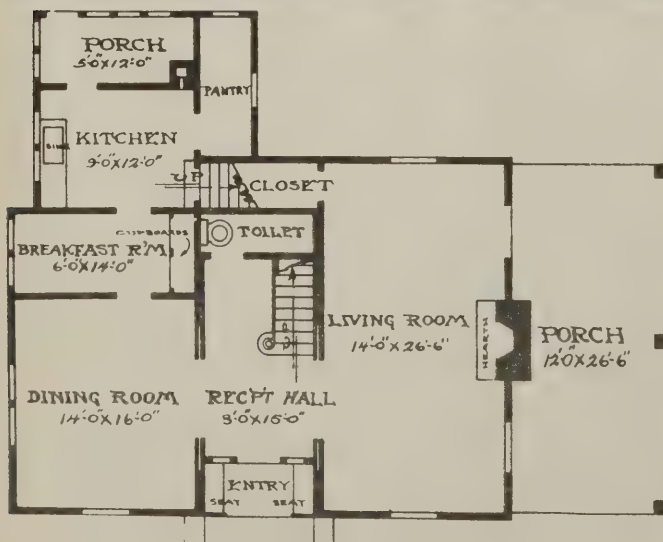
IT MAY be said with all confidence that the next few years will witness a revolution in home design. The taste of the general public is drifting away from the flashy, overworked type of design and is beginning to swing toward the simpler and more conservative styles. This tendency is due to a number of reasons, chief among which are the publicity that has been given to the government and industrial housing schemes; the examples of well designed

houses that are presented in the daily and periodical press throughout the country; and last, but not least, to the fact that the "style" is changing. Within a few years, the multitude of gables, heavy dormers, enormous porches, bays and other "stunts" which have until lately been so popular, will be hopelessly out of date and the possessor of such a house will be in much the same position as is the present-day owner of a house built during the jig saw

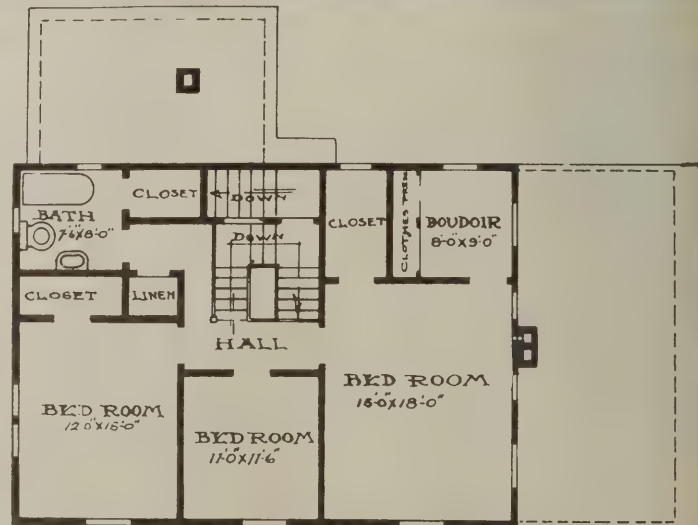
period of twenty or thirty years ago.

The two houses which are illustrated in this article were designed by Ye Planry of Dallas, Texas, and may be taken as fair examples of the modern tendencies in design. Neither of these houses have dormers nor other useless appendages and are straightforward and attractive designs that will be "in style" as long as they stand.

The two-story house is suitable for either farm, suburb or small city. The recessed



FIRST FLOOR PLAN



SECOND FLOOR PLAN

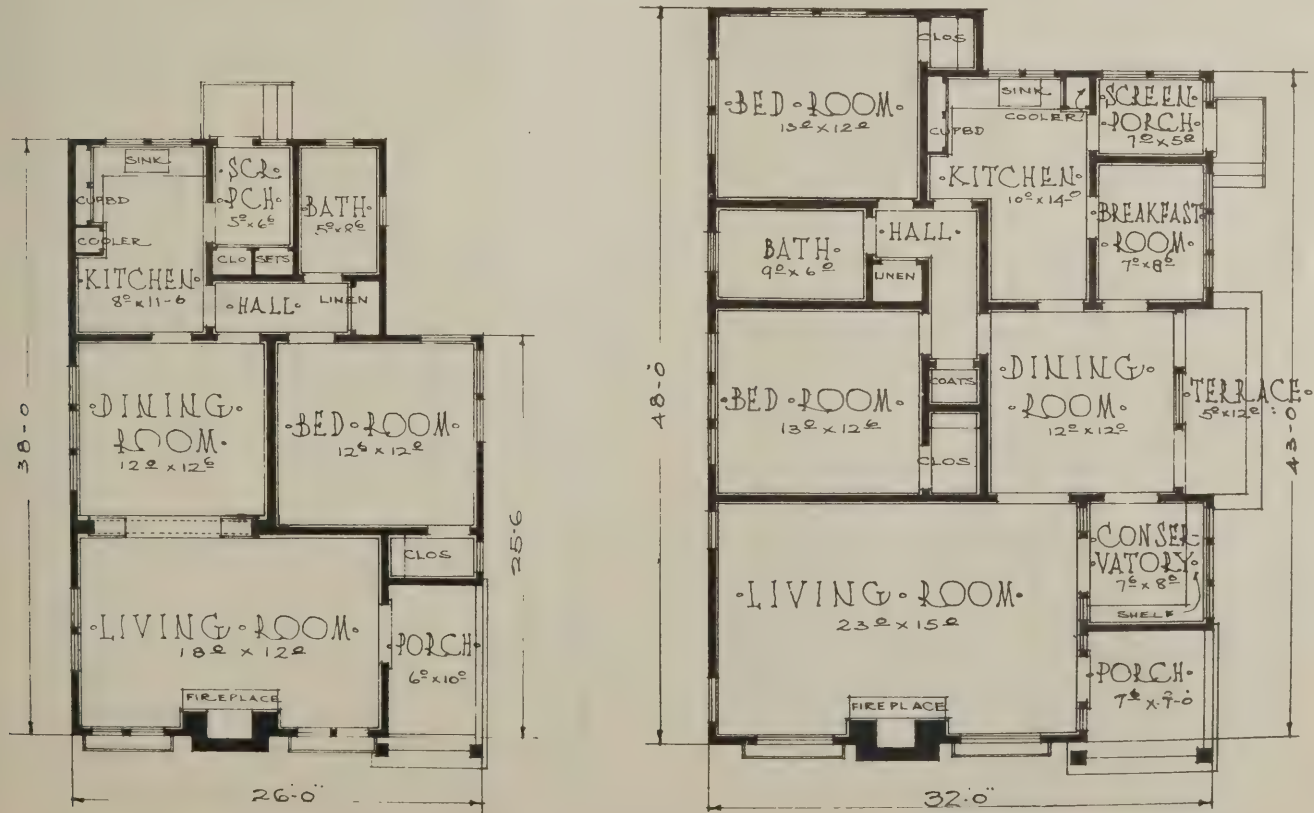
entrance is both unusual and practical. It could easily be fitted with storm doors to form a vestibule in winter if desired. This house has no basement, and in case one were used it would be advisable to rearrange the present stairs to provide a basement stair from the kitchen. The combined breakfast room and pantry is a novel and practical idea. The back stair from the

kitchen is scarcely a necessity in a house of this size, but is often demanded by housekeepers. The porch opening from the living room is an attractive feature and if glazed in would be useful the year around. The second floor is well provided with closets and the large bedroom has a dressing room at one end.
The bungalow exterior is simplicity itself.

Any feeling of bareness is overcome by the flower boxes and trellis. The casement windows, the brick porch and the stepping stone walk add picturesqueness to the design.
Two plans are shown for the bungalow. The smaller plan contains but one bedroom, but a wall bed could be worked into the living room or dining room to provide for



Two floor plans are shown for this bungalow



additional sleeping space. This plan is very compact and livable. The larger plan provides two bedrooms, but wall beds, which give notable flexibility to planning, could

also be provided in other rooms if desired. The conservatory could be used as a sun porch if desired and could contain the main entrance so that a wind break would be

provided between the living room and the exterior. One end of the dining room is fitted with French doors which open onto a terrace.

Three Inexpensive Houses

ALTHOUGH unusually plain in respect to structural lines, the little house shown in Plate 1 nevertheless presents an

exceptionally pleasing exterior. The dignified entrance, of Colonial design, is set exactly in the center of the front wall, with

an electric lighting fixture at either side, and farther to each side is a group of three narrow, full length windows, with a black



Plate 1—Simple and attractive. Two floor plans are shown



grille enclosure as a detail at the bottom and a stenciled white awning above.

The outside walls are of wide clapboard siding which, including the trimming material, are painted white. The roof, designed with a curve over the front entrance and

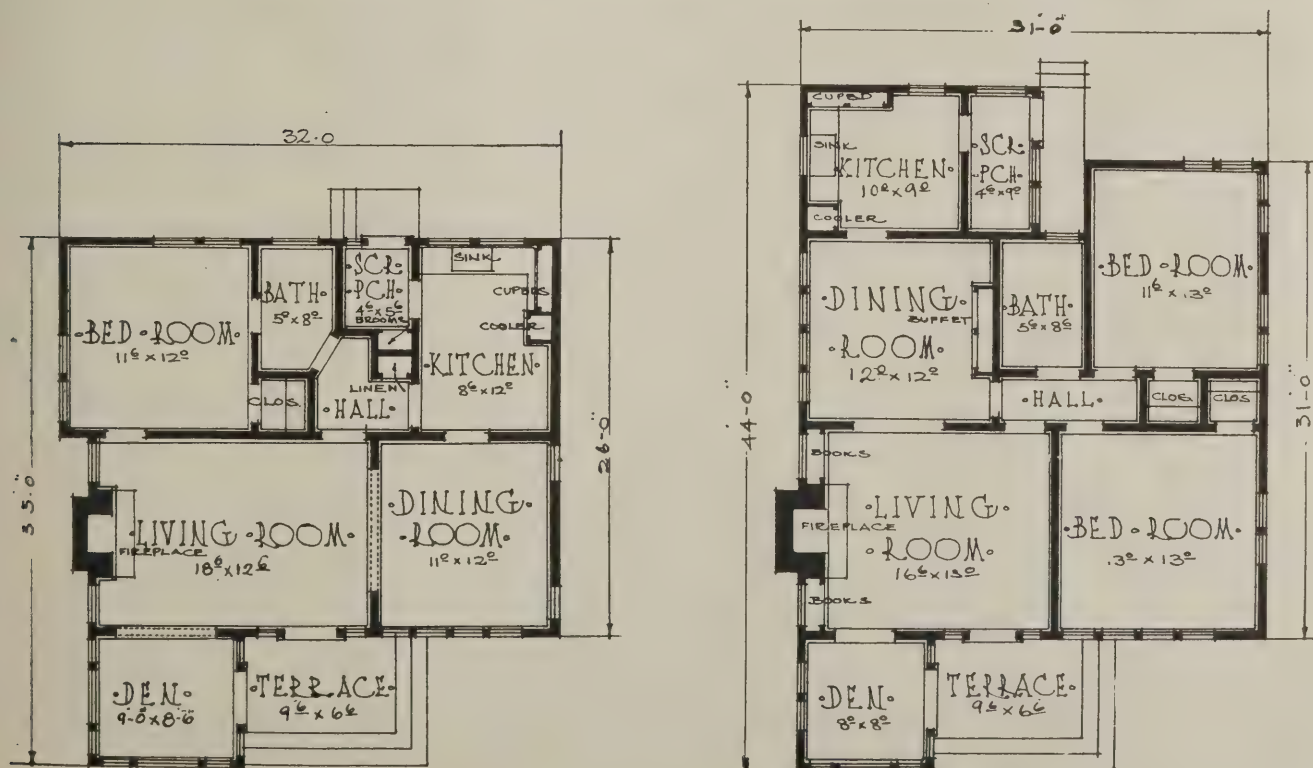
with "cut-offs" at the ridge ends, is shingled and painted green. The chimney is of white cement-stucco over brick and the entrance is floored with cement.

The designer has prepared two different floor arrangements to produce the same

front appearance. The house here photographed, however, is built on the smaller scale, which omits the screened sleeping porch. The woodwork of the interior is of pine throughout, which in the living room and dining room is finished in old ivory



Plate 2—A charming cottage in the English style. Two floor plans are shown



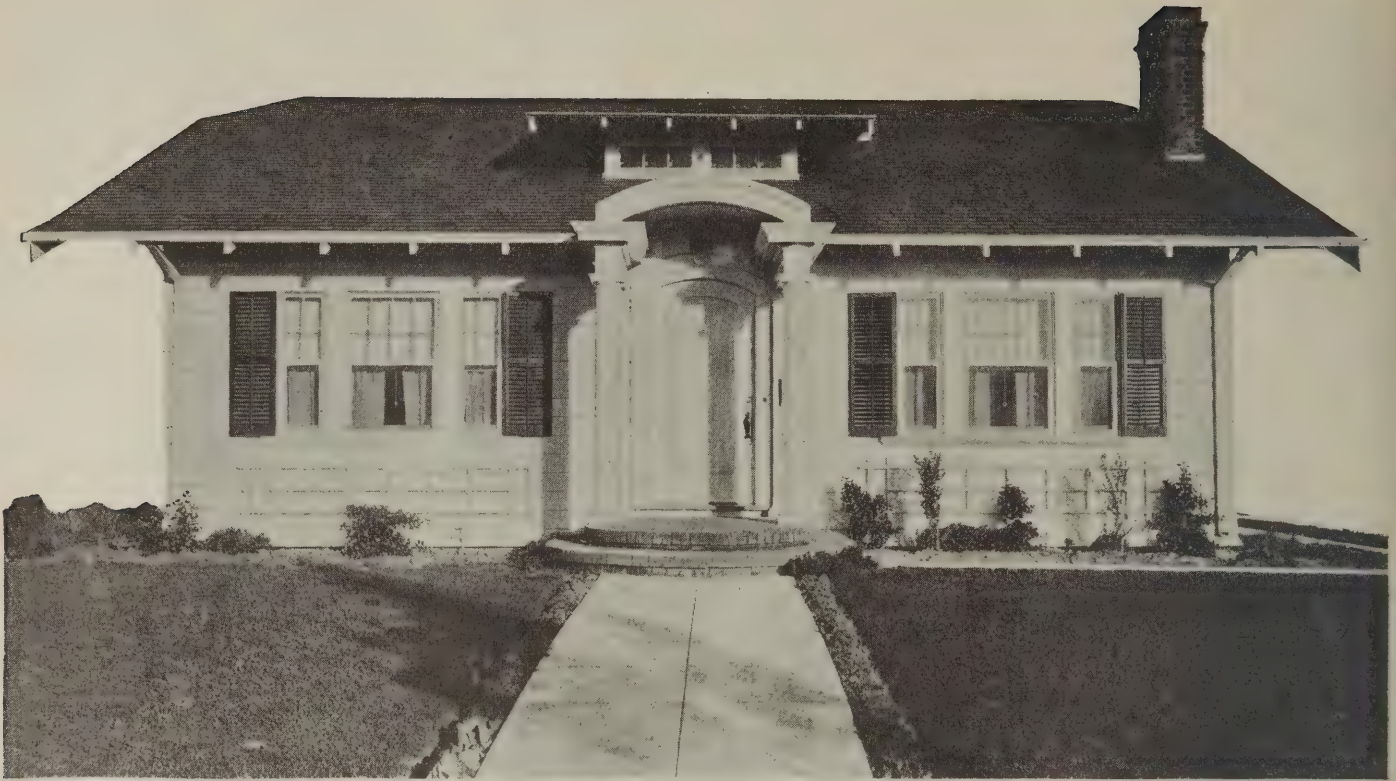
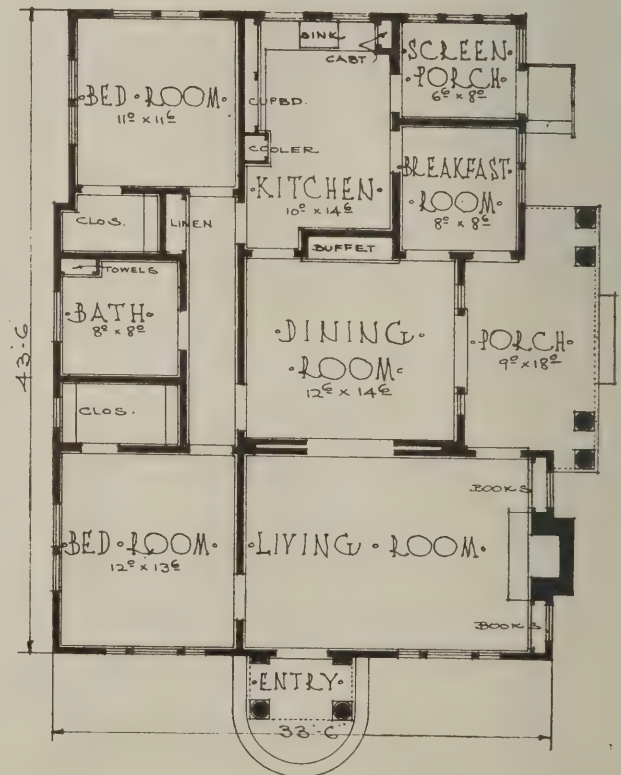
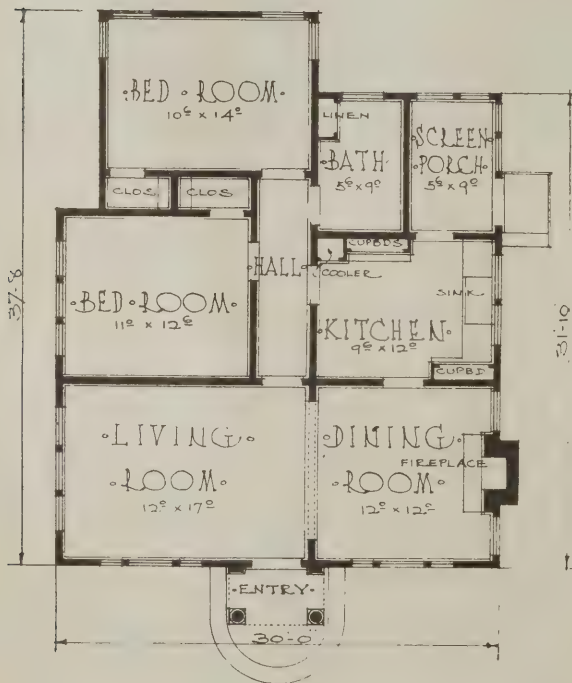


Plate 3—A low-roof Colonial bungalow. Two floor plans are shown



and elsewhere is in white paint or enamel. The walls of the living room, dining room and one bed room are papered and elsewhere they are tinted, except that in the kitchen and bathroom the lower portion, to a height of about six feet, is surfaced with a smooth, hard plaster coat that is enameled like the woodwork. Hardwood floors are used in the living room, dining room and hall, and pine is used in the other divisions. The living room fireplace is faced

with dull green tile and has a wood mantel.

The floor plans should be referred to for closets and built-in features, as well as for the arrangement of the rooms.

The house has neither basement nor cellar, but is heated by means of floor gas radiators in addition to the fireplace. It is estimated that the building cost today

should average about \$2,350 for the smaller plan and \$2,800 for the larger one.

Plate 2 exhibits a simply designed but very attractive little house of the English cottage style. True to the type, there is scarcely any overhang to the roof and the roof is further characterized by clipped gable peaks.

In outside finish the walls are of ordinary wide siding, which, including the finishing material, is painted white, while the shingled roof is green. The entrance approach is a sort of corner stoop of white cement or open terrace from which direct entry is provided to the living room and to a small den, both doors being of glass and equipped with old-fashioned latches. The chimney in one of the end gables is of blue-red brick.

Although two different floor plan arrangements are here suggested for creating the same front, the cottage actually photographed is built on the larger plan, which provides living room, den, dining room, two bedrooms, bathroom, kitchen and rear entry porch. The other plan, while differently arranged, contains the same divisions save that one of the bedrooms is omitted and each, as will be observed, further possesses good closets and some excellent built-in features.

Incidentally, as of course will be apparent, the small room on the front may be used either as a den, as here designated, or for a small sun room or some other such purpose.

The interior woodwork consists of pine throughout. In the den, living room and dining room it is finished in very light gray enamel and elsewhere in white paint or enamel. Hardwood flooring is used in the three rooms just named, and their walls are papered. In the kitchen and bathroom a sort of wainscot effect is created by the use of a smooth, hard plaster coat, marked off into tile-like square, which is enameled like the woodwork. The bedroom walls are merely plastered and tinted. The living room fireplace is of brick and wood of Colonial style.

The house, as here constructed, like that shown in Plate 1, has no basement or cellar, but is heated by gas radiators built into the floor. The building cost today is estimated at about \$3,200 for the smaller plan and \$3,550 for the larger plan.

With its very mildly pitched roof, its wide overhang of roof at eaves and gables and its well-balanced structural lines in general, the little bungalow shown in Plate 3, somewhat suggestive of the Colonial style, presents an exterior that is indeed pleasing and attractive. For interesting details, note especially the Colonial entrance, the dormer lift in the roof directly above, the decorative trellis effect beneath each of the two window groups on the front and the pair of green shutters on either side of the entrance.

The outside walls are of plain, ordinary siding and, like the finishing material, is painted white, while the roof is shingled and painted bright green, to correspond with the window shutters. The entrance is paved with red brick and similar brick is used for the chimney in one of the end gables.

Two floor plans, each producing the same

front, are offered by the designer, but the house here photographed is built from the smaller one, which consists of living room, dining room, two bedrooms, bathroom, kitchen and rear entry porch. The larger plan provides the same rooms, but of larger size, with a breakfast room additional, as well as a particularly delightful porch on one side, which porch, incidentally, may be reached from each the living room, dining room and breakfast room.

Pine woodwork is used for the interior throughout, save for a very small amount of mahogany trim in the living room and dining room. The pine woodwork in these two rooms is finished in old ivory and in the other divisions it is in white, either enamel or paint. Hardwood flooring is used in the living room, dining room and hall and the walls of the two rooms named and of the front bedroom are papered. In the kitchen and bathroom a smooth, hard

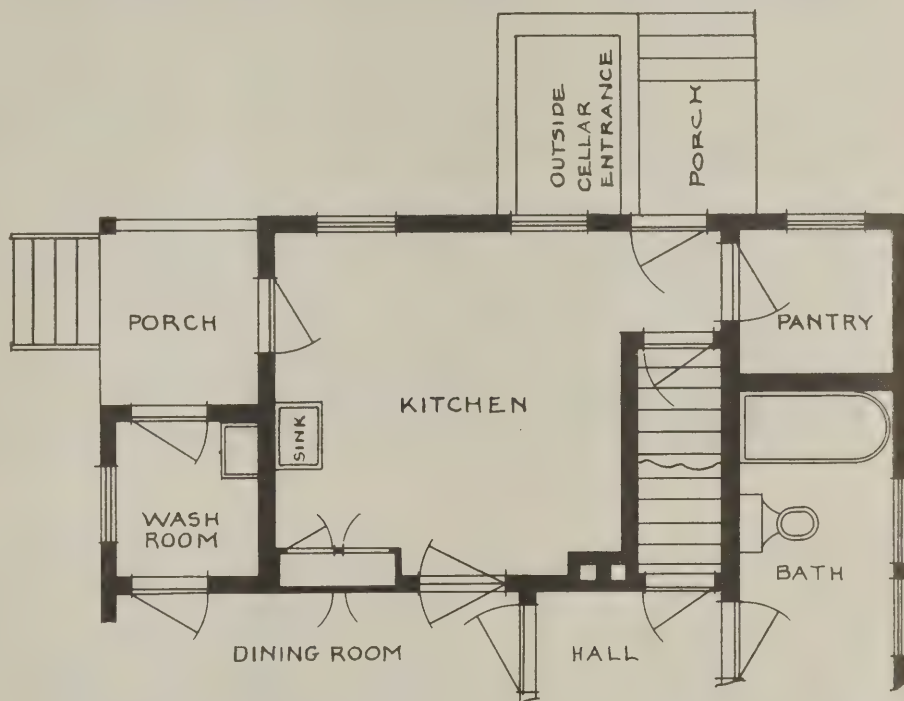
plaster coat is used to finish the walls to a height of about six feet, which is enameled like the woodwork. The living room fireplace is of brick and wood of Colonial design.

Each plan, as will be observed, provides good closets and a number of very desirable and well planned built-in conveniences.

As here built, the house has no basement or cellar, but the one or the other could, of course, be very easily provided, with a stairway leading to it from the rear entry porch. Gas radiators built into the floor provide the necessary heat in winter. The present-day building cost is estimated to average about \$3,900 for the larger plan and \$3,150 for the smaller plan.

The houses illustrated and described are located in Los Angeles, California, and were designed by Floyd A. Dernier of that city.

Wash Room for the Farm House



There are several important changes taking place in the design of farm houses. A contractor or builder finds the farmer of today quite as particular about the details of the new home as is his city cousin. If any point in the house is neglected that point is sure to be the kitchen and the rooms surrounding it. Yet, this part of the home is all important to the housewife and she should be consulted about the plans.

There are a few times during the crop season on every farm when several men are present at each meal. Maybe it is threshing time, silo filling time, harvest or caring for the alfalfa crop that brings in several of the neighbors and an extra hired man or two. The usual arrangement of the farm house makes it necessary for these men to file into the kitchen to wash

their hands and comb their hair just before the meal is to be served. They get in the housewife's way when she is taking the roast out of the oven, use up the hot water which had been prepared for the tea and cause general confusion in her plans.

The solution for this state of affairs is the separate wash room, so placed that men can enter it from the back porch, hang up their coats and hats, wash and enter the dining room without going near the kitchen. The sketch herewith shows such an arrangement successfully applied to a house plan. Sometimes the wash room can be placed in the basement and reached through a grade door. This provides ample room for coats, hats, rubber boots and shoes.—Ivan D. Wood.

Roof-Top Homes--By Delphia Phillips



A Roof-Top bungalow thirteen floors above Broadway, Los Angeles, Calif.

HOUSES built on top of office buildings have many advantages not at first apparent. There is plenty of light and pure air, even in the heart of a city. They can be easily accessible to the business man, and yet be far above the roar of the street traffic. Many green things can be grown there, even to the extent of a lawn and a few vegetables.

Most of the California roof-top dwellings are of the bungalow type, and in the small town of Santa Ana is a whole cluster of bungalow apartments built on the flat roof of the post office building. The courts between the little bungalows are gay with flowers and vines, and the atmosphere is very bright and cheerful.

Perhaps the most unique of all the roof-top homes is the new "House in the Clouds" built on top of one of Los Angeles' tallest office buildings in one of the busiest sections of the California city. This beautiful bungalow was built for Walter P. Story, who owns the building on which it was erected. It is of purest Italian Villa style of architecture, and built of solid



Front door and court of roof-top bungalow



View from front door of roof-top bungalow

concrete with an overlay of cement. The roof is of red Spanish tile.

There are five rooms and a bath; the large living room, with its tile fireplace being the feature of the place. There is also a bedroom and bath, detached from the villa proper, for the use of a servant.

The bungalow interior is finished in hardwood, and the owner is having special furniture constructed to match. It is to be made of Circassian walnut, and patterned after the Italian Renaissance period.

Passing out of the building, one steps through a quaint doorway into a formal Italian garden, surrounded by a high cement wall—and rejoices that the wall is there, both for privacy and safety. It is good to know that no resident of this fairyland roof-top home or visitor there, can walk off the flat roof in his sleep without at least scaling the wall.

The floor of this garden is overlaid with colored cement and tile, and dwarf trees, shrubs and flowers beautify the place.

On the left of the formal garden, fronting Broadway, is a second pretty enclosure, designed as a nook for luncheons and pleasant little parties. Here flowers and vines have already made themselves at home, and it is hard to realize that these inviting nooks and courts, graceful shrubbery and trees are atop of a busy office building. The dwarf palms and glistening-leaved shrubs nestle in corners and against columns as thrifty as on their native ground.

A Clay Block Machine Shed

High cost of material and labor did not stop Mr. H. G. Yost of Clay County, Nebraska, when he was ready to build a machine shed. He had not had a great deal of experience in laying clay block but the photograph shows the results of his experiment. The shed is 20 ft. by 40

prepared roofing which is preferable to shingles on any roof of less than one-third pitch.

It is planned to finish the end where the two windows show into a shop where any agricultural implement can be run in and repaired. The shop will be equipped with



ft. and is built with a 5-in. wall, the tile being laid on edge in good cement mortar. A good, deep concrete foundation was provided to prevent settling of the walls. The roof is sheathed tight and covered with

a drill press, a forge, an anvil and other tools needed in farm smithing. A sliding door will be hung in front of the shop. In fact, thoroughness seems to be a principle with Mr. York.—*Ivan D. Wood.*

An Addition to a School

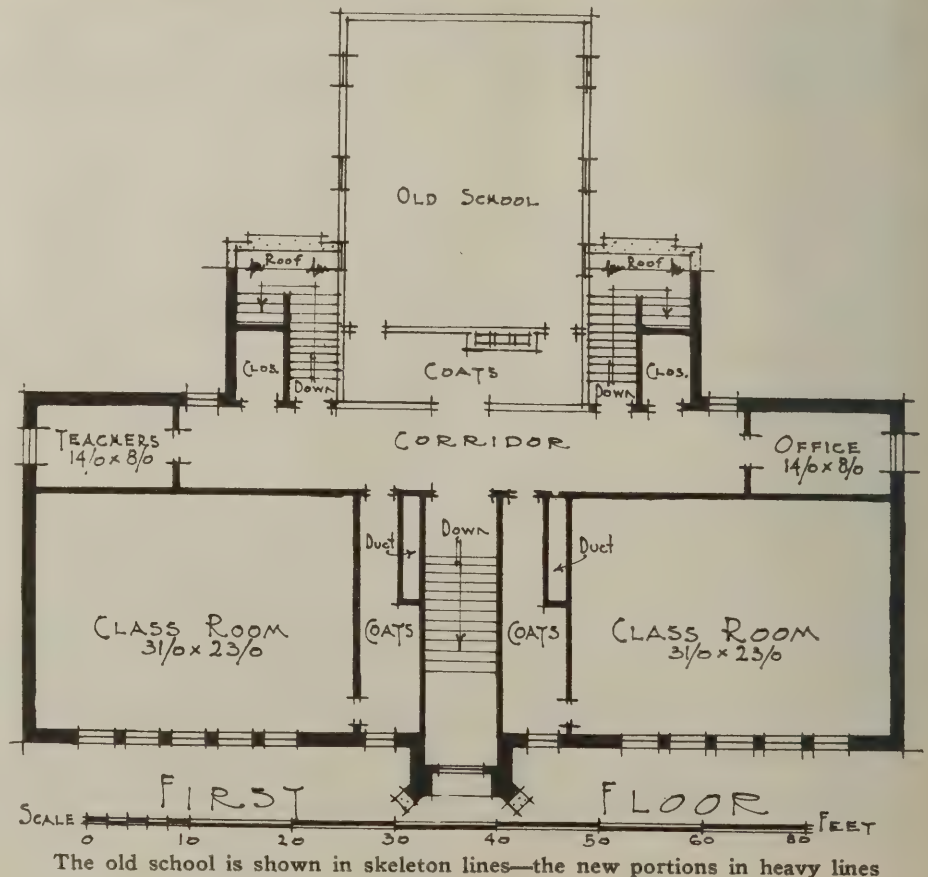


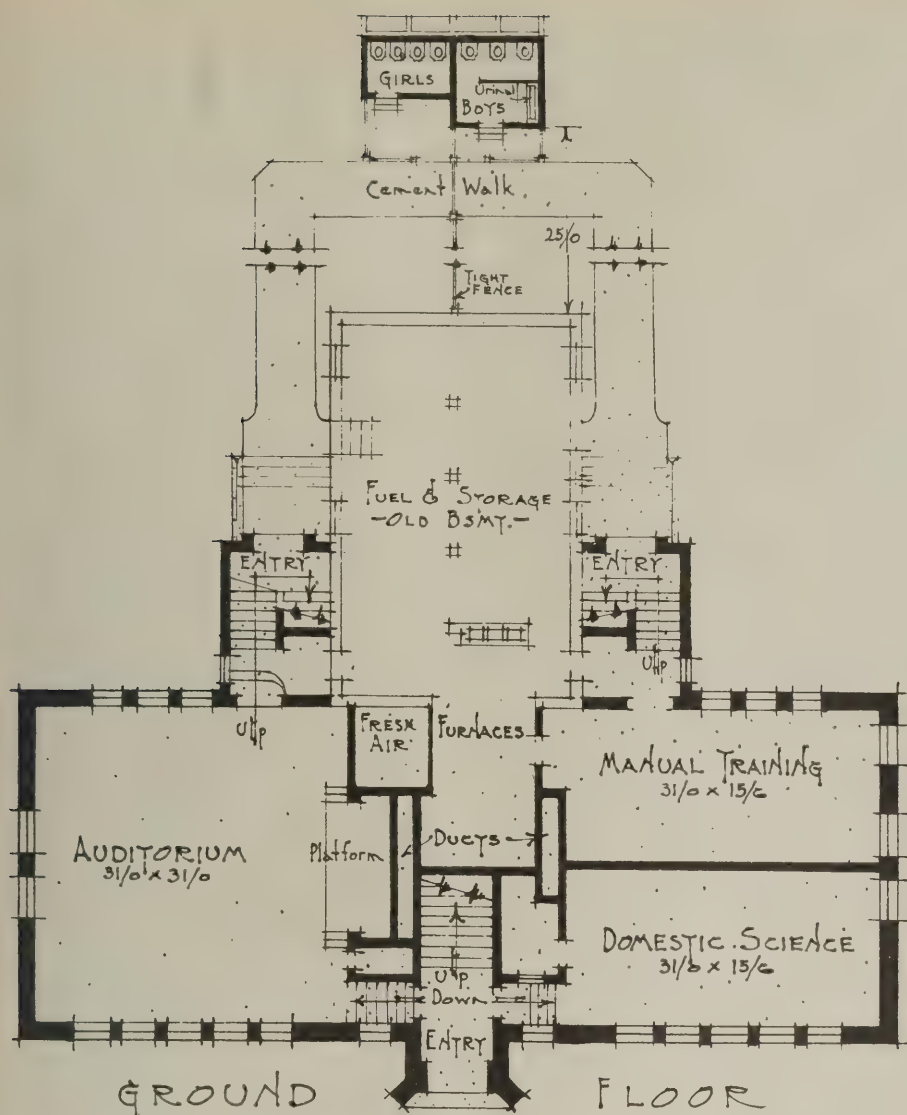
An addition to a school

THE old question of whether it is cheaper to remodel or build anew often arises when additional school facilities are required for a district. In many such cases it is voted to remodel the old building and combine it with such new additions as are necessary. The success of such a plan usually depends upon the degree of thoroughness with which the old building is brought up to the standard of the new portion. That is, most of the old buildings are poorly lighted, heated and ventilated and belong to the dark ages of school design. If these features are corrected as they should be, it will usually be found that when salvage is considered, it is practically as expensive to utilize the old portion as it will be to build an entirely new building. Voters, however, frequently use snap judgment and will not approve a bond issue that contemplates the wrecking of an old building. This is not serious unless the appropriation for remodeling the old portion is not sufficient to do the work properly. It then becomes the height of folly and should be, and frequently is, prohibited by law.

The accompanying illustrations show the Mount Pleasant, Wisconsin, school designed by Chandler & Park, architects, of Racine, Wis.

The design of this school involved the





The additions are shown in heavy lines—light lines indicate the old work

utilization of an old one-room school to which two class rooms were to be added on the first floor and provision made for domestic science, manual training, and an auditorium on the ground floor.

The bond issue was apparently inadequate to bring the building up to date in every respect and the architects deserve credit for doing much with little. The lack of funds doubtless is responsible for the retention of the widely spaced, narrow windows along two sides of the old school room. Questions of cost also are likely responsible for the objectionable toilet facilities offered by the out-house.

The lack of a public sewer system is alone no excuse nowadays for not providing modern toilet facilities in remote districts. A septic tank is a reliable substitute for a sewer; is not expensive; is easily built, and requires scarcely any attention. Chemical closets have also been brought to a high state of efficiency and are approved by the regulations of many health boards.

The old style out-house has so many faults that it should have no place in any building plan. It is a highly efficient device

for cultivating ill health, both physical and moral, but otherwise it has survived its period of usefulness. One of the principal objections to toilets placed outside of a school building is that during cold or rainy weather pupils will dread going outdoors and will therefore restrain their natural impulses. Many diseases of adult life may be traced directly to the victim's early practices in this respect.

The gravity system of heating and ventilating, such as is used in this building, is probably sufficient for a building of this size. It is at least a vast improvement over the old method of heating by means of stoves. Of course some type of forced air or mechanical system should be used in large buildings. All gravity systems are open to the objection that their operation is not a positive one and that they are not efficient except during ideal conditions of temperature and installation, nevertheless, they are comparatively inexpensive and often offer the only feasible method of heating and ventilating small schools.

In the building under discussion the air is heated by three furnaces located in the

furnace room. Fresh air is supplied to the furnaces from a fresh air chamber which obtains its supply from the outside. The warmed air is supplied to the rooms by means of ducts, and additional ducts are provided for the ventilation of each room. The vent ducts exhaust the foul air through the stacks shown in the photograph.

The construction of the new portion of the Mt. Pleasant School is of brick veneer on hollow tile. The basement and the entries have cement floors. The remainder of the construction is of wood. The exterior design is simple and dignified and forms an attractive composition. The use of brickwork trimmings instead of a vast quantity of stone is an object lesson in adding interest to a brick surface without using expensive materials and methods.

The ground floor provides an auditorium that will seat about 130 persons. The auditorium floor is about two feet lower than those of the other rooms to provide a higher ceiling. The room has two exits, both of which lead either to the outside or to the upper floor. The domestic science room is near the main entrance and has a large closet. The manual training room is convenient to the entry which leads to the boys' toilet.

In both of these plans the old building is shown in skeleton outline while the new portion is blocked in solid. The new portion of the first floor provides two class rooms with connecting coat rooms. There is a teachers' rest room at one end of the corridor and an office or library at the other. The two corner entrances lead either to the ground floor or to the out-house. Two large storage closets open from the corridor.

Knocking Down High Prices

At the meeting of the Executive Board of the Associated General Contractors of America, April 23, the organization of a Committee on Materials was approved. The committee was authorized to investigate "sources, supply and demand, costs of production and distribution, prices, standardization and any other questions affecting construction materials of interest to contractors." It was immediately charged with the investigation of present high prices of construction materials with a view to eliminating the causes and bringing about a reduction in prices. The committee was authorized to invite the co-operation of material dealers and manufacturers in making an analysis of the present cost of production and if necessary to request the assistance of the Federal Trade Commission in investigating existing conditions. The scope of the investigation may also include causes of labor inefficiency, currency inflation, so-called luxury or non-essential production, and other factors now blamed for existing high prices.

STUCCO--Second Article

THE perfection of Portland cement has stimulated the use of stucco until at the present time it is one of the most popular methods of construction. It is

among others were masters of the art of stuccoing centuries before the use of concrete was known. Stucco applied to an exterior wall is fundamentally no more an

was applied on the surface. This stonework has a most attractive color and texture and that this was recognized by the early builders is shown by the fact that in many cases stucco was used on only the one or two walls which faced the greatest exposure, thus the stucco in this case evidently served a purely useful purpose and was not used for any decorative value. A similar explanation also largely accounts for the use of stucco on some of the inferior brickwork more or less common to the period.



Plate 1—Stucco is extensively used on housing developments

adaptable to almost any type or style of building and offers a durable and attractive covering at a low cost of both application and upkeep. It is equally adaptable to all types of masonry and frame construction on either new or old work, and when used as an "overcoat" in remodeling work, it is unexcelled.

Some purists have entered objections to the use of stucco on frame construction, maintaining that such use is an evident attempt to imitate concrete construction. This somewhat fanciful criticism, however, fails to recognize that stucco such as we are familiar with is probably an evolution of the ancient mud plaster applied to the exterior of reed or timber huts. Again, if this counter-argument is held faulty because of its speculative foundation, it may be cited that the Greeks and Egyptians

imitation of another material than is, for instance, a tapestry hung in an opening an imitation of a door. In both cases the treatment is decorative as well as useful and is perfectly capable of standing on its own merits without borrowing from other materials or methods. The use of stucco on stone and brick was not entirely due to the pleasing surface which resulted, but had structural value as well. For instance, the more or less general use of stucco in certain portions of Pennsylvania in Colonial days has been referred to. In most cases these stuccoed walls were built of native ledge stone, commonly known as "Pennsylvania split stone," due to the ease with which it may be split into convenient sizes. This stone is quite porous and soft when first quarried and it hardens slowly when exposed. To overcome this defect, stucco



Plate 2—Stucco is used on large as well as small houses

A material that has in its way become almost as closely associated with modern stucco as has Portland cement is hydrated lime. Hydrated lime is merely quick lime that has been slaked, and it should not be confused with hydraulic lime, which is a product combining some of the properties of both quick lime and cement. Hydraulic



Plates 3 and 4—White stucco makes a pleasing contrast against dark foliage



Plate 5—Stucco is useful on commercial buildings as well as residences



Plate 6—Stucco walls with stained wood trim is a popular treatment

lime may be used for any of the purposes for which ordinary lump lime is adapted.

Its superiority over ordinary lime is due to the fact that it is thoroughly and uniformly slaked and cured when it comes on the job. This, of course, insures a more reliable

product than that resulting from hand slaking lump lime under ordinary conditions where labor is apt to be careless or ignorant of the process and where time is usually an important element. When comparing hydrated lime with ordinary lime it should be remembered that one of the essentials of lime for use in plaster or stucco is thorough and complete slaking. In ancient



Plate 7—Old stucco church in New Orleans

times aging was recognized as the only dependable agent that would assure effective slaking, and an old Roman law required that lime paste must be cured for three years before using. Our forefathers cut this period to several weeks or months and modern workmen usually limit the period to a few hours. Sometimes lump lime is delivered on a job in the morning and goes onto the wall in the shape of plaster the



Plate 8—Another combination of stucco and stained woodwork

same afternoon. In such cases the process of slaking continues in the wall and results in pitting and crumbly plaster or stucco.

The process of hydrating lime is quite similar in its results to the curing of lime paste, and it may be said to have all of the advantages of the latter treatment with the added advantage of requiring less time and attention on the job. Hydrated lime is convenient to handle and may be more accurately measured than lump lime. It is of course important to know that the hydrated lime is of good quality; this is usually assured when the material is the product of a reputable manufacturer.

It is sometimes said that hydrated lime will not carry so much sand as will ordinary lime slaked on the job. It should be remembered, however, that the process of slaking increases the bulk of lump lime from 20 to 30 per cent. In other words, 100 pounds of hydrated lime are equivalent to only 70 or 80 pounds of lump lime and

the weight and volume of a lime paste made from 100 pounds of hydrated lime is equal to the weight and volume of the lime paste made from 70 or 80 pounds of lump lime. When compared as lime pastes and not as raw materials, their sand carrying capacities are exactly equal.

Another objection to hydrated lime is said to be that it does not work so easily in mortar or plaster as does lime slaked on the job. This fault may be overcome if the hydrated lime is soaked over night before using.

Hydrated lime as used in stucco may be considered a minor element, but it is often exactly these minor materials that are apt to be slighted in the making of a finished product, with the result that the value of the whole is sacrificed.

The use of hydrated lime in stucco serves two purposes. It causes the mortar to work more freely under the trowel and also acts

as a minute void filler, thereby assisting the cement in rendering the stucco watertight. As a waterproofing agent in stucco or other mortars it probably has no equal, but its use weakens the mortar somewhat. This decrease in strength in the case of stucco mortars, however, is of slight importance.

Magnesite

Another standard building material is magnesite composition used in stucco, floor composition and fireproof plaster. It is not mixed with water, but with a special solution composed principally of magnesium chloride—a dense, non-inflammable liquid that will not freeze except at temperatures lower than 20 degrees below zero. Magnesite stucco is frost, water, fire and time proof, and will stick tenaciously to stone, brick, tile or rough wood surfaces, and will not expand or shrink with temperature or humidity changes. Its many uses and adaptabilities will be treated of in another article.

Public Garages

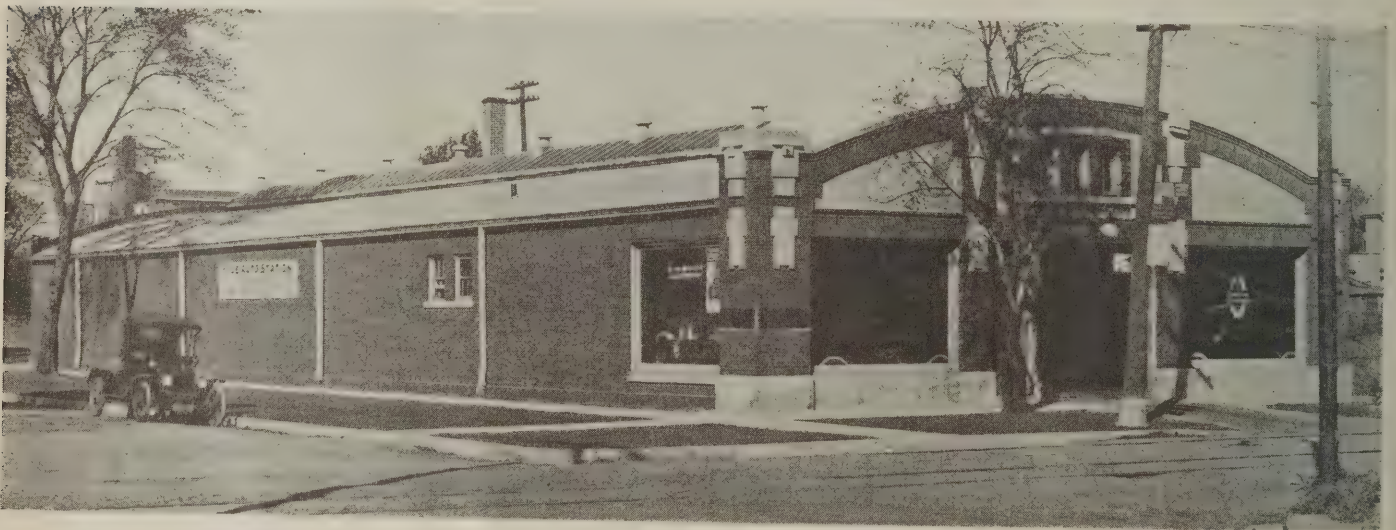


Plate 1—Garage at Oak Park, Illinois

PUBLIC GARAGES usually are more attractive than are the average commercial buildings used for other purposes. This is no doubt due to the fact that a majority of the public garages have been built within the past few years and are not handicapped by the use of the type of business buildings that were built twenty or thirty years ago—and look it.

Plate 1 shows a modern one-story garage built of brick with cement and stucco trimmings. The roof is supported on arched lattice trusses, thus avoiding the use of obstructing columns or posts in the floor space. Ample light and ventilation are secured by means of a skylight.

Plate 2 is a two-story garage and sales-room. The construction is of brick, with stucco on the second story front. The shed roof of tile across the front adds to the

appearance and is provided with ventilators.

Plate 3 shows a repair shop and filling station that is unusual from the fact that the entire front is faced with the one-inch "bex" tiles commonly used for bathrooms and so forth. The body color is white and the panels and sign are made of green tiles. It makes a very striking appearance both by day and night.

Industrial Unrest

One of the latest contributions to "The Reason Why" literature about industrial unrest comes in Ray Stannard Baker's "The New Industrial Unrest—Its Reason and Remedy," published by Doubleday-Page Company. The author is insistent on his impartial attitude, and opens the presentation of cases with the steel in-

dustry and the attitude of the management of that industry toward labor and the expressions of the views of the management to the Senate. The other side is shown in interviews with the workers. The remedial measures are shown in part by the records of concerns which have adopted shop councils, in which the employes have an opportunity to bring actual conditions to the notice of the principal managing powers. The work is timely, is strongly interesting, and a notable contribution to the labor problem.

California Resources and Possibilities, is the title of the 29th and 30th annual reports of the California Development Board, Ferry Building, San Francisco, Calif. An enormous amount of information is contained in its seventy-four pages.



Plates 2 and 3—Garages at New Orleans, La.

Economy of the Two-Car Garage

IN CITIES and towns the two-car garage is usually more economical than the single-car structure, even for the man who owns but one car. If the extra space can be kept rented even a portion of the time, the rental may pay interest on the investment. Full time rental will usually return sufficient to pay not only interest but maintenance, taxes and other expenses as well. It may even return to the owner a small

amount in addition to giving him storage for his own car at no expense.

One compartment of a two-car city garage costing \$850 rents for \$8 per month with heat, producing an annual income of \$96. The owner's outlay in 1919 was about as follows:

Interest on investment.....	\$51.00
Coal	18.00
Percentage of real estate tax.....	10.00

Electric light and water.....	4.00
Maintenance	13.00

making a total of \$96 which is exactly equal to rental received.

Another garage of the same type costing \$1,000 rents for \$10 per month or \$120 per year, with heat. The owner's outlay for last year was about as follows:

Interest on investment.....	\$60.00
Coal	16.80



Plate 1—Attractive two-compartment garage of plain face concrete block, interior plastered directly on block

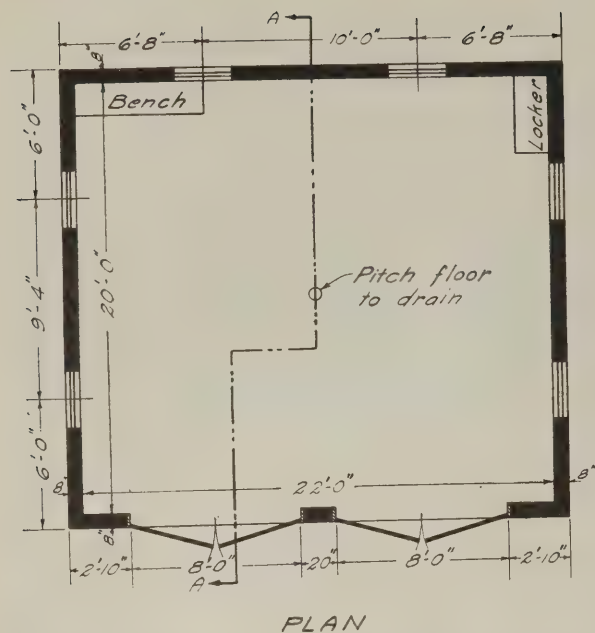


Plate 2—Plan for a two-compartment garage of concrete block, described in the accompanying article

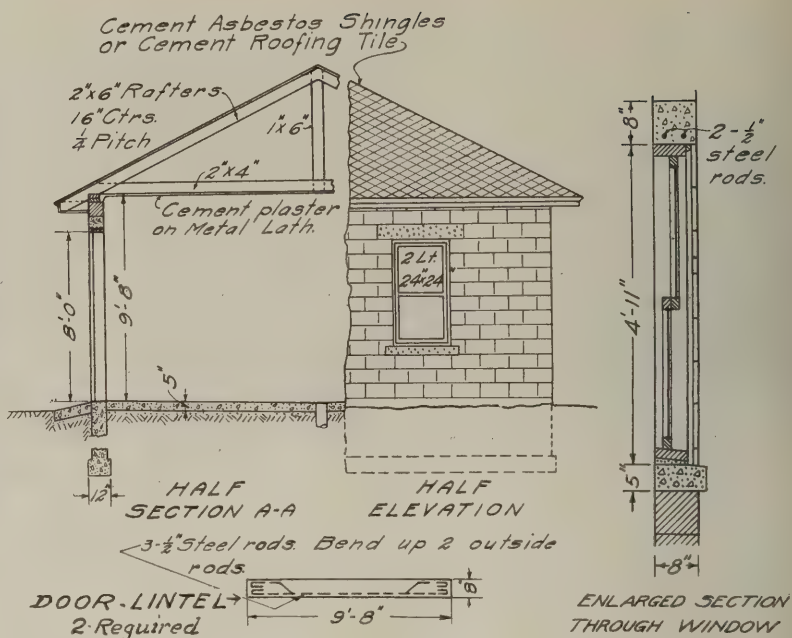


Plate 3—Partial elevation, section and details of garage for which plan is shown in Plate 2

Percentage of real estate tax..... 10.75
Electric light and water..... 5.00
Maintenance 16.20
making a total of \$108.75 which leaves a balance of \$11.25 for the owner after paying all expenses.

If both compartments of the \$850 garage rented at the above rate, it would make an annual return of 11.3 per cent on the investment, while the \$1,000 garage would return over 13 per cent on the investment. These figures should be sufficient to indicate to the city man the possibilities of the double garage as a means of securing free storage for his car.

The cost of the two-car garage of concrete block construction, either block surface or stucco, is seldom more than 35 per cent above the cost of the single-car garage of the same general characteristics. The additional space costs so little that it is worth while, considering the possibility that the owner may have two cars at some

future time. Plans shown in figure one are for a double garage, 20 by 22 feet inside dimensions, with six large windows and swinging doors with ample clearance. If desired, one or both pairs of doors may be duplicated on the opposite side of the garage to permit driving forward in and out.

The following quantity of concrete block and special pieces will be required:

325 smooth granite faced foundation blocks, 8 by 8 by 16 in.

536 smooth granite faced wall blocks, 8 by 8 by 16 in.

56 smooth granite faced corner blocks, 8 by 8 by 16 in.

79 smooth granite faced half blocks, 8 by 8 by 16 in.

If the blocks are to carry Portland cement stucco surface, the following will be required in place of the quantities given above:

917 foundation or stucco blocks, 8 by 8 by 16 in.

76 foundation or coat stucco blocks, 8 by 8 by 16 in.

There will also be required 6 concrete sills, 3 ft. 4 in. long, 6 in. high and 8 in. thick; 6 lintels 4 ft. long, 8 in. high, 8 in. thick; 2 reinforced lintels 9 ft. 8 in. long, 8 in. high and 8 in. thick.

Blocks should be laid with quarter-inch joints. Cement mortar should be used and the joints carefully tucked and cleaned up if the block surfaces are to remain exposed. In case the block is to carry a stucco surface they may be laid rapidly with joints left unfinished, the only important precaution being to see that the foundation or stucco blocks are laid up in as nearly a true plane as possible.

Stucco coats should be applied in the usual manner to walls which have been previously dampened. If the stucco is rich and impervious, the intermediate cost may



Plate 4



Plate 5

Plate 4—Large three-compartment garage of rock face block. The owner has provided for plenty of light by placing three large windows on each side and ample glass area in the doors

Plate 5—A plain and inexpensive garage which has provided free storage space for the owner's automobile and paid dividends for several years



Plate 6



Plate 7

Plate 6—Block garage with stuccoed surfaces and red tile roof. An attractive structure which ornaments the suburban community in which it is located

Plate 7—This garage of concrete block covered with portland cement stucco rents for \$10 per month, per compartment, returning to the owner about 15 per cent on his investment

be dispensed with, applying the dash finish directly on base coat, preferable after an interval of one week.

The garage should have a fire-resistant roof. Either a flat slab of reinforced concrete or a roof of frame construction covered with fire-resistant materials may be used. A covering of asbestos shingles, tile or slate is very acceptable, the choice depending largely on the type of roofing used on the adjoining residence. The underside of the roof should be fire protected with cement plaster ceiling on metal lath with the underhang of the eaves covered with stucco.

Profit in Apartment Building

After carefully considering all factors, the Apartment Homes Company of Sioux Falls, South Dakota, has become thoroughly convinced that apartment houses can be built at a profit in spite of the present high cost of materials and labor.

The company was recently organized with \$2,000,000 capital for the purpose of building apartment houses in the larger cities of South Dakota, and is now preparing to begin work on its first apartment building at an early date. Lots have been purchased on one of the most desirable streets of Sioux Falls and plans are now being drawn. The building is to be of fireproof construction, three stories high, containing fifty apartments, and will cost around \$200,000.

To Regulate Lumber Supply

The American Wholesale Lumber Association, brought into being at a national convention held at the Congress Hotel, Chicago, during the week of May 17, promises to improve the distribution of lumber and effect other reforms which will make better conditions for the builder.

L. R. Putman, formerly president of the

Southern Pine Association, has been appointed managing director and has opened offices in the Arcade Building, Chicago.

Here are some of the ills of the lumber trade as at present conducted, according to the diagnosis of Mr. Putman.

Of all the timber harvested only 37 per cent reaches the market as lumber. The balance is waste—mostly used as fuel in sawmill power plants.

Marketing and distribution is primitive. Hundreds of cars are shipped from producing centers to big central markets, without regard to whether there is a market there for lumber.

Certain fly-by-night speculators accept lumber on consignment, making no agree-

ment on price beyond stipulating that they shall receive a certain commission on whatever amount they can get for it. They throw it on the market at any price offered, with the result that the market is made chaotic.

As a remedy for these ills, Mr. Putman said, the new association will undertake research work so that the greater part of every tree cut will reach the market in some form. It will try to eliminate the irresponsible speculator, reform the shipping system so that lumber will be shipped directly to the place where it is needed, and arrange to route all shipments over the shortest route. The association will undertake to increase reforestation activities.

A Novel Two-Story Garage



A local ordinance limiting the size of a cement floor without a drain, this contractor built his garage with a second floor reminiscent of an old-fashioned blockhouse.

Exterior Doors--By A. Benton Greene

THE small insert (Fig. 1) shows two elevations, interior to the left and exterior to the right, of a two-paneled door in a frame wall. The enlarged sectional elevations surrounding the insert are designated in such a way that their corresponding sections in the small scale drawing are easily identified.

Except for its greater thickness, there is virtually no distinction between an interior door and an exterior door. The principal difference lies in the construction of the frame. The latter must be so designed as to meet the varied demands made upon it by new conditions. What these varied demands are and what the conditions that bring about these changes is the subject of our present article.

Generally speaking, the frame of an outside door consists of a head jamb, side jambs, outside casing and sill.

As in the case of an interior door, discussed at great length in the April edition of the NATIONAL BUILDER, the studding around the opening of an exterior doorway is doubled. The head jamb (see A, Fig. 1), extends across the entire thickness of the wall, from inside face of plaster to outside face of sheathing. It should be separated from the studding by a space of about one inch to allow for the insertion of wooden wedges. These wedges help to make the frame rigid and keep it plumb and level. In first-class work jambs, whether in wooden or brick walls, should be worked out of solid material not less than $1\frac{3}{4}$ in. thick and should be rebated $\frac{1}{2}$ in. or $\frac{5}{8}$ in. on the inner edge to insure a tight shoulder for the door. The outer edge is usually rebated for a screen door. A rebate for the screen door is often formed by setting back the outside casing about $\frac{3}{4}$ in. from the jamb, as here illustrated.

The upper part of the casing should always be finished with a slight incline to shed water. It may be thus left perfectly plain or indefinitely elaborated to suit the character and requirements of the design. In either case, the top of the casing should be flashed with tin or copper. This is turned over and securely fastened to the outer edge of the crown moulding and carried up under the shingles or other exterior covering. The thickness of the casing is determined by the thickness of the screen door, which is usually $1\frac{1}{8}$ in. Its width is from 5 to 6 in. or more, depending upon its simplicity or ornateness.

The section through the side jamb, C, represents nothing that has not already been dwelt upon in our discussion of the head jamb. In fact, in all the details of a door, the section through the head is so much like the section through the jamb

that either one or the other is given, scarcely ever both.

The sill, B, is the most distinguishing feature of a door. It should be about $1\frac{3}{4}$ in. thick and should be made of hardwood to withstand the constant wear and tear to which it is subjected. The reason for giving a slight pitch to the sill, say about $\frac{1}{4}$ in., is quite evident.

Whether the sill is built up (see Fig. B) or made solid (see Fig. B3), the upper surface should be set about $\frac{3}{4}$ in. above the finished floor to allow for clearance of carpets and rugs.

The joint between the door and sill is the most vulnerable point in its construction. Section B, as a casual study will show, offers no resistance to the ravages of storms, while in Section B3, we find a most satisfactory solution to this problem. In the latter sill the upper part is finished with a quarter round which, together with the semi-circular groove in the lower edge of the door, makes the joint weather-proof and water-proof. In exposed situations an additional precaution is taken, namely, the planting of a drip mould on the lower part of the door, as shown in Fig. B3. This mould forms a hood over the joint and renders it practically impervious to rain and wind. All the other sketches shown in the accompanying plate indicate sections through doors in masonry walls. Section C1 shows the usual method of constructing the door frame in a brick wall. The frame must be thoroughly secured to the wall otherwise the constant slamming of the door will work the frame loose from the wall. One method of counteracting this tendency is herewith illustrated. The frame is blocked up with 2x4 studs, which are set into a recess and securely anchored thereto. Another method is to build into the wall wooden blocks of the size of bricks, and securing the frame to them. The first method is the better, for the anchors are not affected by shrinkage, as are the wooden blocks. Two iron anchors, about $\frac{3}{4}$ in. x 2 in., 8 in. long, screwed to each jamb, are sufficient to keep a frame for a heavy door square and plumb.

Note the double rebate in the frame C1. One is for the exterior door and the other for a screen door. The staff bead takes the place of the head casing in a frame wall, its function being to conceal the joint between the masonry wall and the wooden frame.

Sections C2, C3 and C4 are examples of walls 12 in. and over in thickness. Door frames built in such walls are usually provided with paneled jambs, as shown. A careful study of these illustrations will reveal the principle of their construction. They may be divided into two classes:

Paneled, as shown in C2 and C3, or made up of two parts, as shown in C4. The latter is less expensive but not so attractive looking as the former.

In the sill sections shown in B1 and B2 there are presented several features which merit consideration. In B1 is shown a stone sill cut with a saddle on its inner edge, forming an integral part of the sill. Sometimes a separate wooden threshold is used; but the latter practice is not recommended, particularly in public buildings, for the wood threshold will eventually curl up and allow the water and wind to be driven under the door. Section B2 obviates this difficulty. A metal saddle with a semi-circular groove in the center is used. Into this groove is set a rubber hose, one-half of which is sunk and the other half exposed. The bottom of the door is then bevelled in such a way that when the door is closed it will just clear the hose, thus forming an absolutely weather-tight joint.

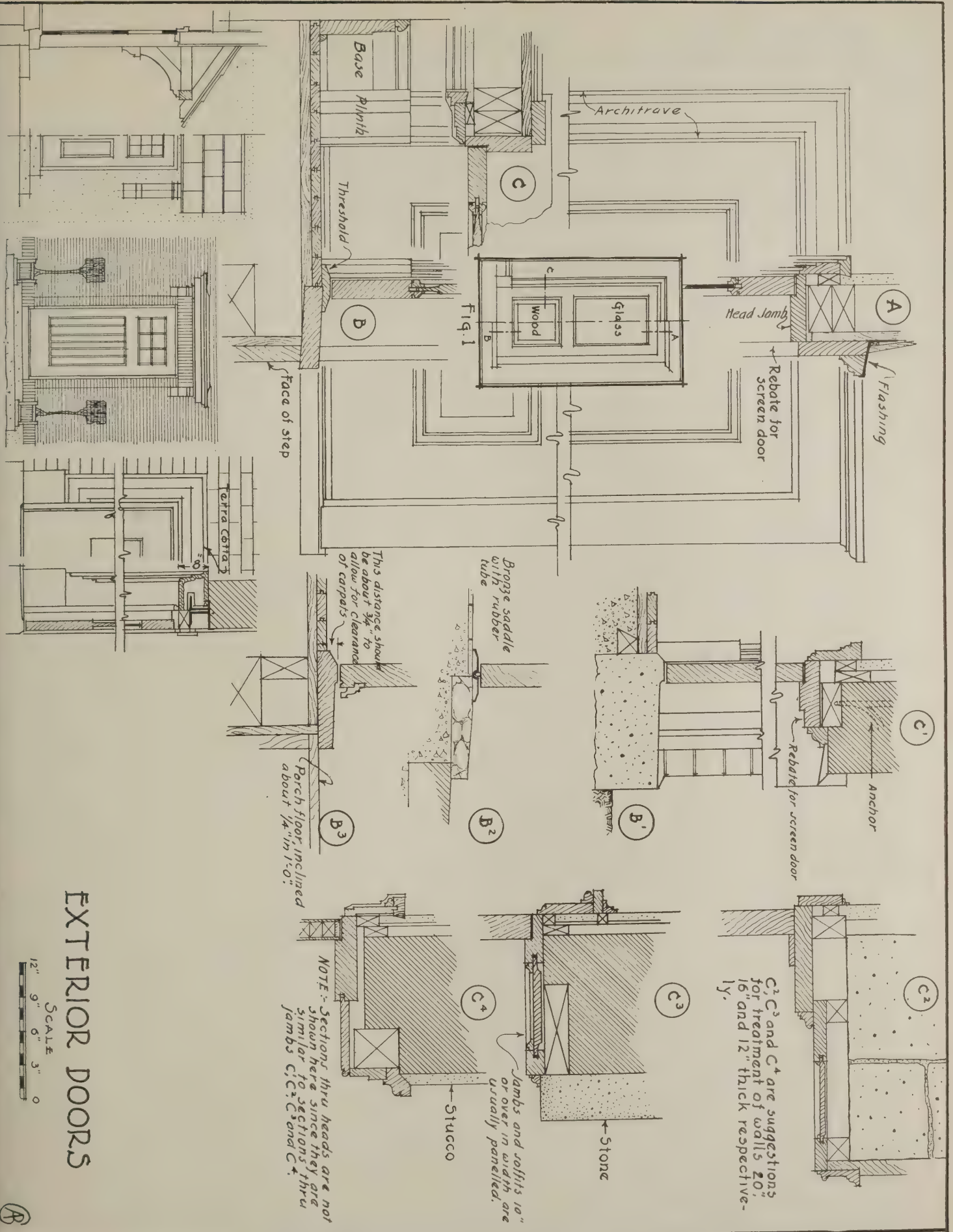
The sketches given in the lower part of the accompanying plate are suggestions for designs of exterior doors in frame, brick and terra cotta walls respectively. If the reader is so inclined, he could test the comprehension of the subject by drawing sections through various parts of the door, referring to the appropriate details given above for guidance and verification.

The Forest Products Laboratory Decennial Celebration

The Forest Products Laboratory was organized by the U. S. Forest Service in 1909 and formally opened in June, 1910. It is conducted in co-operation with the University of Wisconsin.

A good many men acquainted with the work of the laboratory have expressed the thought that the laboratory and the service rendered by it should receive some mark of recognition or appreciation from the industries which it serves. In response to this thought, the decennial celebration has been planned, and the General Committee organized to carry out the detailed arrangements.

The present plans call for a two-day program, including addresses by men prominent in science, industry, and commerce; inspection of the laboratory; a banquet; and various other forms of instruction and entertainment. It is proposed to make a permanent record of the decennial in the form of a souvenir publication to contain all of the addresses and other relevant matter, including the names of those who can permit a permanent record of their co-operative contributions to be made.



C₂, C₃ and C₄ are suggestions for treatment of walls 20", 16" and 12" thick respectively.

Jambs and soffits 10" or over in width are usually paneled.

NOTE: Sections thru heads are not shown here since they are similar to sections thru jambs C₁, C₂, C₃ and C₄.

EXTERIOR DOORS

SCALE
12" 9" 6" 3" 0

Cutting Roof Framing With the Yard-Saw

WITH the present cost of labor and material the building contractor is faced more than ever with the question of how it is best to utilize to the fullest extent his machinery, both in shop and yard.

He wants to be able to reduce as much as possible the time in erecting and he also wants to reduce the amount of waste which usually goes on when the lumber is sent on direct to the job when all the framing is to be cut by hand.

While it is impossible to avoid leakage under these conditions, if the bulk of cutting to length and angle is done in the yard many cubic feet of timber can be saved and it is surprising to what a variety of uses those short cuttings can be applied.

At this stage one is very apt to say, "Well, if this is to be done it means double transport"; yes, in many cases it does; but to my way of thinking the cost of the extra transporting and handling is more than recovered by the cutting with the circular saw, and my experience has been that this idea of cutting roof framing before sending to the job is a live proposition.

In work of this kind the first question one has to ask himself is, would it be quite safe to cut and prepare the roof from the sizes given in the drawing? Well, I can only speak from my knowledge of work on this side and I am not inclined to take the measurements on the drawing as accurate, because I have found so many discrepancies in the setting out of work that I have always found it worth while to visit the job and measure the principal lines of the fabric, though, of course, I would never think of waiting until the walls were ready for the ceiling joists. Oh no! We want the roof framing to be on the job at that time. But I would be on the job by the time the bricks on the concrete lower wall were in position and from them I would be able to ascertain if I should lay down the roof to the size given on the paper, or what changes would require to be made. In cases where there was an overseer or a foreman on the job I might be saved making the journey, as in his weekly report these measurements could be included.

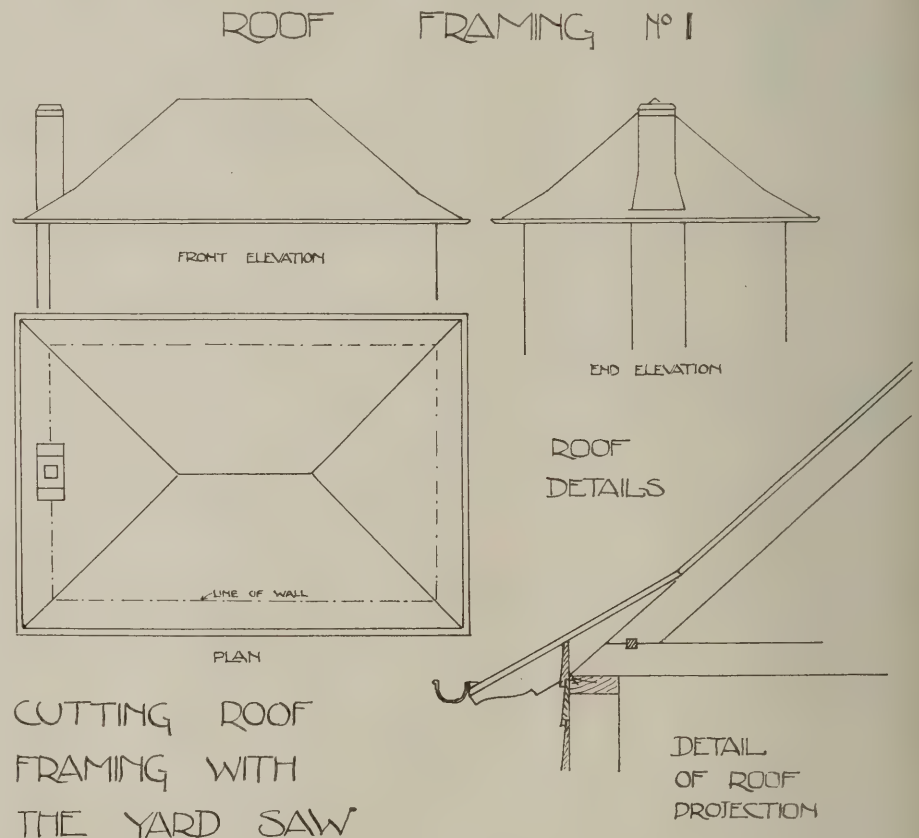
In the design of a roof illustrated the lines are, very simple. The only part of the structure which interferes with the ceiling joists and the spars of the roof is the chimney stack. In a roof such as this I would not recommend the stack to be taken any note of at this time. Just arrange this end of the roof in the same way as the right-hand end and cut out from the few spars which are behind the roof the portion

equal to the thickness of the chimney on the job. Another point which should be carefully gone into is the description of the roof from the specification and any special description of the work and material noted.

A good plan is to order sufficient ceiling joists to cover the distance between the inside of the ends of the building and for the spar as anything beyond that on either side is short lengths. The length of the

lines of a section of the roof full size on the ground, which allows the mould to be made for the end of the ceiling joists, the angle ceiling joist and the short ceiling joists for the return end of the roof.

In cutting out the outer end of the angle ceiling joists, this part is usually cut to a side angle to allow the boarding to be flat on the angle framing, but in this case, as all the spars of the roof and the ends of the ceiling joists receive an eaves



CUTTING ROOF
FRAMING WITH
THE YARD SAW

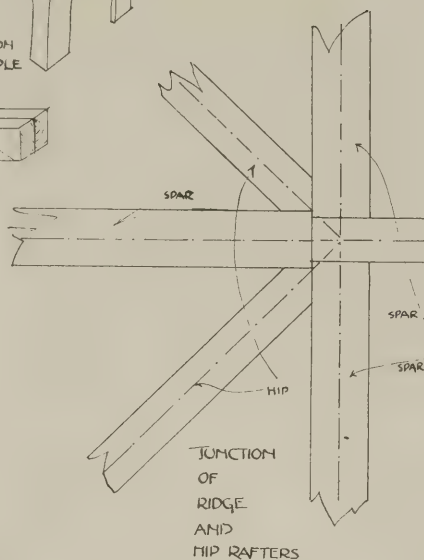
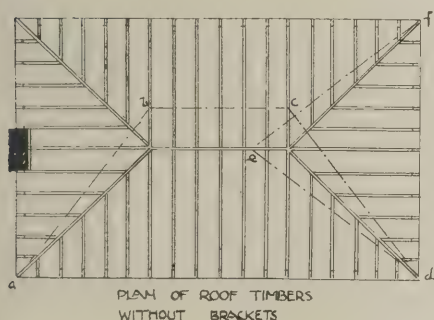
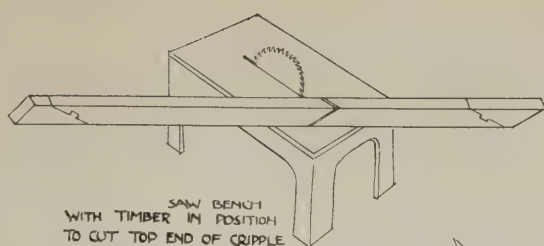
spars can be got from the section of the roof and the number of spars required is got by taking the length of the roof on the front and dividing by the distance from centre to centre. To the product add one, which is the number of spars required for the front. The same number is wanted for the back and two for the ends. If this number is ordered all the lengths of the common spars, the cuttings off the cripple spars on each side, will be sufficient for the cripple spars on the ends of the roof. To these quantities there may have to be added some material for the brackets at the eaves and for the horizontal ties or any other method of stiffening the roof which may be adopted.

The next step is the laying down the

bracket, this cut is best left square.

The other end of this piece is cut at an angle of 45 degrees on the top, each side of the angle being mutual to the centre line of the joist. The short joists of the return end of the roof are jointed on to the first and the last long ceiling joist. The custom in England for a long while was to make the first and the last joist much thicker than the other ceiling joists and to notch the short ones into them, but that has been almost universally changed, as now the usual method is to nail a 3-in. by 1½-in. fillet on to the side of the joist and notch the ends of the short joist on to it. This idea of jointing these joists is shown in the line drawing with several of the ceiling joists set off as specified.

CUTTING ROOF TIMBERS WITH CIRCULAR SAW



In a great number of roofs the centres of the ceiling joists do not go evenly into the length of the roof. Well, what I do in that case is to arrange the narrow space near the middle of the building, because that prevents the arrangement of the ceiling joists and spars from being interfered with on the parts of the roof which are formed by the cripple rafters.

In cutting out the common spars 16 are cut to the mould according to the plan of the roof timbers. The length of the whole spar is 10 ft., which we get from the mould and what we now want to find is the length of the shortest cripple. If we have taken the trouble to mark off on the ceiling joist mould the position of the ceiling joist, and if the first joist from the corner is projected on to the spar mould the length of that cripple is easily obtained and is 1 ft. 3 in. on the mould.

Now 1 ft. 3 in. from 10 ft. gives us 8 ft. 9 in. and if that is divided by 5 the number of spaces between the last common spar and the shortest cripple the answer is 1 ft. 9 in., which is the difference in length of each cripple as it gets nearer the ridge.

1 cripple	1 ft. 3 in.
2 cripples	3 ft. 0 in.
3 cripples	4 ft. 9 in.
4 cripples	6 ft. 6 in.
5 cripples	8 ft. 3 in.

The length of the cripples on either end and on back and front should be the same. The side bevel for these rafters are shown on the plan of the roof timbers and the plumb and horizontal bevel is the same as the common spar.

The length of the hip rafters I generally get by taking the foot run of the spar and by squaring and finding the root get the

that the foot run is taken right up to the junction of centre of the members, as is shown in the plan of the ridge and hip rafters. To be exact it should be half the thickness of the common spar on the diagonal less, but as we are cutting the framing for a roof possibly 100 miles from the shop, and the hips are such important parts in the erection of the roof, I always like to send them on the length shown in the mould, because it gives the erector of the roof a little bit to work on.

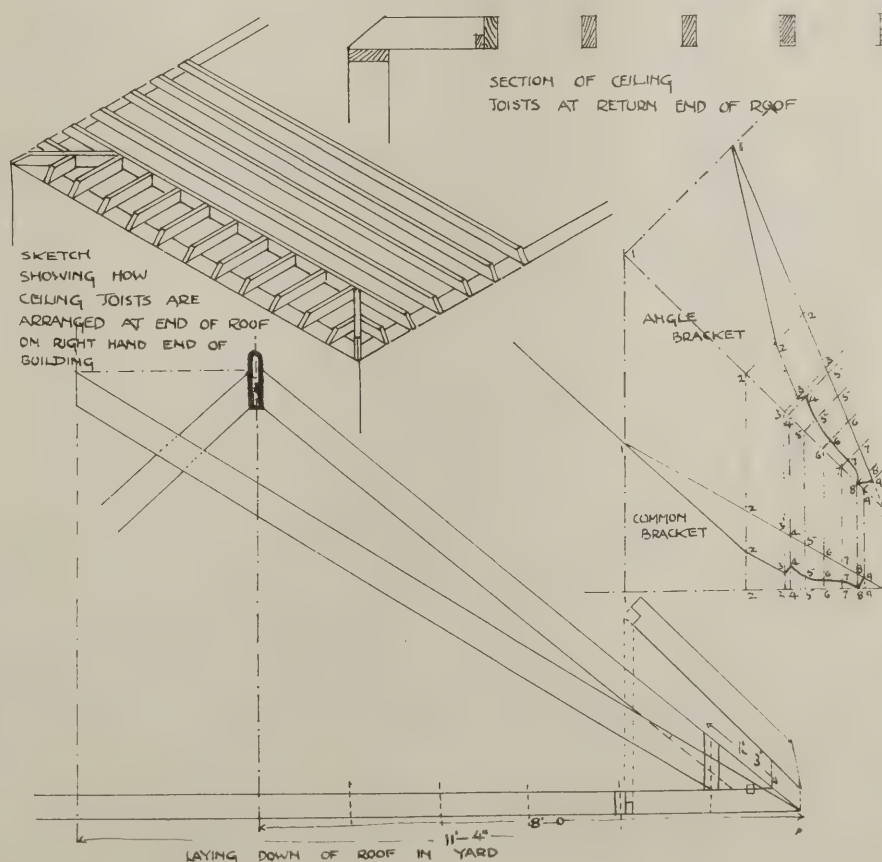
Another point in cutting the hips is that I don't advise the side bevels at the top to be cut in the shop for the reason stated above.

In cutting the cripple spar a good plan is to draw them in in pairs, and another point which I find works out very well is to draw the longest one and the shortest one on the one stick, which means that we gain for our trouble a saving of an angle cut. All these cuts can be done with the circular saw.

After the spars have been cut the pole plate is cut out by hand. The pole plate is very useful to steady the roof in position and is very general in roof construction throughout England.

We have still the eave brackets to draw and cut, as shown, and angle 1 is required, as shown in the line drawing, which is really an extension of the common bracket on to a line making an angle with front

CUTTING & SETTING OUT CEILING JOISTS



and return for the roof similar to the hip rafter.

If the roof rafters are to be strutted these parts of the framing will also be required to be cut so that they can be sent off along with the ridge board and the pole plate and the roof boarding. In setting up a roof of this kind which has been cut by some person who is not the erector, success depends a great deal on a definite line being laid down for the setting out of the work.

In setting the ceiling joists the first two joists to be set should be those immediately under the ends of the ridge. The exact distance from the end wall of the house to the middle of the joist is half the width of the building. The other joists will then be set at the specified centres toward the outer walls. The last whole joist on each side will be set to suit the short joists on the end and space between the first joists

set will be filled in in the usual way. If there is a tight space this is where it should be. The chimney stack will now be trimmed and the short joists fitted in position.

With this arrangement complete if there is a pole plate to be put in between the foot of the spar and the top of the ceiling joists it should be set off now and cut out preparatory to the raising of the roof spars.

The next stage is the raising of the ridge. Usually before doing this it is well to mark off the position of the ceiling joists on it, which is also to be the place for spars at the top. The ridge board would now be lifted up and a few spars stuck up in position. Usually the whole of the spars on the back and front are nailed in position when one couple may be plumbed and the end common spars tried in position.

If everything is coming in right the ridge would be cut off flush with the end spars

and the common spar on the return fronts nailed in position.

I have seen cases where, in dealing with a roof this kind, that the first and last spar on the front and back had to be readjusted. Shifted slightly nearer the centre of the building, or shifted out, as the case may be required; but all this should be done before the ridge board is cut to the length.

Now the hip rafters are fitted in position and if they are not to be bevelled on the top edge the top arrises are set flush with the top of the common spars. The cripple would now be fitted back and front. On the return front only, on the one end, we have the chimney stack which will require to be trimmed for the spars which surround it. After this would come the fixing of the eave blocks and the boarding of the roof for the covering.—*John Y. Dunlop.*

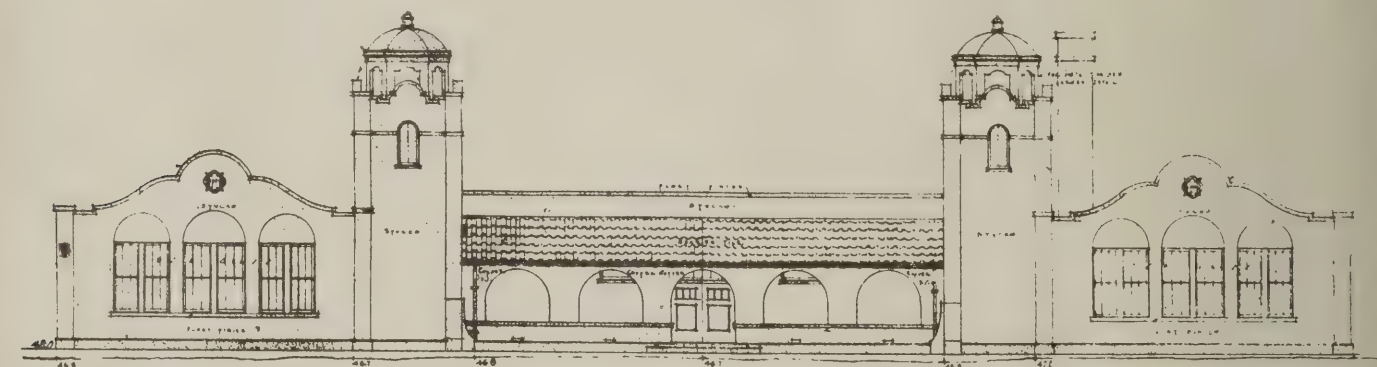
Administration Building for a Pavilion Type School

IN THE April issue of NATIONAL BUILDER a pavilion type school designed by Maurice J. Sullivan, for the city of Houston, Texas, was described. In that article, working drawings showing a typical two-

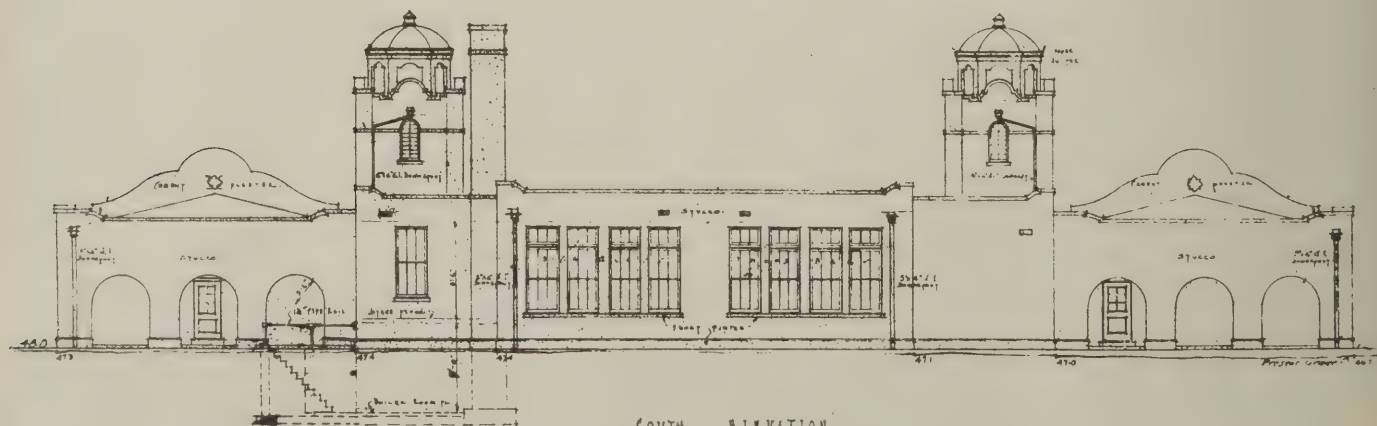
room unit and the general layout, were discussed. A photograph of the administration building was also reproduced. A number of readers have expressed a desire to study the plans of this building also.

Therefore a sketch plan and the principal elevations of the administration building are shown in this article.

The style of this building is Mission, to conform to that of the class-room units.

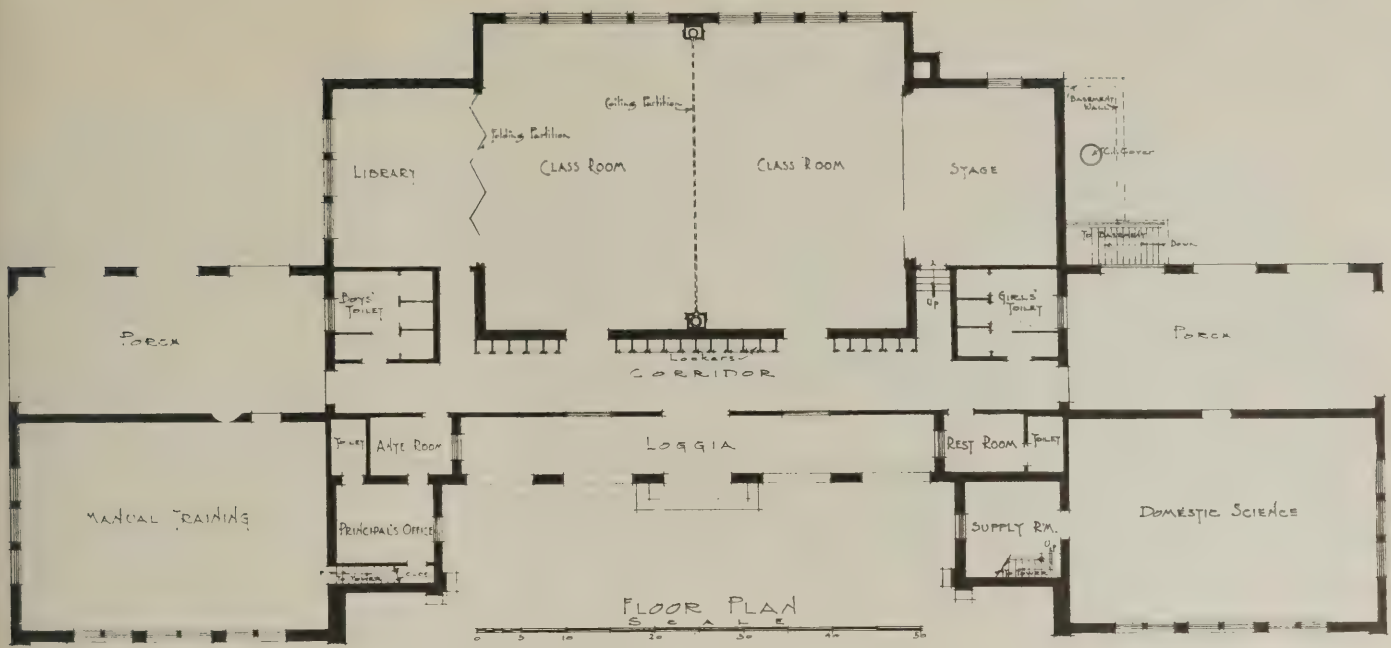


NORTH ELEVATION



SOUTH ELEVATION

Elevations of administration building of pavilion type school



Floor plan of administration building of pavilion type school

and the administration building and the several units are connected by covered walks or cloisters. The construction of the walls, including the interior partitions is of hollow tile, with brick piers built in to carry the girders, beams and other concentrated loads.

A feature of the plan is the arrangement by which the auditorium is made to also serve as class rooms. At one end of this room is the stage and at the other is the library. A vertical coiling partition in the middle of the room makes it easily convertible into two large class rooms. Folding doors fill the opening between the library and these rooms. Thus a large auditorium is always available, yet the space which it occupies does not stand idle during school hours. The class rooms, library and the stage all have independent entrances to the main corridor, and lockers for the children's wraps are placed in the corridor.

The boys' toilet is placed at one end of the corridor and the girls' toilet at the other. At each end of the corridor are covered, open air play spaces. These are very desirable for use during very warm or rainy recess periods, and form comfortable places for the children to eat lunches. If desired these porches could also be used as open air school rooms.

A domestic science room opens from one of these porches and a manual training room from the other. Note that the porch near the girls' toilet and the domestic science room is easily restricted to the use of the girls, while the other porch is similarly located with respect to its use by the boys. Thus separation of the sexes is provided for without confusion.

A supply room opens from the domestic science room. A stair in the supply room leads to additional storage space in the

tower. The supply room for the manual training room is located in the tower above the principal's office.

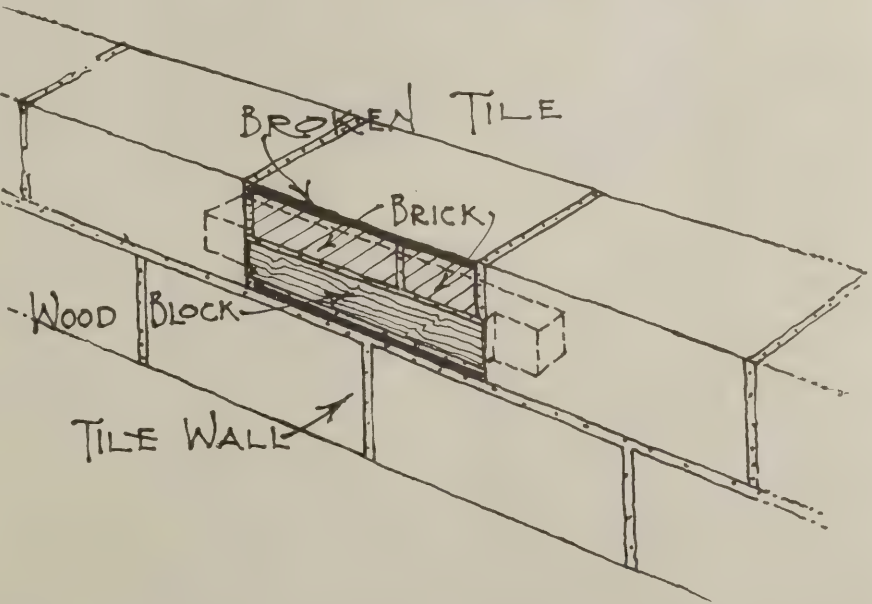
An anteroom is placed between the prin-

cipal's office and the corridor. At the other end of the corridor is a teacher's rest room. Both the principal's office and the rest room have private toilet rooms.

Nailing-Blocks for Hollow Tile

J. F. M. of California says that some difficulty has developed in preparing hollow tile walls to receive furring, grounds, etc. His experience has been that it is difficult to prevent ordinary wooden wedges or

the sketch, he breaks out one edge of a tile and inserts in it a 2 in. by 3 in. block of wood about 16 in. long. The block is notched for 2 in. from each end, the depth of the notch corresponding to the thickness



plugs from working loose, thus causing the trim to pull away from the wall.

The following describes a method that he uses, but he is anxious to hear from readers who know of a better and simpler one.

Assuming ordinary 5½ in. by 8 in. by 12 in. "backup" hollow tile and referring to

of the shell of the tiles. Thus when the block is in place its face is flush with the face of the tile and the notched ends of the block are engaged against the inner surface of the adjoining tiles. Bricks are placed on top of the wooden block to fill the remainder of the cavity. Both bricks and block are laid in cement mortar.

An Assembly Plant



An auto assembly plant. Note the parking space

THE accompanying photographs show an automobile dealer's assembly plant at Dallas, Texas.

The paved space shown in the exterior view is intended for use as a parking space for cars. Note that holes have been left in the edge of the paving so that the fence posts may be easily set in place.

The interior shows that the building is designed on the "daylight factory" principle. Almost the entire wall surface is taken up with windows and a monitor skylight runs the entire length of the building. All of the wall sash are of steel to provide the maximum glass surface. The monitor sash are of wood and each alternate one is pivoted and is connected to a sash operating device by which eight sash may be opened or closed at one operation.

The exterior walls are of brick, and the floor and paving is of concrete. The roof construction is of frame, covered with a felt and gravel roof. The monitor is sup-

ported by I-beam girders resting on cast iron columns. Note the design of the raised column bases which are intended to prevent side skidding of autos which at least results in bent mud guards and scratched bodies, if not in injury to the structure.

An office and toilet rooms are located at the far end of the building. Near this end can be seen the smoke hood for the forge and also the motor and pulleys for the lathe. Also note the electric outlets just above the work benches in the center of each bay, and the fuel gas outlets on the piers.

The entire interior, with the exception of the iron and steel work, is whitewashed which aids in diffusing the light, thus reducing the shadows.



An assembly plant built on the "daylight factory" principle

A Warehouse

THE accompanying illustrations show a warehouse built by the Industrial Building Company for the Western Stone-ware Company of Chicago.

The first floor is of concrete and with the exception of the reinforced concrete floor of the office portion over the boiler room, is laid directly on the earth filling. The second floor and the roof is of slow burning mill construction, 3 by 14 inch joists supported on posts and girders. All foundation work, including the footings for posts, is of concrete. The lintels over windows and other openings are of reinforced concrete.

The office space is at the front of the building and consists of a general office,

two private offices, a general toilet room and two private toilets. A corridor from the main entrance gives access to these rooms and also to the warehouse portion of the building. A stair leads from the corridor to the second floor which is entirely given over to storage purposes. A stair under the main stair leads to the boiler room.

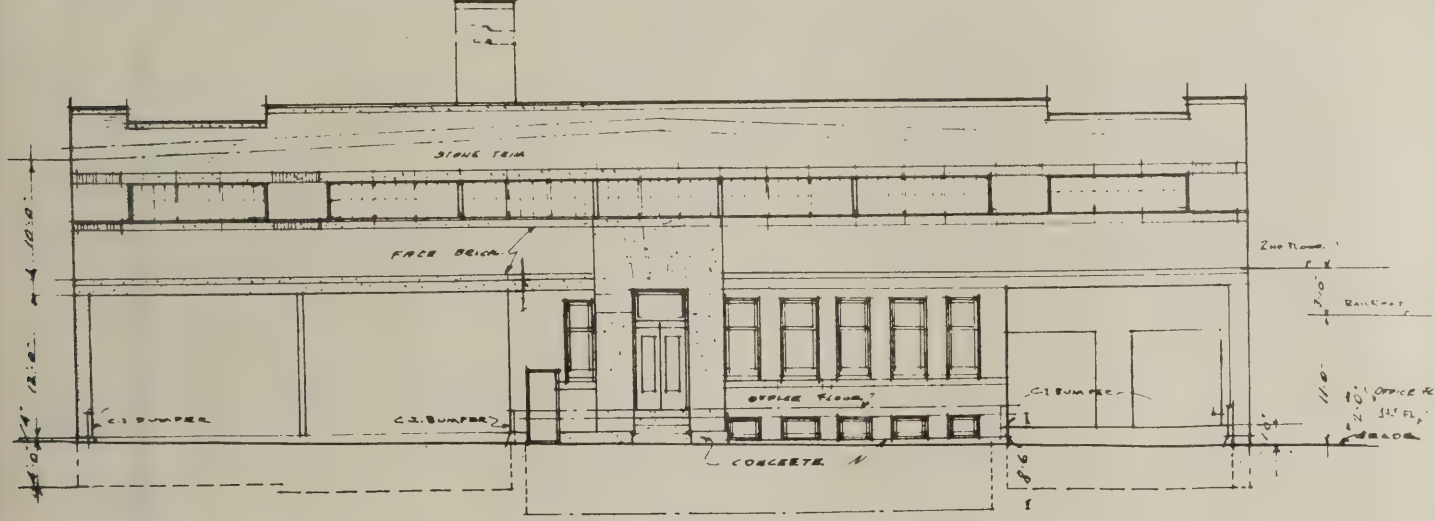
Fire walls divide the first floor into two sections and also separate the office portion from the remainder of the building. The fire walls are of brick and have self-closing metal clad doors. All windows are fitted with metal sash; those of the second story being pivotal.

At the left of the office portion is a storage space for trucks or wagons, while at the right of the office portion is the loading space. These large openings are closed by means of steel rolling doors. The floor of the loading space pitches to the rear to allow the body of the truck to come even with the first floor of the warehouse and thus simplify the loading of heavy crates. An elevator is provided between the first and second floors.

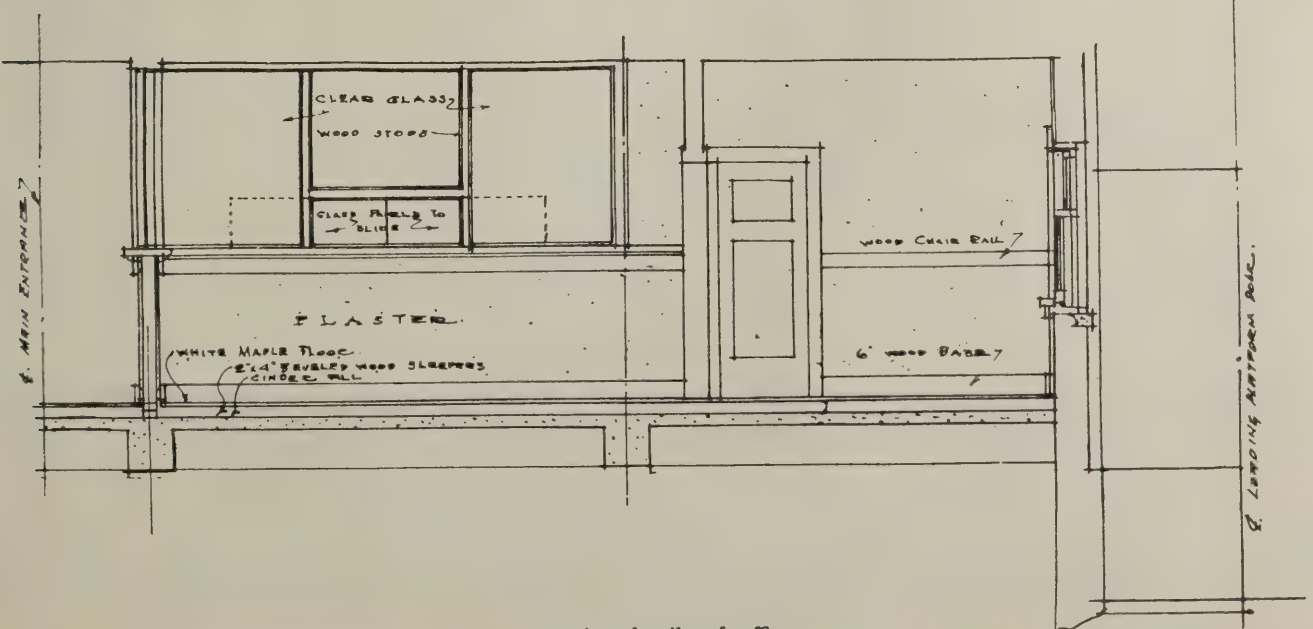
The front is of plain brick broken by cement work, the use of which is regulated by the construction. The only studied decoration appears at the main entrance which is of cement jointed to represent stone work.



Tile decoration of this building has been confined to the details that were made necessary by the structural requirements

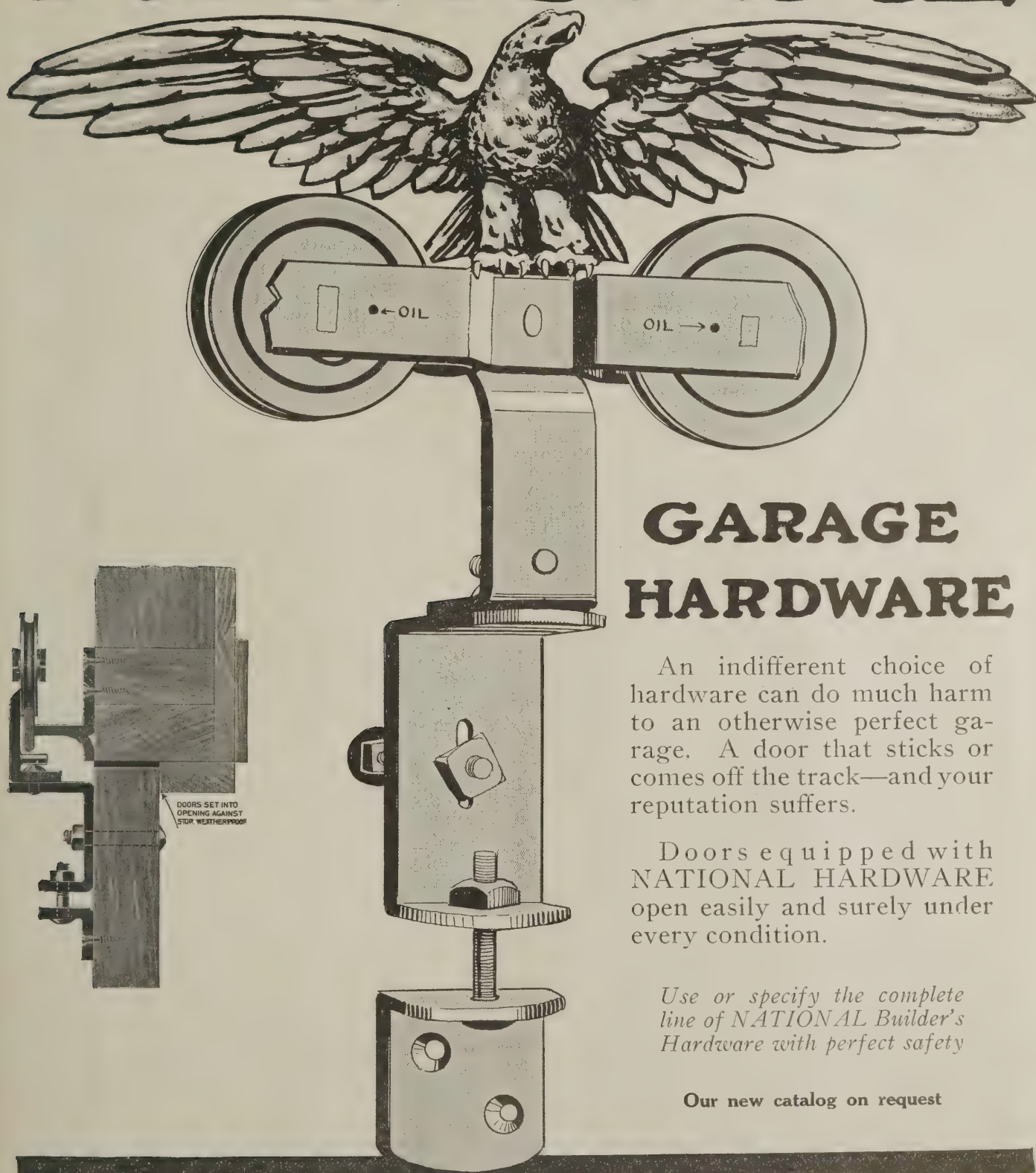


Elevation



Interior details of office

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Announcements and Publications

Architects Tooker & Marsh, New York City, should have been given credit for the house shown at the right of the advertisement of the Creo-Dipt Stained Shingle Co., Inc., in our June issue. The other house in the illustration is by Architect Robert Seyfarth, Chicago.

Announcement is made of the death of D. W. Brimer, senior member of the firm of Brimer & England, contractors and builders, Knoxville, Tenn. An eloquent tribute to his character and worth was made by the Association of Knoxville Contractors.

The methods of manufacture, qualities and styles and the prices of planes and edge tools are given in a series of monographs issued by Mack & Co., 100 Brown's Race, Rochester, N. Y., manufacturers of the "D. R. Barton" edge tools.

Desco Metal Store Fronts is the title of a catalogue issued by the Detroit Show Case Company, 470-490 West Fort Street, Detroit, Mich., giving details to scale and full description for the installation of the store fronts manufactured by the company.

The Journal of the American Society of Heating and Ventilating Engineers, 29 West 39th Street, New York, for May, in addition to the official reports of the research bureau, features *The Significance of Odorless Concentration of Ozone*, by E. S. Hallet; *Heat Insulation Facts*, by L. B. McMillan; *High Efficiency Air Flow*, by F. W. Caldwell and E. N. Fales; a *Symposium on Health and Humidity*, and the report of the Committee on Industrial Engineering.

A New Method of Sewage Disposal is the subject matter of Bulletin No. 200 issued by the National Lime Association, as a progress report on a new development in the use of lime as a chemical reagent in effecting the purification of impure natural waters and trade wastes, and as extended to the treatment of municipal sewage.

Van Guilder Double Wall Machines are illustrated and described in a circular issued by the Van Guilder Double Wall Co., Inc., 77 South Avenue, Rochester, N. Y.

The Contractors' Equipment Co., Keokuk, Iowa, in Bulletin P21, announces a big reduction in mixer prices with illustrations and descriptions of the various types of mixers manufactured by them, with full specifications and shipping data.

Republic Trucks for General Contractors, is the title of a handsomely illustrated catalogue issued by the Re-

public Motor Truck Co., Inc., of Alma, Mich. The design, construction and tests applied to the trucks are illustrated and described and specifications for the several types are given with detail drawings and photographs of trucks in practical operation in the kind of work for which they are especially adapted.

The Disston Crucible for April, the house organ of Henry Disston & Sons, Inc., saw, tool, steel and file works, Philadelphia, Pa., features an interesting series of articles on the timber resources of the world.

The Portland Cement Association announces that J. W. Johnston, for the past two years district engineer in charge of the Parkersburg, W. Va., office, becomes district engineer in charge of the Milwaukee office, and that J. H. Riddle, who has been connected with the Parkersburg office, takes charge of that district.

Concrete in Architecture and Engineering, published by the Portland Cement Association, April-May issue, illustrates and discusses various types and systems of concrete house developments.

The Loudon Machinery Company, Fairfield, Iowa, announces its 1920 issue of the general catalogue as ready for distribution. It shows a complete line of modern barn equipment. A new issue of Loudon barn plans is also off the press, containing blue-print suggestions for all styles of barns and also treats of every phase of barn construction.

Ball bearing butts are featured in a thirty-two page catalogue issued by the Stanley Works, New Britain, Conn., the central spread analyzing a ball-bearing butt, showing the different features that make this type of butt desirable to install.

A compact, business-like catalogue of simple and direct design presents the claims of the Standard Motor Trucks, showing 1, 2½, 3½ and 5 ton capacities, and various styles for various uses. Issued by the Standard Motor Truck Company, Detroit, Mich.

Mack Trucks for Contractor and Mack Trucks in Heavy Hauling, are the titles of catalogues illustrating and describing the trucks indicated in the titles and manufactured by the International Motor Company, West End Avenue and Sixty-Fourth Street, New York City, N. Y.

Announcement is made that the Stanley Works, of New Britain, Conn., has purchased the manufacturing business of the Stanley Rule & Level Company, also of New Britain. The two businesses will be carried on under their distinctive names as heretofore.

Ransome Concrete Machinery Co., 1764 Second Street, Dunellen, N. J., announce that their products will be sold in Atlanta territory by W. F. Goodrich & Bro., with offices at 10½ Auburn Avenue, Atlanta, Ga.

Wayvell Chappell & Company, manufacturers of the Automatic Ball-Bearing Electric Floor Surfacing Machine, 416 W. Grand Avenue, Chicago, announce the purchase of a factory to meet the requirements of increased business. The new plant is at 137-141 North Jackson Street, Waukegan, Ill.

Recent sales statistics compiled by the Trailmobile Company of Cincinnati, Ohio, show an increasing market for trucks and trailers, lumber business leading, with farmers second, and contractors third.

The semi-annual meeting of the American Society of Heating and Ventilating Engineers at St. Louis, May 26 to 28, offers an unusual professional program. The meeting will be characterized by two important Society undertakings in which an effort will be made to establish reliable standards as guides for practice. The establishment of an effective standard for ventilation will be here attempted as one of the first and most important results of the work of the Research Bureau at Pittsburgh, and also discussion upon a proposed standard for testing heating systems will here be started in order to guide the future work of the Research Bureau in this direction. Also there will be interesting and important committee reports and a comprehensive statement of the most recent work of the Research Bureau.

The Contractor—An Analysis of His Transportation Requirements, is the title of a finely illustrated catalogue issued by the Packard Motor Car Company, Detroit, Mich., in which the almost unlimited kinds of activity that engage the contractor are shown, with the kind of truck and appurtenances best suited to each particular job.

Hall Motor Trucks are shown in a variety of styles and for varied uses with a special emphasis on dependability and speed in a catalogue issued by the Lewis-Hall Iron Works, Ferry Avenue and Grand Trunk Railway, Detroit, Mich.

"Old Homes Made New," forms the leading subject-matter in *General Fireproofing* for April, the house organ of the General Fireproofing Company, of Youngstown, Ohio. Illustrations of metal lathed and plastered houses are shown with detail sheets and specifications.

BISHOPRIC WINS AGAIN!

(This Time It's Sheathing)

Put to Rigid Tests by—

OMAHA CITY OFFICIALS

Once More Overcomes

PREJUDICE WITH FACTS

The figures given in the following dispatch from T. R. Porter, of the Omaha Daily World-Herald, were taken from official records of Chief Building Inspector R. E. Edgecomb, who conducted the tests:

OMAHA, Neb., June 15.—A test of strength of different plans of frame construction has just been conducted by the Omaha City Building Department in the presence of fifty of the most prominent contractors and architects of the city and the result probably will be that systems of construction which heretofore have not been permitted under the Omaha building ordinances will, in future, be ranked even with, or above, the present systems countenanced in Omaha. In fact, one of the building systems which has heretofore been taboo in Omaha showed but slight effect under a strain which completely wrecked the system of building which has heretofore prevailed in this city.

"I am surprised that the new patented types showed up as they did," said Chief Building Inspector R. E. Edgecomb, at the conclusion of the tests.

THE SHEATHING TEST

The comparison which attracted the most attention from the builders and architects present was that between the accepted "wood sheathing" plan now used in Omaha and "Bishopric" sheathing, which heretofore has not been permitted in Omaha because of its supposed lack of strength. Under a strain of 2100 pounds the wood sheathing panel simply went to pieces as a complete wreck, the deflection being 5 1/2 inches, while "Bishopric" sheathing showed a deflection of 1-9/16 inches under the same strain.

The building ordinances of Omaha are soon to be revised and it was in connection with securing data for this purpose that the demonstration of the comparative strength of the different systems of construction was held. The tests took place in the Sunderland yards on Thursday, June 10, with Chief Building Inspector Edgecomb in charge. Mr. Edgecomb was assisted by deputy inspectors from his office force. Panels used were 4x8 feet, frames were nailed with 20-pennies, studs were 16 O. C. with two 10-penny nails to each bearing. Where sheathing was used it was 7/8 inch shiplap stuff. Strain was applied by a 24-inch screw jack manned

by two big teamsters with a couple of crowbars.

The first type of construction tested was that in ordinary use in Omaha under the building ordinances of this city, and known as "wood sheathing." The reverse side of the panel was wood-lathed. The strain was applied at a height of four feet from the bottom.

Three turns of the big jack and the machines showed a pressure of 200 pounds. An accurate measurement developed that the deflection of the panel under this strain was 5/32 of an inch.

Another turn or two was given the jack and the pressure increased to 400 pounds. The deflection was discovered to have just doubled under the double pressure and was 5/16 of an inch.

At 600 pounds the deflection was 19/32 of an inch and at 1200 the departure from perpendicular was 1 1/2 inches, from which point the "break" was rapid.

When the strain reached 1600 pounds, the deflection was so marked that it could be detected at 100 feet distance and was found to be 3 1/4 inches.

When the jack placed a strain of 2100 pounds on the panel, the whole thing gave way with a crash. The wreckage was total.

The second test was of a panel with Bishopric sheathing instead of the 7/8-inch wood sheathing as in the former panel. In all respects save the matter of sheathing the two panels were the same. The strain was applied in the same manner.

Before the strain was applied the announcement was made that the Bishopric sheathing is not used in Omaha, because the building ordinances did not consider that sheathing sufficiently strong.

The first reading of the perpendicular on the Bishopric sheathing was made when the strain reached 200 pounds. The deflection was 4/32 of an inch. At 400 pounds, the deflection was 3/16; at 600 pounds, 11/32 as compared with the wood sheathing deflection of 19/32 under the same strain.

At 1200 pounds, where the wood sheathing had shown a deflection of 1-28/32 inches, the Bishopric sheathing showed a deflection of but 21/32 of an inch. At 1600 pounds the comparison was: Wood sheathing, 3 1/4, Bishopric sheathing, 1-1/16.

Where the wood sheathing crushed under 2100 pounds, with a deflection of 5 1/2 inches, the Bishopric sheathing showed a deflection of only 1-9/16 in.

At 2200 pounds in the Bishopric sheathing panel test, the nails pulled from the sill and the panel separated, but there was no break in the board.

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The Situation

THE promise of an immense building activity that marked the beginning of the year faded rapidly in May. Building has slumped heavily, but the need for buildings of all kinds is accumulating. The potential wealth is here awaiting the adjustment of the machinery to give it movement into the right channels. In efforts toward adjustment hope rests in the activities of the National Federation of Construction Industries in conference with the Senate Special Committee on Reconstruction and Production.

While housing activity has largely come to a halt, it is obvious that the pressure of high cost while preventing building is also stirring investigation of every description of material and every character of construction and method that holds a promise of sound economical building and financing.

The National Federation of Construction Industries in this crisis asks all building associations to furnish the Hon. Wm. M. Calder, chairman of the Senate Special Committee of Reconstruction and Production, Senate Office Building, Washington, D. C., with the following information:

1. The name and address of your President.
2. The names, addresses and committees of your Committee Chairmen.
3. The names and addresses of members of a special committee appointed by your Association to deal with the Senate Special Committee.
4. Information as to the shortage of housing and industrial construction.
5. Whether the shortage is increasing or decreasing.
6. The effect of the shortage on industry and public welfare.
7. The remedial measures which have been taken affecting the various localities or industries.
8. Your views as to the merits of such measures.
9. Your opinion as to the necessity of Federal action in the present emergency.

The Big Four—Transportation, Coal, Taxes, and High Wages are running around the circle, and prices are increasing.

When an Indiana Builder Wanted a Loan

An Indiana builder last month asked NATIONAL BUILDER where a loan could be obtained on a prospective apartment build-

ing. His letter and statement were submitted to C. C. Mitchell & Co., of Chicago, with the request for information as to how and where builders may arrange for loans, producing the following reply:

"We regret very much to say that unless some radical changes are made in the existing revenue laws, it will be necessary for you to apply to the National Treasury at Washington, which is the same as the railroads are now doing, in order to secure funds for home building. The present administration has seen fit to impose an exorbitant income tax on the income from mortgage investments, at the same time exempting from any income tax whatever, either normal or surtax, the income from all municipal bonds. It does not require a financial genius to decide which investments money would flow into. In our judgment, you will not find funds available for the purpose you desire so long as the present penalty is imposed. Large buyers of mortgages, that is those individuals or firms having incomes subject to surtax have been almost completely driven out of the loan market. Small buyers whose income is subject only to a normal tax are forced to buy bonds on which the borrower contracts to pay certain percentages of the normal tax. Firms like our own who have devoted several decades to what we regard as a wholesome thing for American citizenship—the building of individual homes and small apartment houses—are now forced to finance only such enterprises as can bear the burden of the income tax which must be imposed in double amount upon securities of this class in order to relieve from any burden whatever those classes of securities which our lawmakers have seen fit to exempt."

Beating High Costs With Second Hand Material

In Rock Island, Illinois, the local building and loan association is trying to beat the high cost of building by encouraging the use of old material in the houses, to as large extent as possible. E. B. Kreis, secretary of the Rock Island Building and Loan Association, thus described to a representative of NATIONAL BUILDER the financial difficulties in the way of house building.

"We could loan for house building all the money we could get hold of. There is no limit. We are from 15 to 20 applica-

tions behind for loans to build homes. We have turned down quite a number of applications, even when we had the money, because we felt that the persons making the applications did not know what they were getting into. Their plans and specifications showed that.

"We have five houses under construction right now, even in the face of the high prices. Each house will cost around \$5,000, and they are only 5-room bungalows. But they would cost a great deal more under ordinary methods of construction.

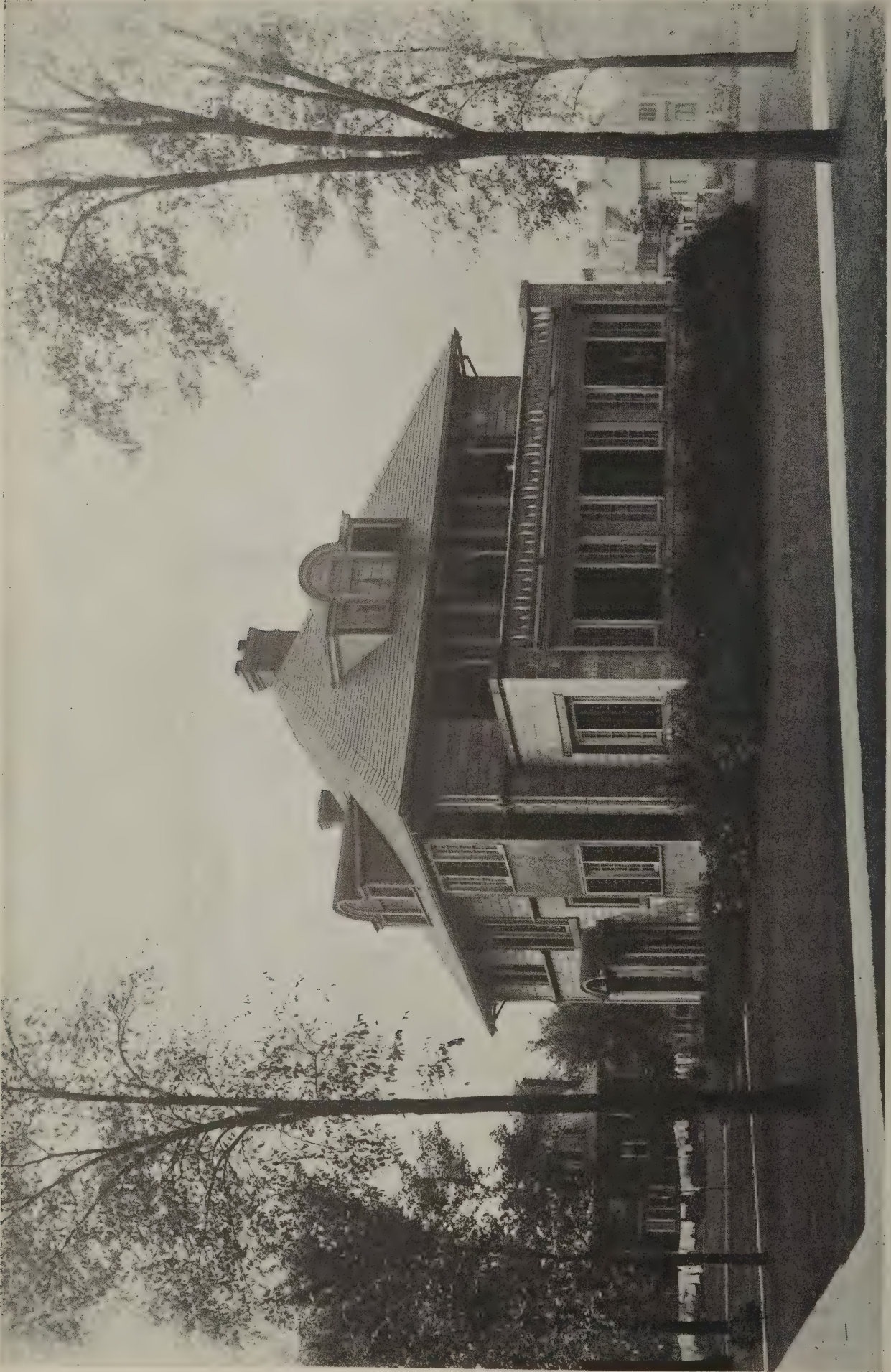
"There are three contractors that are building for us now. They are not getting their material in the regular way, and that fact makes it possible for us to build. These contractors watch for every old building that is to be torn down, and they buy the material. They use most of that second hand material in the erection of the bungalows; and they can thus erect them at a cost 25 per cent less than can the contractors that buy their material new from the regular dealers. They use this material except in the finishing, as in the case of baseboards and the trimmings, where, of course, old stuff will not work. It is my opinion that new building material is at least 25 per cent too high to justify building, unless one can buy some cheaper materials to go with it, as in this case.

"But even for houses so built, the financing has become a serious matter, as the banks have raised their interest rates to a point where it is not advisable for us to borrow money from them

"Thus, last year we borrowed \$16,000 from a bank for reloaning purposes. The demands on us are strongest in the summer months, during the fall and into December. Then it falls off, and the amount coming in for dues is then used for paying off the bank loan secured in the summer, which we generally accomplish in the winter months. Hitherto, we have always been able to make such loans at 6 per cent.

"This spring we still owed a balance of \$5,000. I went to the bank to have the loan renewed for four months, which is the usual period of such renewals. I was informed that the rate for the renewal would be 6½ per cent, and that the rate for the following renewal, if there should be any, would be 7 per cent. Our directors said that there was nothing further doing in that loan, and told me to pay off the

(Continued on page 16)



A Nine-Room House of Concrete Block

Henry L. Spann, Architect, Buffalo, N. Y.

Working drawings of this building form a supplement included in this issue of National Builder



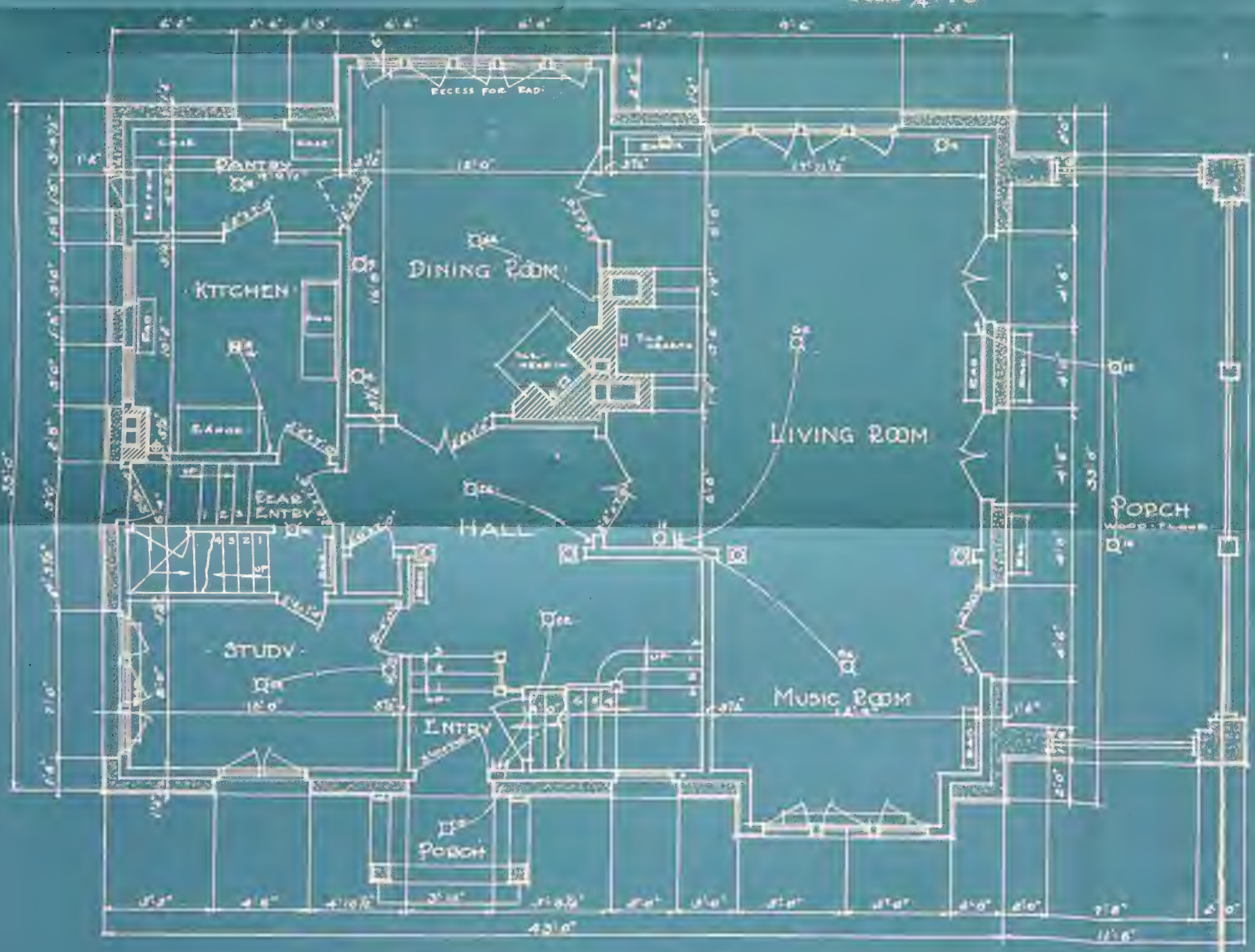
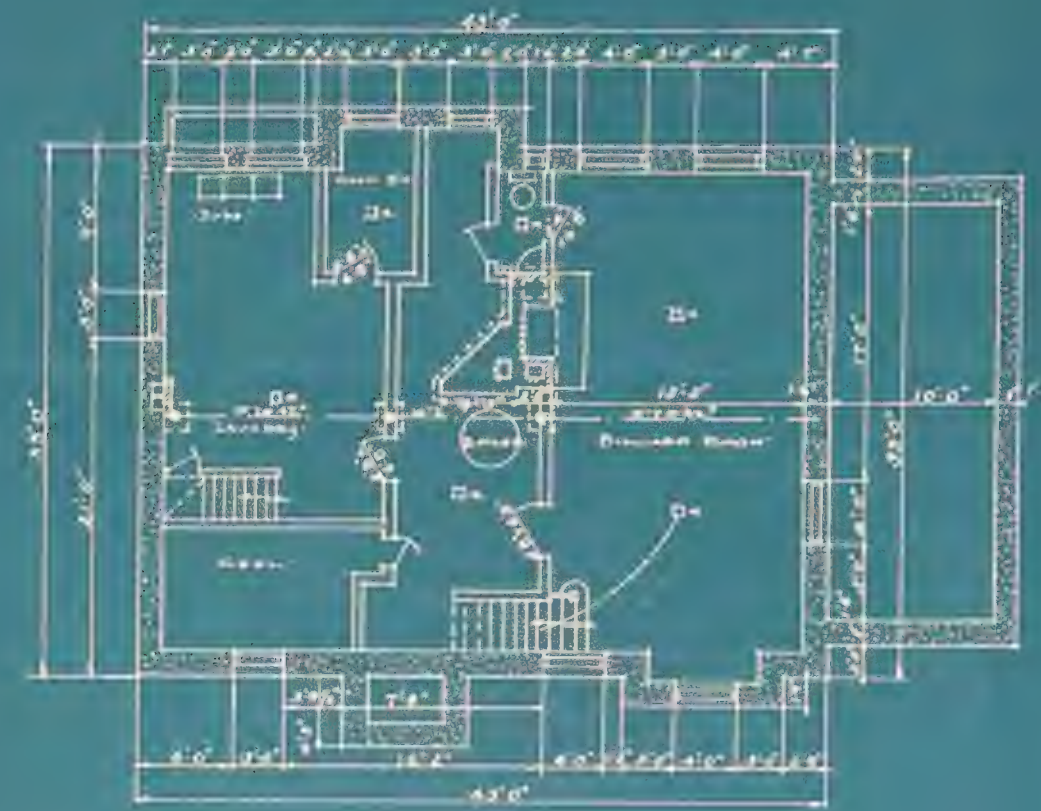
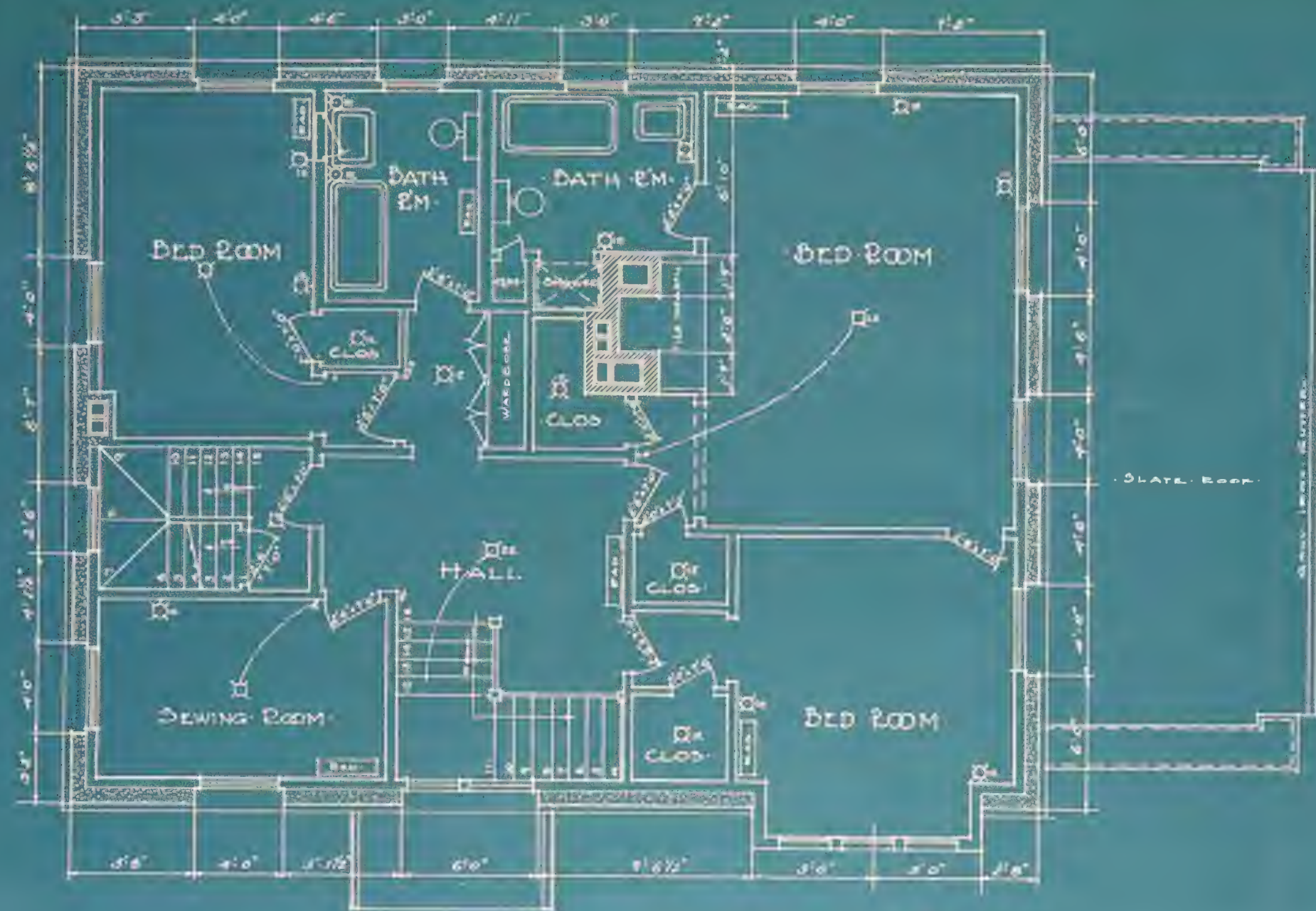
W. PLAINING

CUTTER 7

6"

1' 6"

ELEVATION.
Scale $\frac{1}{8} = 1'-0"$



NATIONAL BUILDER SUPPLEMENT JULY 1920

A NINE ROOM RESIDENCE
HENRY SPANN ARCHITECT
PHOTOGRAPHIC REPRODUCTIONS AND
DESCRIPTION IN READING PAGES



A Nine-Room House of Concrete Block

Two-Story Residence Built and Designed by Henry L. Spann, Buffalo, N. Y.

THE two-story residence of modern concrete block construction shown in the accompanying illustrations is located at the corner of Starin and Woodbridge Avenues, in the fashionable Central Park residential district of Buffalo. It was designed by Henry L. Spann, a well-known residence architect, and built under his supervision for Mr. D. J. Perry, president of the Perry Sand Company. The present owner is Mr. Max Nowak.

Good general proportions stand out as an easily recognized feature of the design. The irregularity in size and spacing of window openings precludes monotony in the wall areas although adding considerably to the special block work required, for although a block with a length of $19\frac{3}{4}$ inches was used, with quarter-inch joints, making 20-inch units, the complications of this design required 49 other lengths of block (varying from $3\frac{1}{2}$ to $23\frac{1}{2}$ inches), mostly for use around irregularly spaced openings. This experience would prove that even under such adverse circumstances modern concrete building block may be economically employed. Two pleasing panels in rough dash portland cement stucco (on wood frame and metal lath) add a touch of contrast to the block surface. One of these, appearing on the east elevation, also may be seen in the photograph. The 6-inch belt or molding carried around at the level of the second story sills, breaks up the flat lines of the plain block thereby adding considerable interest.

The block used in this house were made with a rich facing of portland cement and white marble aggregate, cleaned with a weak acid solution after curing. They are of the smooth or plain face type, with sharp corners. A light cement mortar was used and the block laid after previous soaking. The courses are 8 inches in height, this being the combined height of the block ($7\frac{3}{4}$ inches) and the thickness of the $\frac{1}{4}$ -inch joint. Interior plaster was applied to wood lath attached to furring strips anchored to the block. The sills and lintels, as well as the porch coping and other details, are of precast concrete. The chimneys are of concrete block lined with clay flue tile and are stuccoed on the exterior and have stone caps. The entrance has simple classic lines, the canopy and columns being of wood. The roof is of blue-green slate on wood frame.

While the house is of a type which may be considered well above the average in its

ability to resist fire from without, a great deal of wood was used in the interior in the floors, stairways, partitions and trim. With the present prices of fireproof types of concrete or masonry floor construction, fireproof floors would be a decidedly worth

Full
Working
Drawings
of this
House are
Given in
the
Supplement
in this
Issue of
National
Builder

while improvement were this structure to be built again.

Arrangement of rooms on the first floor is out of the ordinary but has many favorable points. The providing of a fireplace in the dining room as well as in the living room adds to the former an element of attraction which is not difficult to visualize.

Since completion of the house, the large open porch has been glazed in, and as a sun room provides conservatory space for flowers and gives additional living room space. The owner's bedroom on the second floor has a private bath with a shower and a shallow alcove with fireplace. There are two additional bedrooms, general bath, sewing room and service stairs, as well as the main staircase. A billiard room in the basement is a feature which adds not only to the enjoyment but to the salability of the house as well.

Two Methods of Financing Buildings

"We practice two methods of financing buildings," said W. Anwander of A. H. Holinger & Company, Chicago, to a representative of NATIONAL BUILDER. "The two ways are necessary because we have two kinds of houses to finance—dwellings and apartment buildings. We use mortgages for the dwellings and make bond issues for the apartment buildings. The only reason for the difference is that we find it easier to get rid of small mortgages than large ones. We can sell mortgages easily if they are for \$5,000, \$10,000 or even \$15,000; but when it comes to selling a \$50,000 mortgage we find it difficult. Therefore we make the \$50,000 loan into a bond issue, so that it can be bought by different people instead of by one person or interest.

"Up to 1914 our mortgages and bonds were based on a 60 per cent valuation of the property, but now we base them on 40 or 45 per cent of the valuation. That means that we are discounting present values by from 25 to $33\frac{1}{3}$ per cent.

"A slump may come in two or three years or it may not come for four or five years. It may not come at all; but we think it only safe to recognize that it may come.

"The present state of building construction, based on the very high prices for material and labor, is detrimental to us. In the first place so few houses and apartments are being erected that we can't make as many loans as we used to. In the second place we can't make up for this loss in number of loans by the increase in size of the loans, for we dare not use the old 60 per cent of valuation as a base for the mortgages or bonds. It means to us, as to others in the same business, a loss in volume of business."

(Continued from page 13)

loan. So we stopped loaning money from the dues for building purposes, and used the dues for paying off the bank loan."

"With inability to borrow money at a rate justified by the per cent of interest we are receiving on the loans we make to our members, we can only finance new buildings as the dues accumulate."

What Holds Back House Building in Davenport

In Davenport, Iowa, the house building situation is in a waiting state. B. W. Gartside, Jr., a prominent architect of that city, in an interview with a representative of NATIONAL BUILDER said:

"There is nothing being done in the building of houses here at the present time. One reason for the stagnation is that the people have become disgusted with the high prices of building material.

"My work is largely connected with house construction. The housing situation is this: You can't rent a modern house here in Davenport for any money. The people that are living in such houses hang onto them.

IOWA FARMERS BUY DAVENPORT HOUSES

"Along in March and April a good many sales of houses were made. A lot of Iowa farmers have sold their farms at high prices and they came into town and bought houses at big prices. I know men that had built a few years back for around \$3,000. They were able to dispose of their houses for around \$8,000 to \$10,000. They thought they could go out and build again for themselves and make money by the transaction. But they found that they were stung. The prices for building material, and building conditions were such that they could not build at all.

A SHORT-LIVED BOOM

"What appeared to be a boom in house building started about the first of the year. During January, February, March, and April, the demand was so good that we were kept busy making plans, and people were so eager to get houses started, I do not think we took figures once during those four months. A man would come into the office and tell us to build him a house on the cost plus plan.

"But since the first of May, there has been an entire change, and nothing new in the house building line has been started in the tri-cities.

"In the last few weeks there have been some remarkable sales of house property made, which will go to illustrate the acuteness of the housing situation. One house that I fixed up was built in 1915, when it cost \$6,700. On May 8, this year, it sold for \$25,000. Another that cost \$7,500 in 1916 sold for \$27,500.

"There is quite a lot of big building go-

ing on, and that is keeping the carpenters and other building mechanics at work. But when those buildings are finished, I hate to think what will happen to those workmen.

"It looks to me as if the people are looking forward to a fall in the prices of building material. If they did not think that, there would be a lot of building going on.

"But there is another thing that is retarding the building of houses, especially as an investment, and that is the big force of employes being maintained at the United States arsenal in Rock Island. They usually employ 2,000 men there, while now they have 7,000. It is rumored that 5,000 employes are to be let go in a few weeks. Many of these men are now living in Davenport. A great many of these men came from surrounding towns, and most of them will go back to their former residential localities. That will relieve the pressure on our housing situation. That fact discourages men that would build to sell or rent.

"That also affects men that are working in the arsenal. They will not build because they fear they are going to lose their jobs and could not pay for a house if they started to build one."

Muscatine's Housing Plan Waits

Muscatine, Iowa, has been at work for a year or so on housing plans. As yet the leaders have not been able to find a way to build houses and find men that will buy them at a price necessitated by the present high cost of construction.

The Muscatine Chamber of Commerce has been active in this effort. Its secretary, Mr. R. C. Chamberlin, tells us of the obstacles that lie in the way of the success of the movement.

"The initial trouble, so far as I can see it," said he, "is that none of the planners of these housing schemes has foreseen and solved the problems of selling the houses they propose to build. The cost of these houses places them beyond the reach of many of the people for whom they are supposed to be built.

"In my investigations, I observe that most, if not all, of the successful housing schemes have been put through by big commercial concerns.

"Some of the schemes that have been pushed to the front, are, when you analyze them, found to be only another form of the building and loan association plan. They are not new but simply a new form of a plan already in use—that of the building and loan organizations.

"The problem, as I understand it, is to provide homes for working people, many of whom earn only enough to meet their daily wants. You can't expect a man that is getting only \$25 a week to pay \$50 a month on a home; and he would have to

pay that much under some of the plans that some of the housing associations have developed.

"If these housing schemes are to be successful, they must be made with regard to what salary the man is getting and how much of that salary can be used monthly for payments on the house.

"A great many investigations have been made of the family budgets, and conclusions reached as to how much each family does pay and can pay for housing. It is generally agreed by investigators that what a workman is able to pay for this purpose is between 20 and 25 per cent of his income.

"The housing propositions that I have seen are not consistent with these figures. The 20 or 25 per cent of the income of many of these laboring people would constitute payments only on a house very much cheaper than the houses that the housing associations propose to have built.

"As a consequence, I am very strongly behind the idea that the manufacturers in need of help should provide houses without very much thought of any return.

"If they are willing to make this investment on some plan that will require only such returns as will pay for the upkeep of the property, it will produce results.

"What they propose to do here in Muscatine was to build 50 homes, and as fast as the money came in for these houses it was to be used for building more houses; and the initial fund would thus become a revolving fund.

"It was supposed that \$200,000 would be enough; and that the banks would carry one-half of that. This meant that the citizens would have to raise only \$100,000, which would be enough to carry on the work. The whole scheme was built upon a 6 per cent interest basis. But now the banks are getting 7 per cent interest, and that throttles the whole idea.

"Also, the subscriptions amounted to only half of what was originally planned, or \$50,000.

"One of the big fallacies in the soliciting was in the stipulation that the building material must be furnished by the building material men at cost, which the building material men refused to do.

"This was more than could be expected of them. What building man could be expected to do that, when he had unfilled orders from his regular customers at regular prices. What man, if he were a seller of building material would decline to fill the orders of his customers and divert the material to those that would pay him no profit for it.

"As a result of this controversy, some of these that had subscribed, cancelled their subscriptions.

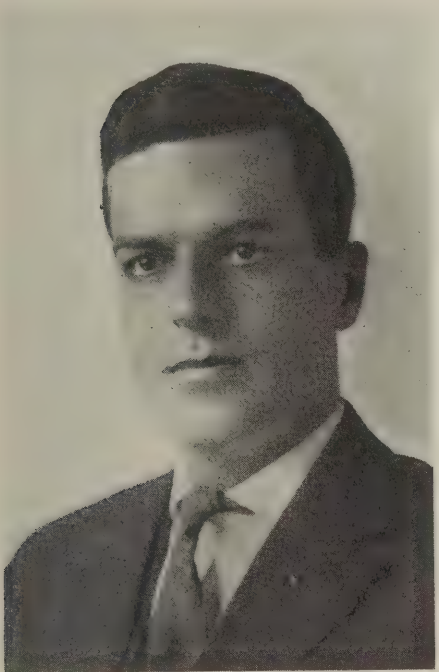
"That is the state of our housing plan today. The successful plan of building and selling houses for small wage earners has yet to be worked out."

A Connecticut Firm of Builders

THE Ellison Construction Company of Hartford, Connecticut, was incorporated in May, 1916. In 1919 they handled more than 1,000,000 dollars worth of construction work, and from present indications a much larger volume of work will be erected by the company in 1920.

work. All of these men are technically trained, experienced builders and keep in close personal touch with the activities of the company.
The operations of the concern include all types of building construction such as mills, factories, office and store build-

ler installations; for which skilled crews are maintained. A specialty is also made of property and building appraisal work and estimates for fire loss adjustments. Other builders are often in a logical position to extend their activities along similar lines. The extension of a firm's ac-



Raymond E. Kelley, Vice-President



Frank D. Ellison, President and Treas.



Robert H. Palmer, Secretary

The executive heads of the firm are Frank D. Ellison, President and Treasurer; Raymond E. Kelley, Vice-President, and Robert H. Palmer, Secretary. William A. Rutherford is the General Superintendent in charge of the outside

ings, banks, high-class residences and industrial housing developments. The organization is self contained in that the scope of its services include not only carpenter and mason work, but also includes heating, plumbing and automatic sprink-

activities along reasonable lines, results not only in increased profits, but also is highly valuable as a means of "becoming acquainted" with possible clients and thereby being in a better position to land new construction work.



On one of the jobs



Residence built by the Ellison Construction Co.

work, the name of the job, the amount of work done, and other data necessary for filling out the segregation sheets. The segregation sheets are of the loose-leaf type, 11 by 11½ inches in size, and are ruled with red and blue lines with the headings printed in black. Each sheet is ruled with about 40 horizontal lines.

Daily Records

It will be noted that one segregation sheet is designed as a daily record of a job, while the other forms a weekly recapitulation of the daily sheets, and also gives information as to unit costs and so forth. The value of the segregation sheets for use in estimating other work is plainly evident and they also form a reliable check on the progress and expense of the work in hand. They would also likely prove of great value in case of disputes which might arise in connection with the cost of work.

Graphic Chart

One of the most valuable features in connection with this system of cost accounting, however, is the use of graphic charts that are prepared from the data furnished by the segregation sheets. Curves representing the costs of current work are plotted on cross-section paper and these sheets are posted on the jobs. These sheets are kept up to date and there is a constant effort on the part of the men to pull down the line that represents their job. A spirit of competition or rivalry has thus been developed between the jobs and the men as well as the foremen enter into the game with spirit.

Graphic charts for such use are not

difficult to prepare and could doubtless be used to advantage by many builders. It should be remembered, however, that to be effective they must be accurate and kept up to date. Also the men must not be handicapped or misled, that is, if a cost line is rising due to no fault of the men,—as for instance will occur when second story work is compared with first story work of like character,—such facts should be explained to them as they will otherwise become distrustful of the scheme and lose interest in it.

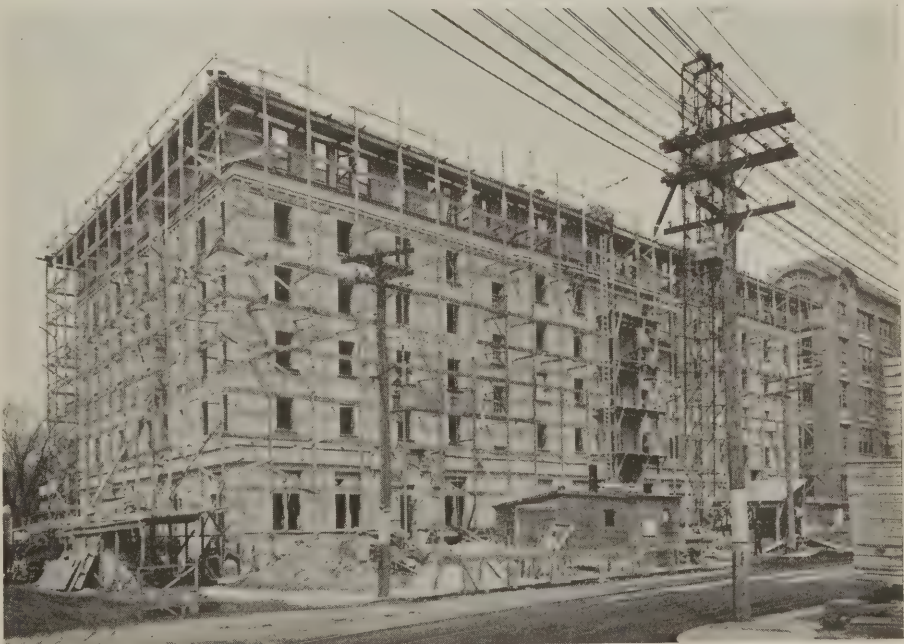
As an aid to the easy understanding of the method of using the segregation

sheets a few items have been filled in on each sheet. A complete sheet, of course, would usually include a number of items that are not indicated here.

Starting with the daily sheet, under "segregation" we set down the symbol for the work in mind. In this case we will suppose that B1 represents brick-work on first story. Each branch of work should have its symbol, for instance F6 might represent setting frames; C1 concrete footings, and so on. On this job we have 6 bricklayers who put in 48 hours at \$1 per hour, making a total of \$48 for the day. The bricklayers have 6 helpers at 75 cents an hour, making their cost \$36 for the day. We also have a mason foreman at \$1.25 an hour whose cost is \$12. These totals are then transferred to the next to the last column on the right where they may be footed. Any important remarks regarding the job are placed in the column at the extreme right.

The Weekly Record

The weekly segregation sheet is compiled from the daily ones with the assistance of the foremen's daily reports which show the amount of work done or material placed. In the first column—"Class of Work"—is placed any description of the work that is not fully indicated by the segregation number. This data will prove useful in estimating future work. Then comes the segregation number and then the daily totals. These totals in this case amount to \$414. The foreman's record shows that 36,000 brick were laid and dividing 414 by 36 gives the unit cost of laying 1,000 brick or \$11.80 per thousand on this job. It is of course understood that these are only labor costs. Costs of materials are not considered on these sheets.



Club-Hotel for the employees of the New Departure Mfg. Co., Bristol, Conn. The Ellison Construction Co., Builders. W. E. Hunt, Architect

Equipment for Apartment Buildings

By Charles E. White, Jr.

TO KEEP pace with new ideas in apartment building design, manufacturers of equipment have brought to bear all their ingenuity to provide equipment that is desirable from the standpoint of economy as well as convenient and practicable.

The "wall bed" or "door bed," of course,

Concealed Beds

These concealed beds come in several patterns based upon varying conditions of space and location. One very good model well known throughout the length and breadth of the land as a popular and highly successful type is called a "door bed" consisting as it does of a bed which can be

built as a separate piece of furniture, mounted upon its own casters. It can be up-ended and then trundled into a closet built for the purpose. There are other patterns made for special purposes, such as couch-beds, table beds, and davenport beds, so building owners may purchase in the open market any type of bed required.



Modern apartment building of Bedford stone and texture brick equipped with the latest in heating and plumbing apparatus, hardware and built-in furniture

is the chief fixture which makes the small apartment comfortable, so on this most vital piece of apartment equipment engineers and architects have spent the greatest thought. Wall bed manufacturers making a specialty in apartment building equipment have not only experimented at great length on bed designs but they have actually planned and built apartment buildings and then kept in touch with tenants to see how the new ideas worked out in actual practice.

The result is that the wall or door bed is now practically a standard fixture like the built in bathtub or fireplace.

Most manufacturers make convenient single, three-quarter and full-size units based upon similar ideas though each manufacturer, of course, claims superiority for his product.

tipped up on end, and by means of a pivoted arrangement swung through a doorway into a closet. With the bed closed within the confines of the close or little dressing room, and the closet door closed, the apartment has no resemblance to a bedroom. At night the door is opened, the bed swung into position in the apartment and the living room becomes a comfortable bedroom.

Another excellent type of door bed consists of a bed fastened to a door of double width (resembling a pair of French doors). The bed up-ends and pivots into a closet or dressing room as with other types of door beds. When the bed is concealed the French door, usually glazed with mirror lights, is highly attractive in the room and blends harmoniously with any decorative scheme.

Still another type of concealed bed is

Free Consultation on Bed Problems

For the benefit of owners and architects erecting buildings, manufacturers of concealed beds maintain consulting bureaus. They are glad to advise with designers about the planning of apartment buildings in order to work out the space in the most practical manner, and their recommendations as to types of beds desirable for any specific project is very valuable to the prospective building owner. This service is gratis.

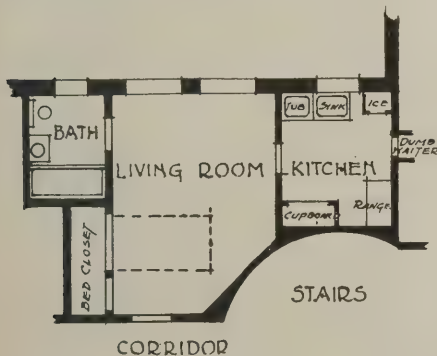
In the best modern practice concealed beds are well ventilated at all times whether concealed in closets or dressing rooms. It is always best to have the space contain an actual window opening on the street or into a light shaft. Anyone can readily see how much more sanitary the bed will be if it is concealed during the day in a space well ventilated and well

lighted, receiving about the proportion of light and air an ordinary bed would receive in an ordinary bedroom.

Convenient Kitchen Cabinets Essential in Apartments

The next fixtures to receive special study was the kitchen sink, the range and the refrigerator. With increased cost of building construction and consequent increased rents the tendency in families is to reduce the size of their living quarters. Naturally, the kitchen and its appurtenances the pantry, sink and stove received special attention in the reduction idea and it has been found not only that kitchens may be smaller than they formerly were but this reduction in size is actually beneficial because making housework so much more easy.

Sheet steel, white enameled, has proved a very satisfactory material for kitchen outfits and several well known manufacturers build kitchenette cabinets which are



Floor plan showing small kitchen with no breakfast porch, the former equipped with range, refrigerator, sink-tub and cupboard

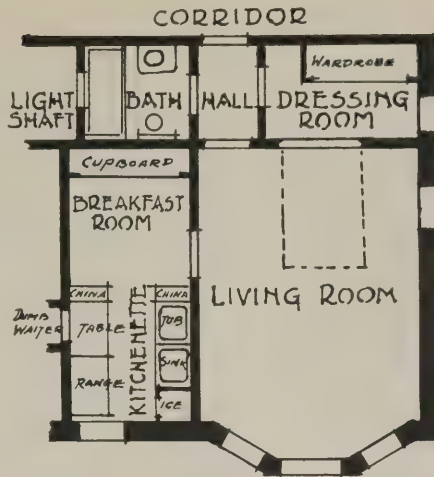
as near perfect as human brains can conceive and human minds execute. Many of these fixtures come in units, such as a stove-unit, refrigerator-unit, pantryette-unit or a china-cupboard unit. Thus, units may be purchased in many combinations to suit the amount of space and other conditions.

In some of these kitchenette fixtures, the small gas stove has three open burners at the top with an oven below. In the oven are two adjustable shelves, the upper one for baking and the lower for broiling.

The stove stands in a little steel cabinet often without doors, and a china cabinet with shelves and drawers is contained in the unit above; below the gas range is a drawer for cooking utensils.

Another steel unit can be combined with the stove unit, the former containing a small refrigerator below, with a food cabinet, above. Often, steel bread and cake boxes are included as well as spice jars and flour and sugar containers.

Thus the well known kitchen cabinet to be found in so many home kitchens has been developed to the point in modern apartment buildings where it is really prac-

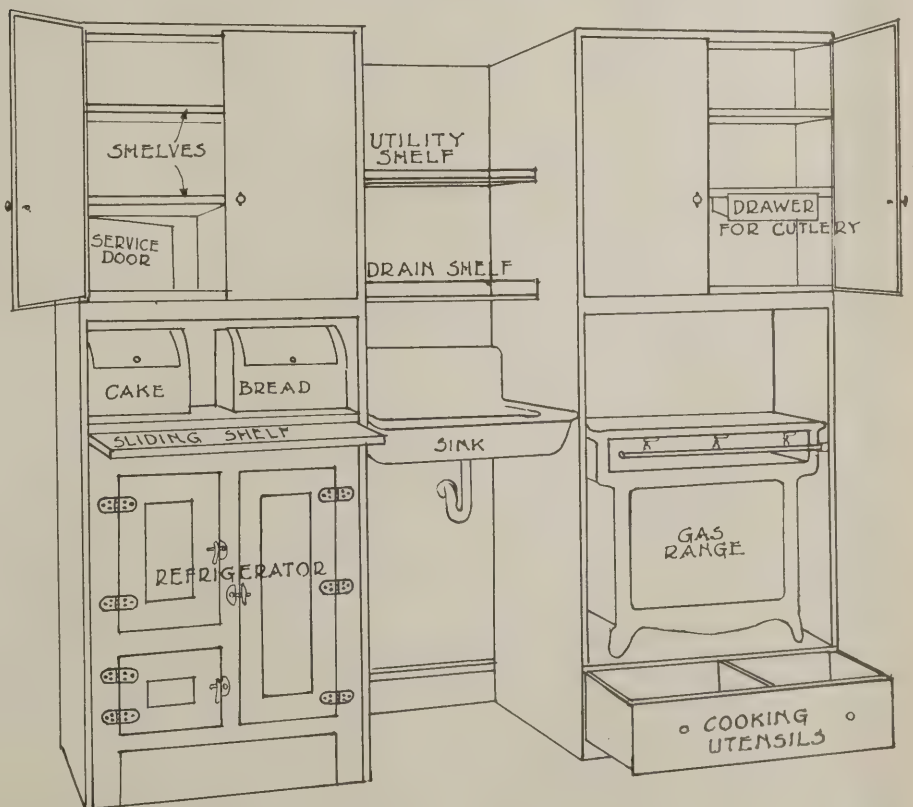


Popular type of apartment with combination kitchenette-breakfast porch equipped with range, table, sink-tub, refrigerator and china cabinets. Supplies reach the kitchen by means of a dumb-waiter

tically impossible to build satisfactorily without this convenience.

The sink, itself, may be located in a variety of ways. Sometimes it is placed on the kitchen wall as in any other kitchen and the various stove and cupboard fixtures are grouped by themselves near the sink. In other very satisfactory kitchen units, the space between the stove unit and the food unit takes the sink, a small enameled-iron affair, with white enamelled shelves, above.

Different food, cooking and china units of the modern kitchenette can be grouped

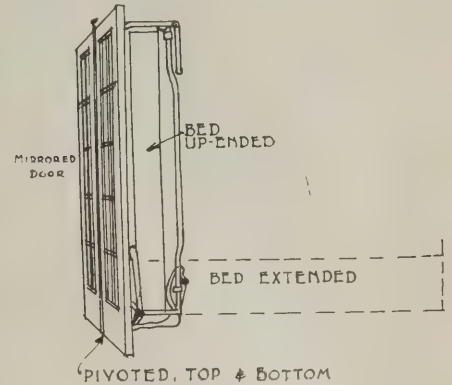


A built-in "kitchenette" of steel which serves all the purposes of a large kitchen. The various units can be built up in various ways like a sectional bookcase

in any desired combination as parts fasten together in the same manner as sectional bookcases. You may have a food "base" with a cupboard above, or a stove base with shelves above. Your sink may be contained between two food or cooking units or separately on the wall of the kitchen.

The Built-in Kitchenette

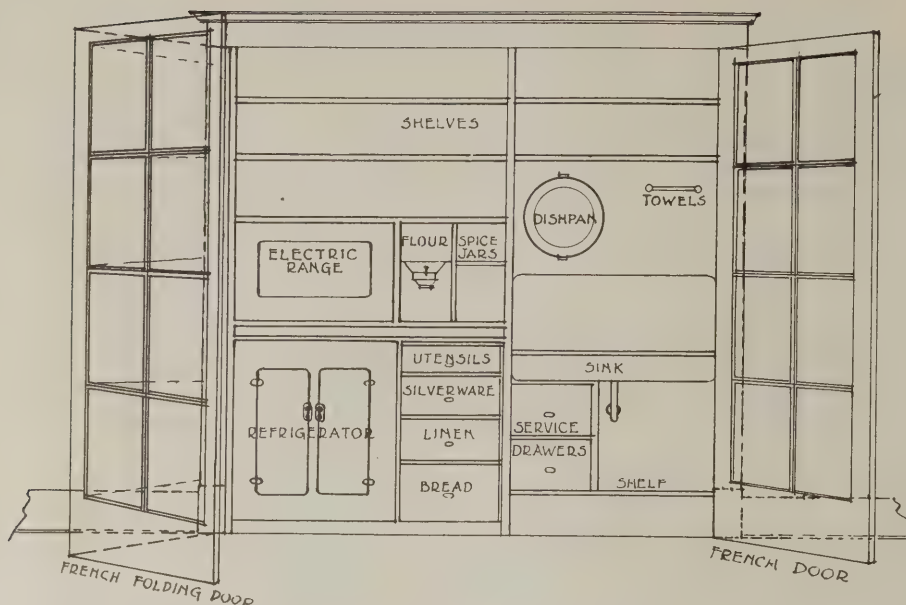
Another very convenient kitchenette outfit is placed in a niche built in the kitchen, about 5 feet 6 inches wide and 21 inches deep. The niche or closet is fitted up with



The wall-bed has made possible the utmost economy of space in modern apartment buildings. No other invention has contributed more to the comfort of families who live in the city

an electric range, a small refrigerator, drawers and shelves for food, silver and table linen, and the white enamelled kitchen sink.

This is a most ingenious arrangement of necessary kitchenette apparatus contained



A kitchenette placed in a niche in the wall, with doors to close when the morning's work is out of the way

in small space but entirely practicable and convenient. Three French doors, usually glazed with mirrors, shut off the closet so that after the work is done the room has no possible resemblance to a kitchen.

Ventilation is quite important for built-in kitchenette apparatus and usually a flue connects the food or cooking space with a ventilating flue built into the brick wall of the building.

How to Get Rid of Garbage and Other Waste

Another fixture particularly useful in the apartment building is the incinerator which does away with the unsanitary and unsightly garbage pail and provides a means of disposing of the contents of waste baskets as well as old papers, cans, boxes and other rubbish.

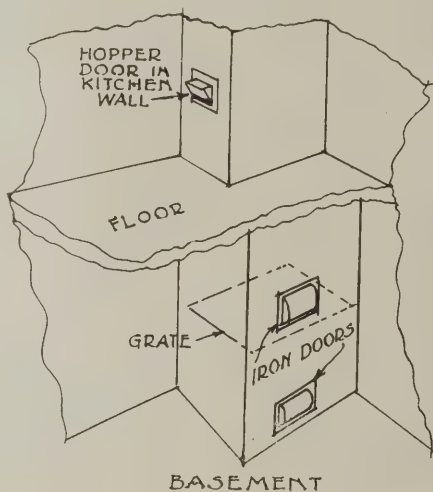
The incinerator or burner, itself, is built into the basement wall from which point a flue or shaft extends to the kitchen above. In each kitchen a tight iron door is built in the wall, through which garbage and other waste may be thrust, dropping down into the burner below. Whenever necessary the janitor lights the waste paper upon opening the basement door, and and everything is consumed. No fuel other than the garbage and waste paper is necessary to operate some patterns of incinerator, though another model is equipped with gas burners to ignite the waste material.

In large apartment buildings it is frequently the custom to provide a garbage burner in combination with the heater for warming the domestic supply of water for kitchen sinks and bathroom fixtures:

Garbage burners are small boilers or furnaces into which the garbage is dumped where it burns and the heat is utilized to assist in warming the hot water supply.

The Usefulness of Package Receivers

The problem of receiving groceries and other packages in the various kitchens of an apartment building has been given spe-



The incinerator stands in the basement of apartment building and consumes garbage, waste paper and other refuse received from each apartment

cial study by domestic engineers who are keen to provide every possible convenience for the tenants of modern buildings. In a building containing a considerable number of families a certain percentage of tenants will be out when the grocery delivery occurs as there is no servant in most small apartments.

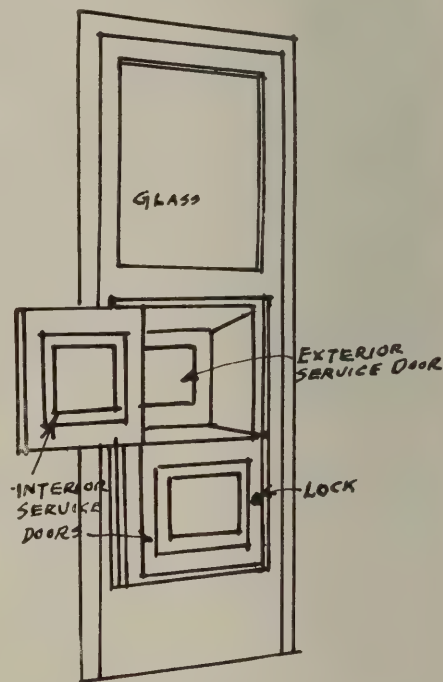
To obviate the necessity of the mistress remaining at home to receive household supplies it is now the custom in high-grade buildings to install door or wall package receivers, each consisting of a little box or cupboard opening from within the kitchen as well as in the hall. When the cupboard door on the kitchen side is locked, the outer door opening into the hall automatically unlocks. Packages can be thrust into the cupboard from the hall side

by the delivery man, who then turns a knob which automatically locks his side of the apparatus but unlocks the kitchen side. At her leisure the house mistress removes the packages at the same time locking the kitchen side of the cupboard, leaving the cupboard ready for another delivery.

Some of these delivery cupboards are built into the outside door of the kitchen, where they hang in the room on the kitchen side; others are built into the wall between kitchen and hall.

Still another method is to devote the space between two of the shelves in a kitchen cabinet for delivery packages, which are thrust into the compartment upon opening a little door in the hall.

The modern apartment building depends for success upon the efficient design and construction of all these little fixtures that go to make each little home comfortable, attractive and convenient. The owner, his architect and the contractor should become familiar with the different patterns manufactured, realizing that tenants have now become educated along the lines of the best modern, sanitary arrangements of apartments. If your building lacks in any of these essentials to comfort, tenants will leave you to lease quarters in a more progressive building.



An automatic package receiver on the kitchen door makes it unnecessary for madam to remain at home to receive the daily supplies

It is up to the owner to insist that his building be equipped with the best of everything, design and quality considered, for in no other way may he hope to cope with the competition of other buildings, and secure and hold his tenants.



A Private Garage of Unusual Type

Private Garages

HERE are nine illustrations of various types of private garages which are published for the ideas they may give. Plans are not shown as garages have become well standardized and NATIONAL BUILDER has published numerous examples in the past.

Before beginning the construction of a garage it is well for the uninformed to

obtain manufacturers' data on garage hardware and other special equipment. Much valuable data on garage construction is also available through the manufacturers' associations which are now maintained by the manufacturers of various building materials.

Plate 1 shows a stucco garage of unusual appearance. The open porch at the

left is useful for garden tools, bicycles and so forth. It could also be fitted for use as an open air tea room if desired. The second story contains a room that might be used as a servant's room or as a play room for children. The walls are of stucco with stained wood trim and the roof is of tile.

Plate 2 shows a garage built into the



Plate 2—Garage and house at Milwaukee, Wis.



Plate 3—Garage at Chicago, Ill.



Plate 4—Garage at Davenport, Iowa



Plate 5—Garage at Clinton, Iowa



Plate 6—Garage at Hartford, Conn.

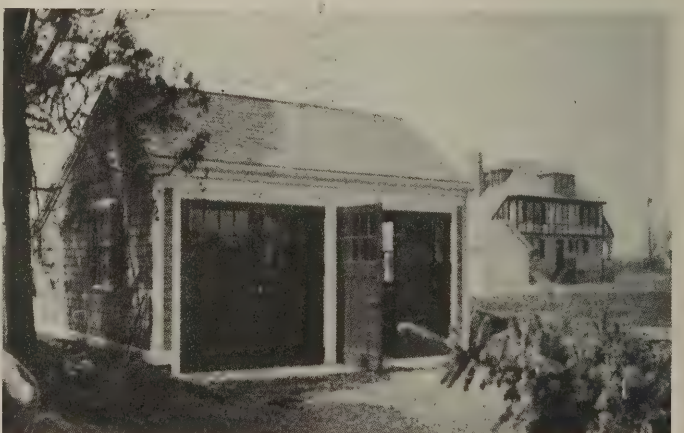


Fig. 7—Garage at Hartford, Conn.



Plate 8—Garage at Clinton, Iowa



Plate 9—Garage at Rye, N. Y.

rear walls of a house. The construction is of brick and as the garage is cut off from the house by a fire wall and as the parapets are carried well above the roof, there should be no serious objection on account of fire hazard.

Plate 3 is of hollow tile veneered with brick. It is a simple, yet attractive example of the small garage. It has a flat roof and is placed close to the property line, thus avoiding a drive through the ward.

Plate 4 is also of brick veneer, but used

on a wood frame. The roof is hipped and covered with asphalt shingles.

Plate 5 is of stucco on wood frame with a shingled roof. The trellised pergola at the entrance gives distinction to this garage.

Plate 6 shows a wooden garage with trelliswork on the walls to relieve any feeling of bareness. The doors are painted green and do not form the disagreeable contrast with the white walls that is so noticeable in the photograph.

Plate 7 is also of wood construction, with shingled walls stained natural, and

white trimmings. This is a double garage, a type that is increasingly popular, as it costs but slightly more than a single garage and the extra space is often useful for a guest's car or may be rented. They are also often built on a lot line to serve two neighbors.

Plate 8 is a concrete garage with a flat, concrete roof. The parapet is covered with vitrified tile coping.

Plate 9 is a double garage filling the space between two houses. It is built with stone walls and a reinforced concrete roof which is covered with earth and sodded.

Public Garages

THE garage shown in Plate 1 is located in Syracuse, N. Y., and was designed by Harry D. Phoenix, architect, of that city.

It is located on a corner at the intersection of a side street with a more important one. The front on the principal street has properly been given more importance than the one on the side street

and forms an unusually attractive example of modern garage design.

The body of the front is of gray brick trimmed with cement stone. The elliptical arches above the windows and the cement stone transom bar are very effective. It would probably be an improvement if the brick imposts were also of cement stone as

are the columns. The introduction of tile inserts into the stucco panels under the hood is interesting. The hood is covered with Spanish tile and is supported by wooden brackets.

The elevation on the side street has a row of pivoted steel sash placed rather high in the wall to afford the maximum of light



Garage at Syracuse, N. Y. Harry D. Phoenix, Architect



Garage at Salem, Mass. Geo. H. Fanning, Architect

and ventilation. Two show rooms are placed at the front, and the remainder of the building is used for the storage of cars.

Plate 2 shows a garage at Salem, Mass., designed by George H. Fanning, architect.

This garage is also of brick trimmed with cement stone. Show rooms are placed along the main front and the garage portion is at the rear. An unusual feature is the raising of the floors in the show rooms so that they are almost at the level of the top of the bulkhead panels. This scheme is based on the arrangement of show windows in ordinary merchandising establishments, in which an effort is made to bring displayed articles into the normal range of view of the pedestrian. In the present instance the arrangement has apparently resulted in an increase in attention over that ordinarily given by passersby to an auto display.

The detailing of the exterior is good; the entrances to the show rooms being unusually well handled.

This building gives an opportunity to give credit to automobile men for the almost universal good taste displayed by them in the design and arrangement of street signs placed on their buildings. Of course, there is much to be done, even in this business, to improve the character of such signs, but almost all automobile men seem to understand that a sign loses none of its effectiveness by being made subordinate to the architectural features of a building and it is seldom that one finds a building deliberately defaced by an automobile sign. As compared to most lines of business—notably moving picture theaters—the difference in the manner of placing street signs is too apparent to merit further explanation.

KEEP the name of your product before buyers attractively—not annoyingly.

Supporting Floors of a Two-Story Garage

In answer to a letter from O. L. S. of Kansas, regarding girders for supporting the concrete floors of a two-story garage: For such a building it is entirely impracticable to consider the use of 75-foot span girders of either steel or reinforced concrete. A reinforced concrete girder having such a span would have to be more than six feet deep and four feet broad and even then it is doubtful if any experienced many would consider its use. In any event the cost of the construction would be excessive.

There are no I-beams rolled of sufficient size for use on such spans. Of course a plate girder could be made, but it would be of tremendous size and probably would present a shipping problem on account of its length, as well as requiring very elaborate provisions for hoisting into place on the supports.

You should advise your client that one or two lines of columns will not prove so objectionable as would the almost prohibitive cost and danger of eliminating such supports.

A one-story garage up to, say, 100 feet in width may be safely built without columns, by using a lattice or other truss to support the roof. A wide two-story garage, however, requires a heavy duty floor system and therefore the use of adequate supports. The second story might be built without columns, using trusses to support the roof.

Effect of Oils on Strength of Glues in Plywood

Plywood may be used near machinery and tanks with little likelihood of being dangerously weakened by the action of oil

or gasoline on the glue joints. This fact is evident from a test lately completed at the Forest Products Laboratory.

Plywood panels glued with animal, vegetable, blood albumin, and casein glues were immersed for nearly a year in engine oil and gasoline. At regular intervals specimens were removed from the liquids and tested for joint strength. All the glues weakened somewhat during the early part of the test, the animal and vegetable glues more than the casein and blood albumin glues. The total loss of strength in any case, however, was small enough to be negligible under most conditions of service. A glue shear strength of 100 to 125 pounds per square inch is considered sufficient for practically any purpose for which plywood is used. Only in two or three instances did the strength of the casein and blood albumin glues fall below 150 pounds per square inch. Engine oil, castor oil, and gasoline seemed to have practically the same effect on the glue joints.

During the 45 weeks' test, the wood absorbed 60 per cent of its original weight in engine oil and 70 per cent of its original weight in gasoline. The absorption of these oils did not cause any noticeable swelling of the wood.

The wood-working industries and their immense importance are the subject-matter of an article "The Backbone of Industry," by Charles Lathrop Pack, president of the American Forestry Association, in a recent issue of the Boston, Mass., Commercial Bulletin, reprints of which are being distributed by the National War Garden Commission, Washington, D. C. President Pack declares that the center of the lumber industry is fast moving to the Pacific Coast, which means long hauls and high freight rates.

Panelling the Principal Rooms

By John V. Dunlop

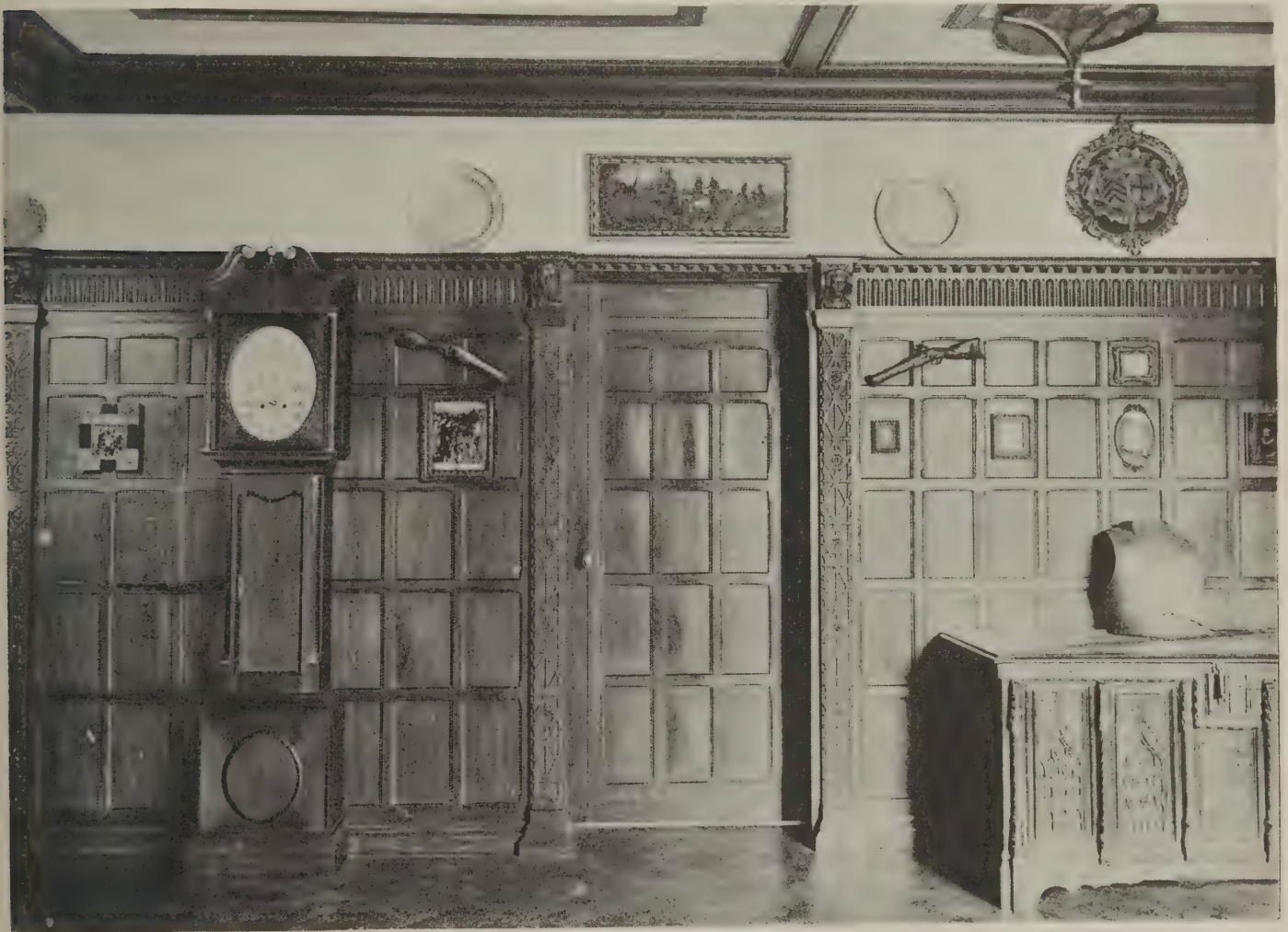
FOR ages panelling the walls of the principal rooms has been carried out in all classes and sizes of houses. Such rooms were usually finished with plaster on the upper part, with plaster cornices and ceilings. There were, however, many architects who objected to plaster ceilings and cornices, and would have nothing but wood work for the entire finish, and for the

of monotony, variety and of contrast, the architects in this country were very successful. The principle of monotony was often used in setting out those panelled walls where repetition—which in this case means size, shape and colour—had the drowsy or quieting effects.

Woodworkers who are left free to work out their own designs are more inclined to

parallel lines and parallel rails. Parallelism is a principle of unity, and unity is an essential in design. The checker board is an example of double parallelism and the simpler types of rectangular panelling are examples of its application.

Radiation is the converging of two or more lines toward a common point or center. In panelling this type forms what



Monotony—Panelling for an entrance hall

dining rooms heavily beamed oak ceilings were very much in demand.

The underlying principle of wood panelling was to add beauty to the walls by means of what an artist would call the breaking up of multiplying principle. The surface which was to be panelled, while broken up into a number of parts, was made to harmonize with the other surfaces to form collectively the same unit.

In carrying out these ideas, which have for their agents the well known principles

follow the principle of contrast, which, being the opposite of monotony, gives vivacious and lively results.

Variety is the happy medium between monotony and contrast and is more often used than either.

In all panelling designs the designer is largely tied down to definite systems of lines such as parallelism, radiation, and the laws of rectangulation.

It needs no argument for us to agree that a common relationship exists between

could be called star like patterns or rails. Wood panelling based on radiation is very rare.

By the aid of parallelism and rectangulation the designer applies the multiplying idea which in practice is the breaking up of the panelled surface into proportionate parts for the sake of interest and richness.

In the line drawing showing the plan of a room which is panelled up to the chair rail, the layout of the four sides of the

room is given. In work of this kind most architects would give a working drawing of one side of the room and it would be left very much to the joiner to divide the panels on the remaining sides.

The first point which would give concern to the joiner in setting out such a job would be on the side which contains the door and the fire place. This room is a billiard room and the light is from a skylight so we have no window openings to consider.

What I always like to do in a job of this kind is to cut a rod for each side of the room so I can then set off the position of the rails and the stiles exactly as the panelling is to be made in the shop. A rod is fitted to the fire place side and on it I mark off the position of the fireplace and of the door, and also the finish or turn on each side of those openings. Then I start to divide off the various panels.

Of course I take my cue for the spacing of the panels from the working drawing, and I generally set off the rod which has been cut for that part of the work first.

If the spacing works out as shown, I then proceed to space the next side.

The drawing shows how the plaster and the panelling are finished, and also how the picture molding is fixed to the wall at the level of the door architrave.

In the half tone illustrations show various designs of panelled walls which might be called typical examples of English joinery.

In the entrance hall the oak wainscoting is carried up to the top of the door on all sides and the sides of the doors are finished with pilasters in place of the usual architrave. The projection of the base is quite heavy and is arranged so that the top edge of the bottom rail comes in line with the top edge of the bottom rail of the door. In the framing of this wall panelling all the mouldings of the vertical stiles are run from end to end, while the mouldings of the horizontal rails are stopped before they reach the line of the vertical members.

In the design for the stair hall every alternate panel is arranged with a square within a square with four ell shaped panels forming the corners. The making of wainscoting of this kind is one of the most exacting jobs in joinery. Every part must fit perfectly before one can expect the whole framing to go together properly.

In my day we jointed panelling of this kind in two ways. In the first we used the method of butt-jointing the inner square in the usual way, but the results were very often disappointing because with the slightest shrinkage in the material, the inner panel became quite unsightly by reason that the shrinkage of the top and bottom rails left the ends of the stiles projecting past the rails.

The other method was to miter the framing of the inner square on the face, and half check it on the back.

The main framing was then mortised into

this part and the method usually gave good results.

In the panelling at the stair landing there is evidently not sufficient room for three panels, and the designer got over the difficulty by substituting a broad vertical stile in place of the plain panel used in the lower hall. This I think, shows off the variegated panels to greater advantage.

The panelling in the sitting room is arranged very much on the lines of the design shown in the line drawing, only that in this case the panels are further ornamented by the addition of a small inner moulding. This raised inner moulding which is mitred, glued and nailed onto the panel is formed with internal right angle corners filled out with rosettes. Thus giving more contrast than that already obtained by the different sizes of panels.

In the half tone illustration of the dining room is shown an example of an oak panelled ceiling which has been carried out very well. The main beams are part of

the structure of the floor above on which the pine flooring joists rest. On the ceiling side the joists are boxed in, and the space between filled with wide planks which form long panels. The panels are decorated with stencil designs in rich colors. The wall panelling in rooms of this type is usually of a heavily ornamented design and in this example we have the ornamentation carried out to the limit. The panelling is designed in two rows, each of which is carried out with elaborate mouldings, and each stile is ornamented with a fluted column with capital and base complete. At the floor the base of each column is carried down to the floor line.

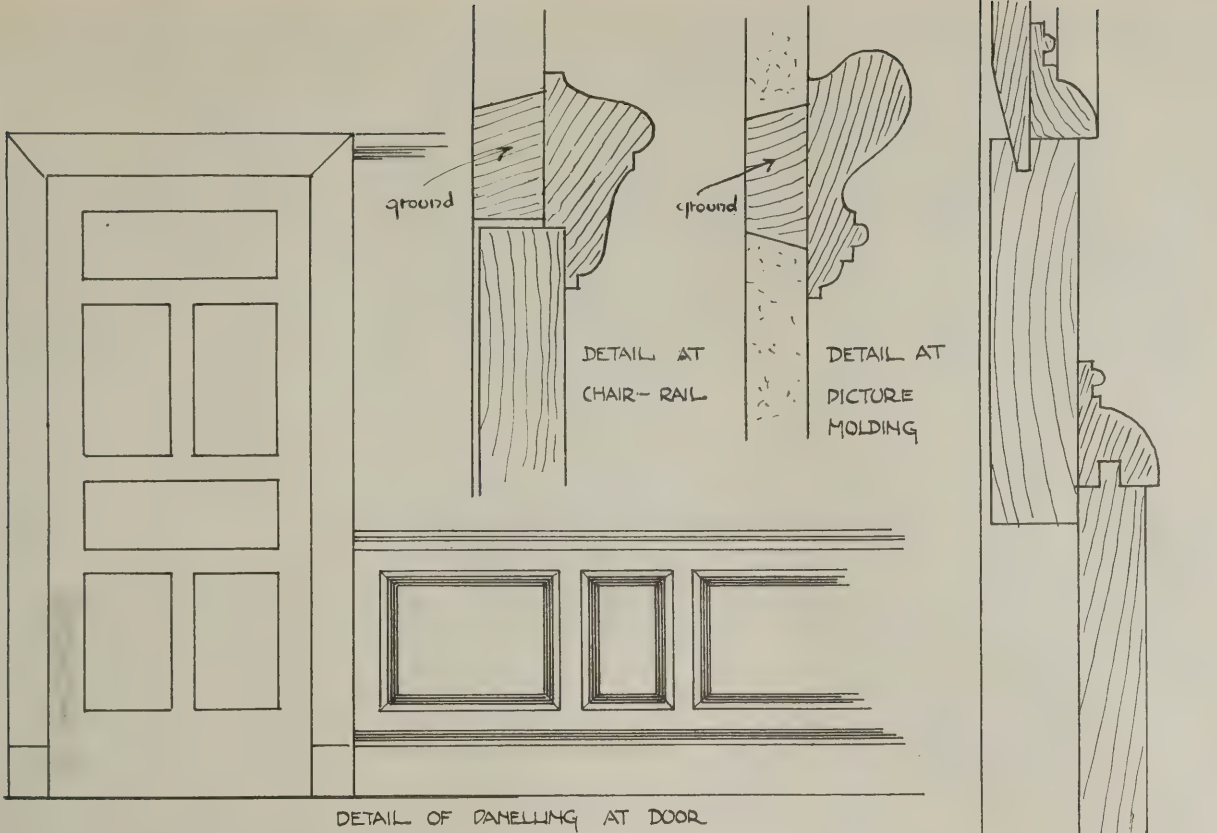
The upper part of the lower panels is decorated with a fret pattern and carved work extending across the top.

The upper panels are carved in relief while the different members of the chair rail are treated in a like manner.

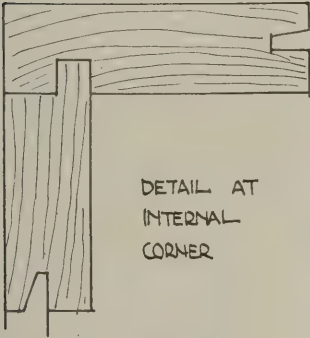
The whole of the fireplace except the marble jambs and lintel is in wood which



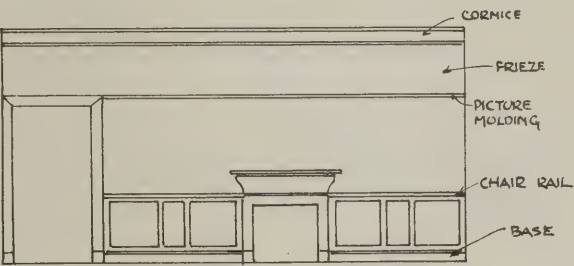
Contrast—Panelling for a stair hall



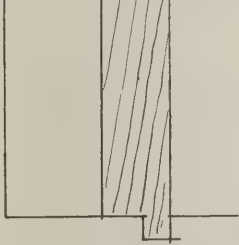
DETAIL OF PANELLING AT DOOR



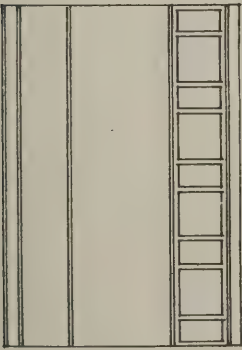
DETAIL AT
INTERNAL
CORNER



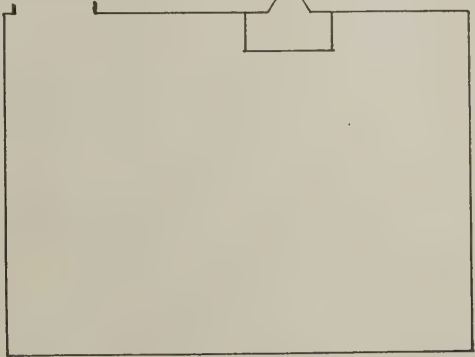
FRONT WALL



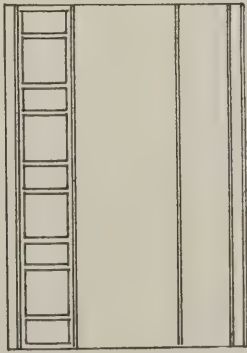
DETAIL AT BASE



LEFT WALL

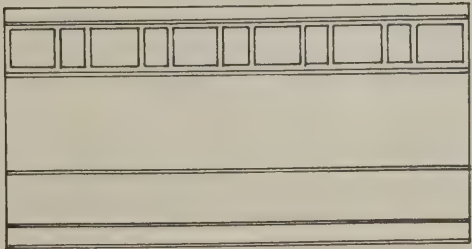


PLAN OF ROOM



RIGHT WALL

PANELLING
PRINCIPAL
THE HOUSE



BACK WALL

OF THE
ROOMS IN



Panelling for a sitting room



Panelling in oak for a dining room



Panelling of a drawing room in American yellow pine and finished in white enamel

goes to show to what extent American oak may be panelled and carved in decorating the interior of the house.

We in England owe much to the very fine quantity of timber which has been imported into this country for centuries and the most of this class of work is done with American oak and yellow pine. What we are now going to do I do not know. With the limited supply of American wood which is now coming into this country we cannot carry out the work and European timber is too coarse for this class of finish.

No finer example of work done with the aid of these imported woods need be shown than the example of the panelling of a drawing room, in which the panelling extends the full height of the walls, finishing underneath the moulded plaster cornice.

To me the full beauty of the timber is lost in the white enamelled covering which has been added to it. At the same time one cannot help admiring the lines,

as an imitation of mahogany or Circassian walnut. When red gum is properly finished, it can be made to look so much like either of these woods that only by very careful observation can the true be distinguished from the substitute. There is a very distinct difference, however, between red gum and mahogany or walnut. This difference lies in the size of the pores.

In mahogany, Circassian walnut, and black walnut the pores are so large that they can be seen very distinctly on a smoothly-cut surface of the end grain, where they appear as minute openings smaller than pin holes but visible without magnification. On surfaced faces the pores appear as fine grooves, running parallel with the grain. They are even visible through the varnish, appearing as dark lines.

In red gum the pores are much smaller and can be seen only with a magnifying glass.

How to Distinguish Mahogany and Walnut from Red Gum

In the manufacture of furniture and cabinets a great deal of red gum is used,

Making Wood Fire Resistant With Paint

Fire retardent paints are the most practical means so far discovered by the Forest

Products Laboratory by which small amounts of wood can economically be made fire resistant. The only other known methods of decreasing the inflammability of wood are to keep it wet, or to inject into it certain chemicals under pressure. These methods, though more effective than painting, are usually either impracticable or too expensive to be considered.

Ordinary calcimine or whitewash has proved in tests to be as fire resistant as any paint covering tried. It is cheap and convenient to use. Although it will not prevent the burning of wood exposed continuously to a high heat, a good coat of calcimine on wood will decrease the danger of a blaze spreading from burning cigarettes, sparks, matches, and similar small sources of fire. Calcimine is, of course, more effective for inside than for outside use.

For exterior use numerous patented fire retardent paints are available. An effective outdoor paint which has been developed at the Forest Products Laboratory consists of linseed oil, zinc borate, and chrome green. This paint has maintained its fire resisting properties through more than three years of exposure to the weather.

Bay Windows--By A. Benton Greene

WE shall temporarily divert our attention from the study of double sash windows and casement windows, both types of which are built in the same plane as the walls of a house, and discuss two other types of windows: namely, bay windows and dormer windows, the former projecting beyond the plane of the wall and the latter beyond the plane of the roof of a house. In fact, this discussion is no digression at all. It is simply a continuation of our study, showing the application of old types to new forms, as will presently be pointed out.

There are as many shapes to the plan of a bay window as there are combinations possible of straight lines and curves. They may be rectangular, elliptical, circular or polygonal in outline. The general character of the design of the house, as well as the taste of the designer determines the final shape the bay will assume.

Whatever shape it may take, it must be fitted with windows. These may be double-hung, casement, pivoted, or fixed. In the drawing here illustrated, the center window is double-hung, while the sides are provided with sashes of the outward opening casement type, that is, windows opening in or out, like a door. Sometimes this arrangement is reversed. Other times a casement window is placed in the center and fixed windows at the sides. There is nothing arbitrary about these arrangements. Climatic conditions, exposure, the wishes of the owner and the inclination of the architect, are the deciding factors.

Bay windows are generally glazed with plain plate glass. Occasionally stained glass is used. Art glass, leaded, is a very popular form of decoration. These leads form a pattern more or less ornamental and hold together the plain glass.

The design of a bay window must harmonize with the general architectural character of the house, interior as well as exterior. On the exterior, the cornice of the bay, for instance, should line up with that of the porch; the water table of one should be contiguous with that of the other, and so on. On the interior, the height and treatment of the windows, of the panels and of all other features should correspond and be in thorough harmony, with the design and decoration of the rest of the room. In short, a bay window should not appear as an excrescence, something "stuck on." It should rise naturally out of the design of the building and with it form one homogeneous, attractive mass or unit.

A bay window adds health, sunshine and comfort to a room. It permits of the introduction of many more windows and affords the opportunity of building in seats, cozy corners and other desirable features.

A bay window should always be placed in the center of a room. Although formerly used only in the dining room, its use has been extended, so that now it may and is used in almost every room in the house, with equal charm and attractiveness.

The observations made thus far have been of an aesthetic character, dealing in general with the design of bay windows. We shall conclude with a study of their construction.

The small scale drawings in the center of the plate illustrating this article, represent a section, half plan and half elevation of a bay having a popular and very satisfactory window arrangement. The heavy lines with letters at one extremity, indicate the portions through which sections are taken. The large size details to the left and above, have letters which correspond with those of the small scale drawings.

In constructing a bay, the following points require attention:

1. **WALL:** The frame wall is constructed in the usual manner of 2-in.x4-in. studs, placed 16-in. on centers and doubled for jambs, head and sill. The studs are covered on the outside with matched sheathing, over which is laid heavy building paper and on top of which the clapboards or shingles are nailed. If stucco is used as an exterior covering, furring strips are nailed over the building paper, wood or metal lath secured is secured to same and the stucco is then applied. The inside of the wall is covered with wood lath, and is then plastered in the usual manner. The corner of the wall at "x" is apt to chip off, for that reason a corner guard or "bull nose," as shown, is provided at that point.

2. **HEAD:** The opening formed in the wall is spanned on top with a 4-in.x4-in. plate. If this opening is greater than ten feet, a truss should be formed between the plate and the underside of the girt or ribbon. A 4-in.x4-in. plate over the wall of the bay, supporting 2-in.x4-in. rafters are both sufficiently strong for ordinary size windows. The roof may be covered with shingles or slate. In low pitched roofs tin, or better still, copper is used.

3. **ANGLES:** All angles and wall connections must be substantially constructed. The studs forming the framework of the mullions are placed to conform to the angles of the bay. The studs at the end are securely nailed to the wall. In the case of a bay window in a brick or stone wall, the framework is secured to the wall with anchors, as shown in plan at the extreme upper right hand corner of the drawing.

4. **BASE:** The lower part of the window must be strongly constructed. In the bay herewith illustrated, the floor beams

are cantilevered and a 4-in.x8-in. wall plate is provided for their support. If that is not possible, as would be the case in a house in which the floor beams run at right angles to the wall, then headers and trimmers must be built around the bay window opening. The beams of the bay are then firmly fastened to the trimmers by means of bridle irons, cleats or by any other approved method.

It is most essential that the underside of the bay be made impervious to rain and wind. One way of effecting this is to plaster the soffit and then finishing it off with wood, as here illustrated. Another, and still better way is to deafen the beams with mineral wool, concrete or other combustible material.

A masonry foundation wall is sometimes built as a support for the bay. This is particularly true in the case of large windows. Such foundation wall, besides providing a most substantial base, has the additional advantage of increasing the area of the cellar.

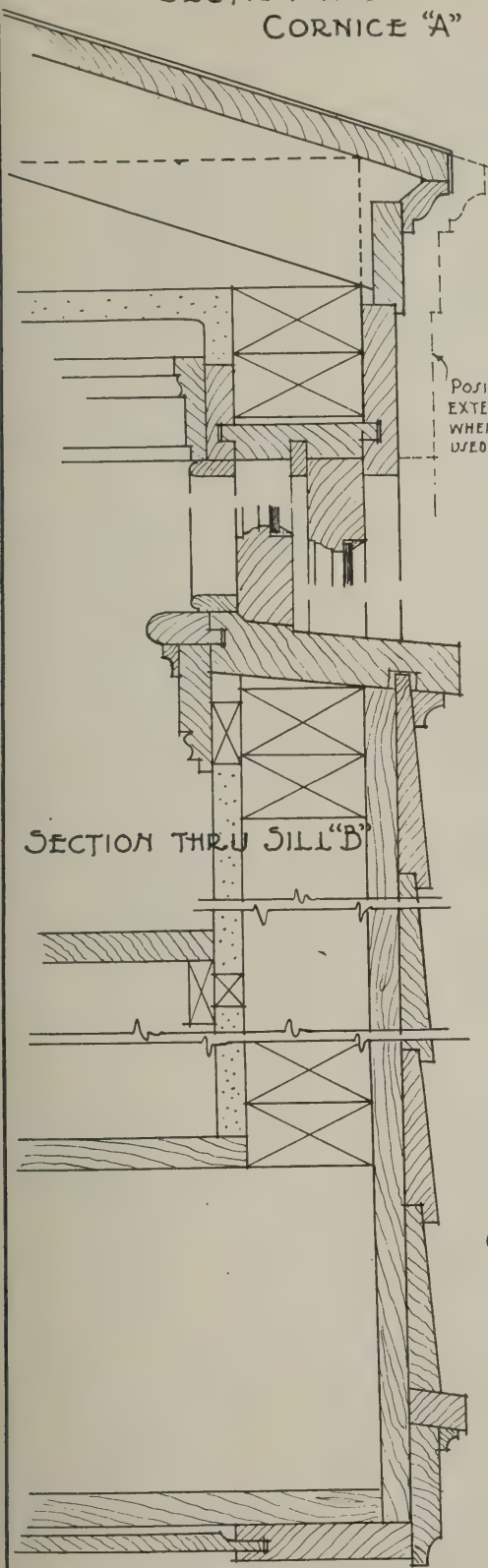
5. **INTERIOR:** The interior of the bay illustrated herewith, shows a seat, which when cushioned and fitted with a lid, makes a most attractive and useful adjunct to the room. On top, over the wall opening, a plastered arch may be thrown or, it may be finished plain, as shown. The general treatment of the other parts of the window should harmonize, as previously pointed out, with the general decorative scheme of the room.

No mention has here been made of the construction of the double sash window, for that has already been fully discussed in previous issues of this series. The design and construction of casement windows are subjects of later articles, soon to be published.

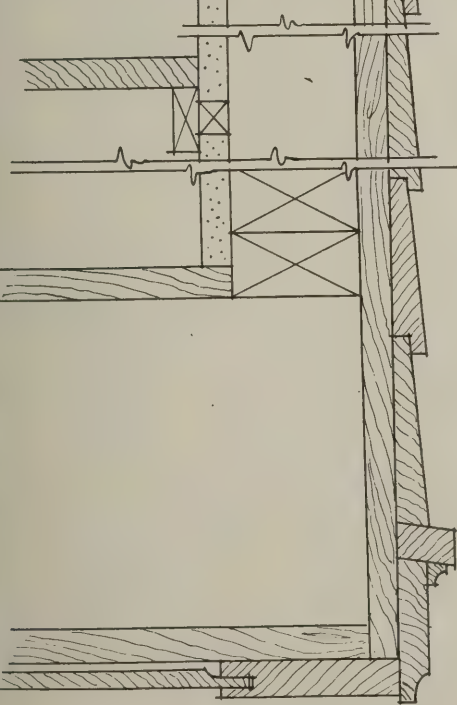
Work in Connection With Industrial Safety Codes

Announcement is made in Technical News Bulletin No. 38 of the Bureau of Standards that during the month of May the final list of changes proposed for incorporation in the National Electrical Safety Code was sent out. As soon as comments from interested parties have been received, the new edition of this code will be sent to the printer and it will be available for distribution late in the summer. A similar stage has been reached in the case of the first edition of the National Safety Code for the Protection of the Head and Eyes of Industrial Workers. This code is being prepared in co-operation with an advisory committee of experts in this subject and final changes have been sent to the committee for consideration.

SECTION THRU CORNICE "A"

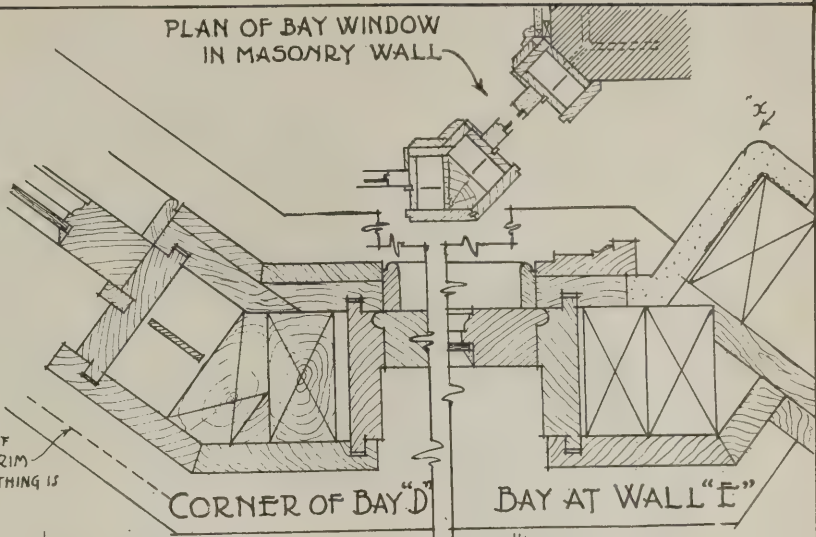


SECTION THRU SILL "B"



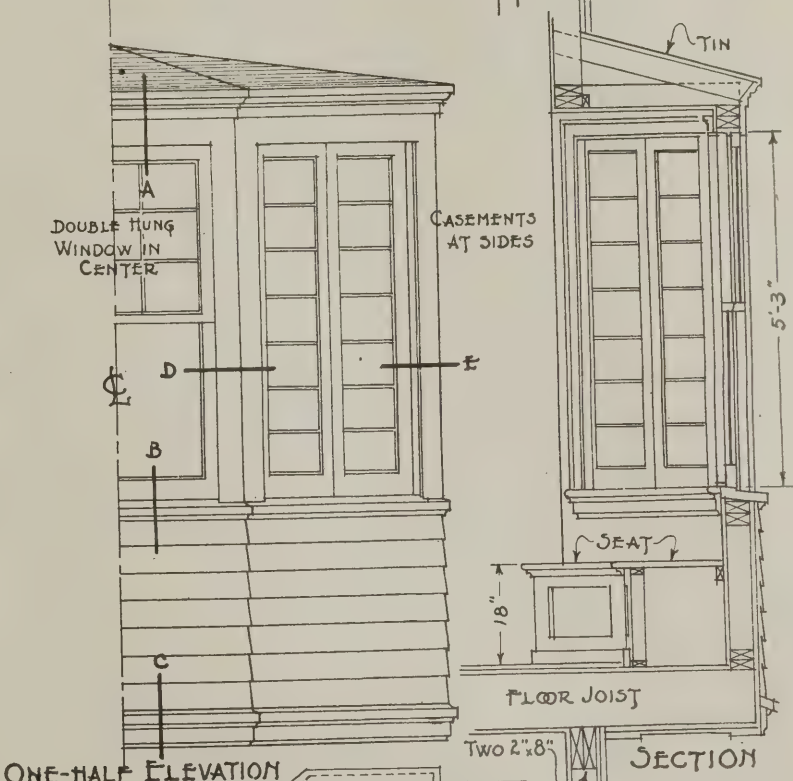
SECTION THRU BOTTOM "C"

PLAN OF BAY WINDOW IN MASONRY WALL

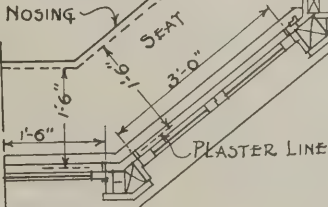


DOUBLE HUNG WINDOW IN CENTER

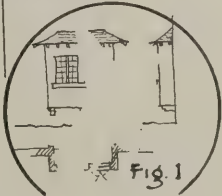
CASEMENTS AT SIDES



ONE-HALF ELEVATION



ONE-HALF PLAN



BAY WINDOWS

SCALES



General Drawings

Details



Plate 1—Detail of entrance to the De Luxe Theatre, Detroit, Michigan. B. C. Wetzel & Company, Architects

Moving Picture Theatres

Fourth Article

IN planning a moving picture house one of the first considerations is the balcony. In some states or cities balconies are prohibited by law; in others they are limited to one balcony, and in others there is no limit to the number that may be provided. Important differences also exist in the various building codes with respect to the arrangement and types of balconies permitted.

There are two distinct types of balconies in use. One is the common type which is raised entirely above the main floor level, and in most cases overhangs a portion of the auditorium seats. The other type is known as the "bleacher type," and is formed by starting the balcony at the level of the auditorium floor, or in other words by raising the rear banks of seats to form a sharper angle than is customary. This scheme permits the foyer, rest rooms, and so forth, to be placed under the balcony in the usual manner, and at the same time prevents the balcony from taking up so much vertical space. Tunnels are provided through the balcony to give access to the auditorium from the foyer.

Probably the chief advantage of the bleacher type lies in the fact that less difficulty is experienced in getting patrons

to use the balcony seats. It is a well known fact among managers that many people will suffer almost any inconvenience rather than take seats in a balcony. This attitude is probably a hangover from the legitimate theater when, in this country at least,—the seats on the main floor are considered superior. However true this may be of stage performances it certainly does not hold good for moving pictures, and in the latter case the balcony seats are almost invariably better. There will probably come a time when balcony seats in moving picture theatres will command a premium over main floor seats, but that day is apparently far in the future.

The arrangement of the bleacher type balcony disguises its appearance in such a manner that it suggests an extension of the main floor rather than a balcony. In fact many people have sat in a bleacher seat without realizing that they were not seated in the main floor.

Of course the bleacher type cuts out the few seats that may be placed under the overhang of the ordinary balcony, but as the bleacher seats may command the same prices as those on the main floor the loss in revenue may be overcome. It should also be remembered

that bleacher seats will often be filled when many ordinary balcony seats would be empty, and an empty seat pays no dividends.

The theater which illustrates this article was designed by B. C. Wetzel & Company for the De Luxe Theatre Company of Detroit, Michigan. This theatre has two balconies, one of which is of the bleacher type, while the other is of the ordinary type.

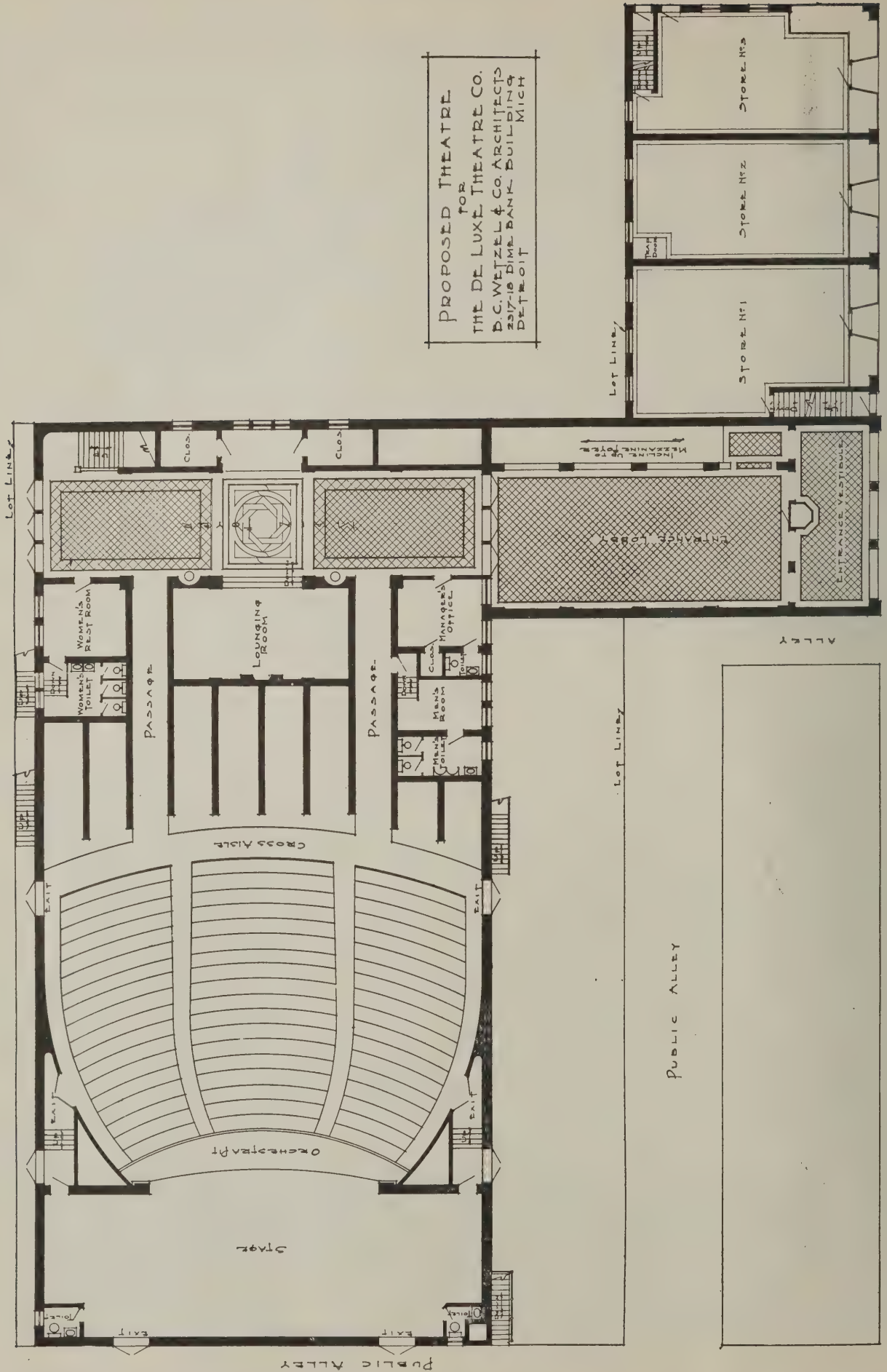
This is doubtless a desirable combination, as the presence of the ordinary type of balcony probably serves to further disguise the presence of the bleacher. It should be understood, however, that bleachers are often built without the combination of an ordinary balcony or gallery, and that in such cases the bleacher usually extends entirely back to the wall line. Reference to the section of the De Luxe Theatre will show that this scheme could have been used in this case without the loss of any seating capacity. The illusion of the bleacher and main floor being one, would be somewhat lost, however, if the gallery were omitted.

The illustration of the interior of the theater shows the relation of the bleacher to the main floor and its accessibility as compared to that of an ordinary balcony.



Plate 2—General view of the De Luxe Theatre Building

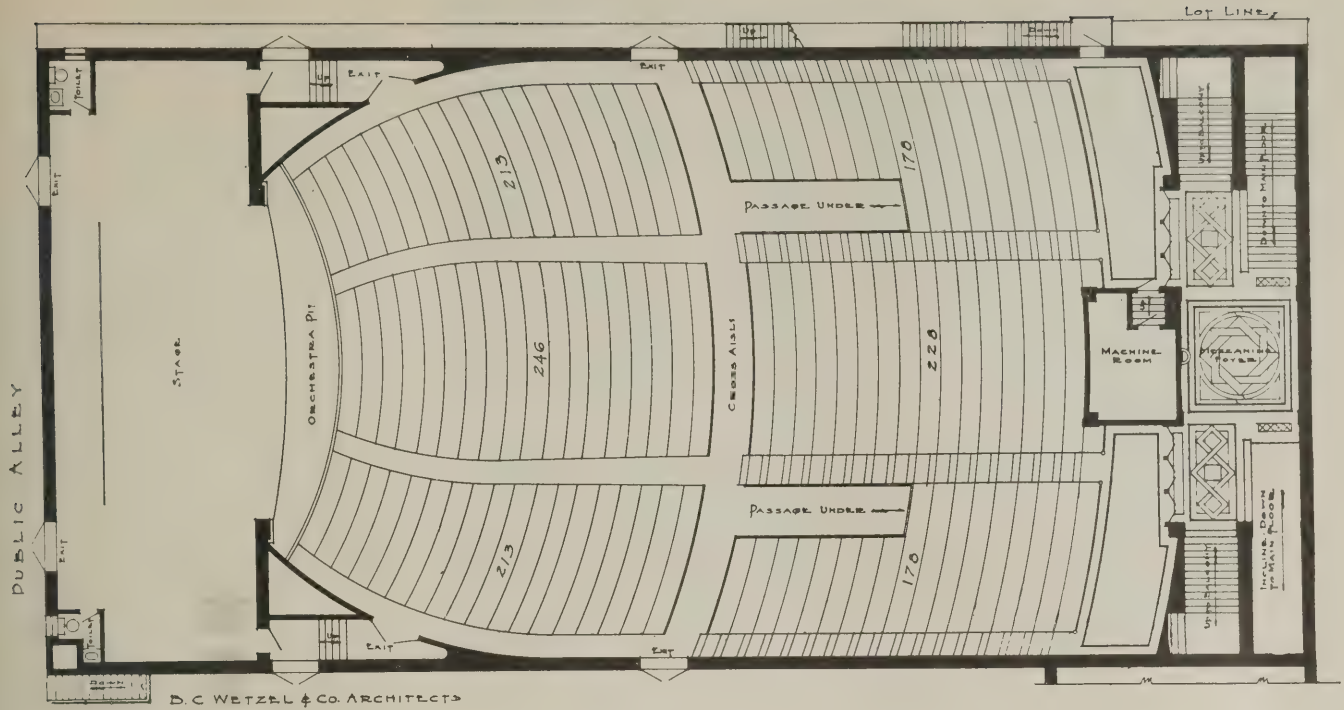
VINCENNES STREET



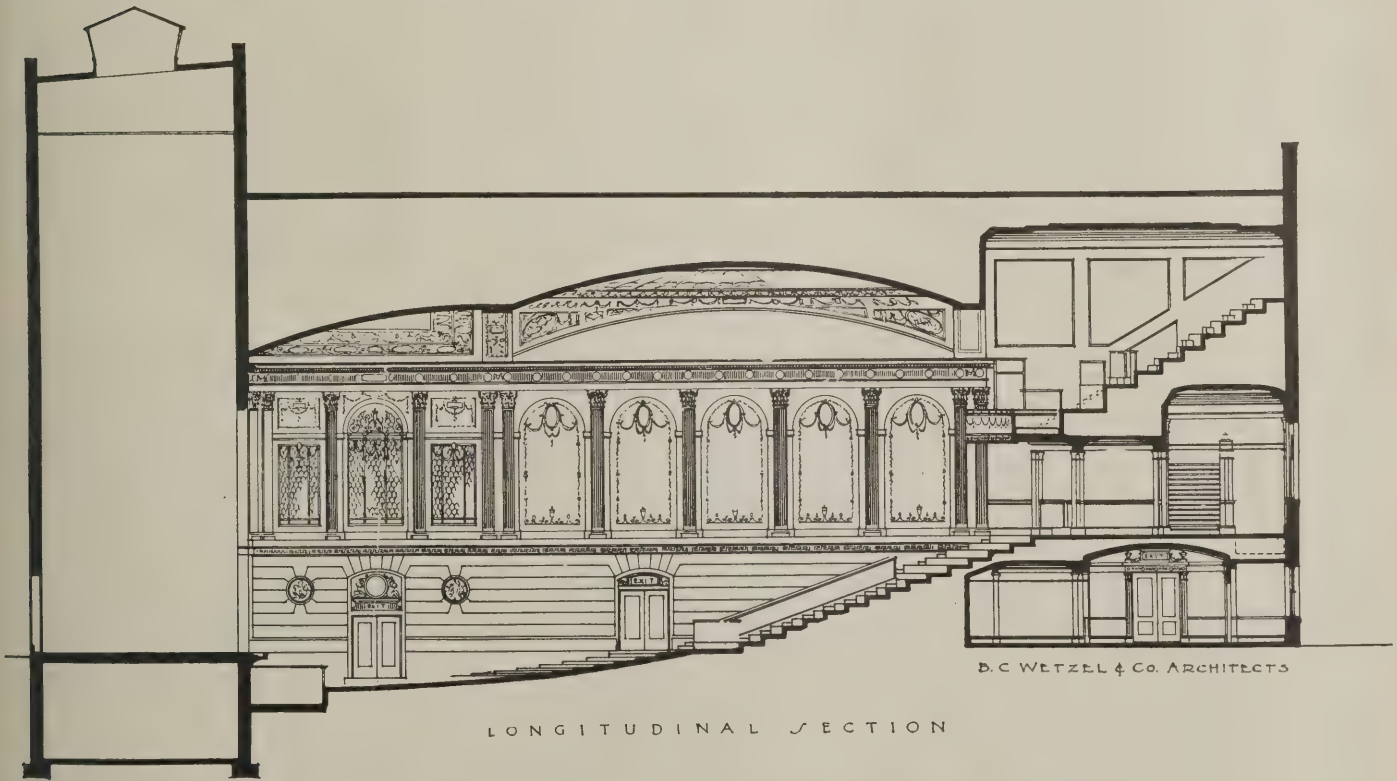
MAIN FLOOR PLAN

KERCHEVAL AVENUE

VINCENNES STREET



BALCONY FLOOR PLAN



LONGITUDINAL SECTION

Many people's objection to a balcony seat arises from the fact that it is necessary to climb a long flight of stairs in order to reach even the lowest of the balcony seats.

In order to comply with the requirement that the main entrance should be provided, but the fact remains that patrons are not ordinarily compelled to use such means of gaining access to the bleacher and may pass onto the main

floor and from there to the bleacher seats. It is of course true that it is necessary to climb many aisle steps to reach the higher seats even in a bleacher, but aisle steps do not appear so difficult as do steps which frankly form a stair.

In the De Luxe Theatre there are two means of reaching the bleacher other than by the aisle steps from the main floor. One is by the stair from the foyer; the other by a ramp or incline

leading from the entrance lobby to the mezzanine foyer. Ramps such as this are extremely desirable for reaching any type of balcony and it will be found that many patrons who balk at stairs will use an incline without objection. An incline is not practicable, however, unless the entrance is deep, as in the present example, so that the slope may be made an easy one without too many turns or changes of direction.



Plate 3—View of entrance lobby looking toward foyer. The incline to the mezzanine floor is shown at the right

The irregular shape of the property makes this plan an unusual one. The theatre has been combined with three store rooms having apartments above, the whole forming a group and apparently utilizing the property to good advantage. If Vincennes street grows in importance it would probably even be possible to arrange another entrance with a ticket booth at this point.

The entrance to the theatre is of ornamental terra cotta. The cloth sign over the marquee is of a temporary nature and has been replaced by a permanent one, more attractive in appearance. The detailing of the lunette is especially good and the pediment and frieze are also well handled. The somewhat "skinny" pilaster treatment of the piers, however, is not so successful. The store and flat building portion is of brick with terra cotta trimmings.

The main floor is complete with a women's rest room and toilet; a men's room and toilet; a manager's office, and a large lounging room that makes a pleasing feature. Storage closets are also provided under the stair and the ramp to the mezzanine foyer.

The mezzanine foyer is located immediately above the main foyer and gives access to the highest point of the bleacher. Stairs from each end of the mezzanine foyer lead to the balcony or gallery above. The projection booth is located between the mezzanine floor and the gallery above.

Tunnels or passages pass through the bleacher and lead to a cross aisle which separates the main floor from the bleacher.

A feature of the auditorium is a large

dome in the ceiling. This dome is more clearly shown in the section than in the photograph of the interior. The curve in the walls near the proscenium arch is a pleasing method of leading the eye to this feature.

Overheating Reduces the Strength of Animal Glue

That long continued heating reduces the strength of animal glue solutions is demon-

strated by the following test made at the Forest Products Laboratory.

Solutions of a high grade joint glue and a veneer grade glue were heated for 48 hours at 104, 140 and 176 degrees Fahrenheit, and tested every few hours during this period for strength and viscosity.

In the first 7 hours of heating at 176 degrees the veneer glue lost approximately one-half its joint strength, and the high grade glue joints weakened almost as much. The greatest loss in the strength of the glue joints occurred at this temperature. In the solutions kept at 104 degrees there was a sudden drop in the strength of the joints made with the high grade glue after 31 hours of heating, due possibly to a combination of bacterial and chemical action. The veneer glue joints showed a more gradual decrease at this temperature. The most favorable of the three temperatures tried was 140 degrees, but even at this temperature an appreciable weakening in both glues was noted at the end of 7 hours, and longer heating caused greater loss.

The viscosity of the high grade glue declined more rapidly than that of the veneer glue, but at the end of the heating test the viscosity of the high grade glue still averaged higher than that of the veneer glue.

Covered glue pots were used in this experiment. When open glue pots are used the loss in strength caused by the heat is less apparent. Since the loss is compensated to some extent by evaporation of the water. On the other hand, the concentration of the glue solution through evaporation is an expensive means of gaining strength.

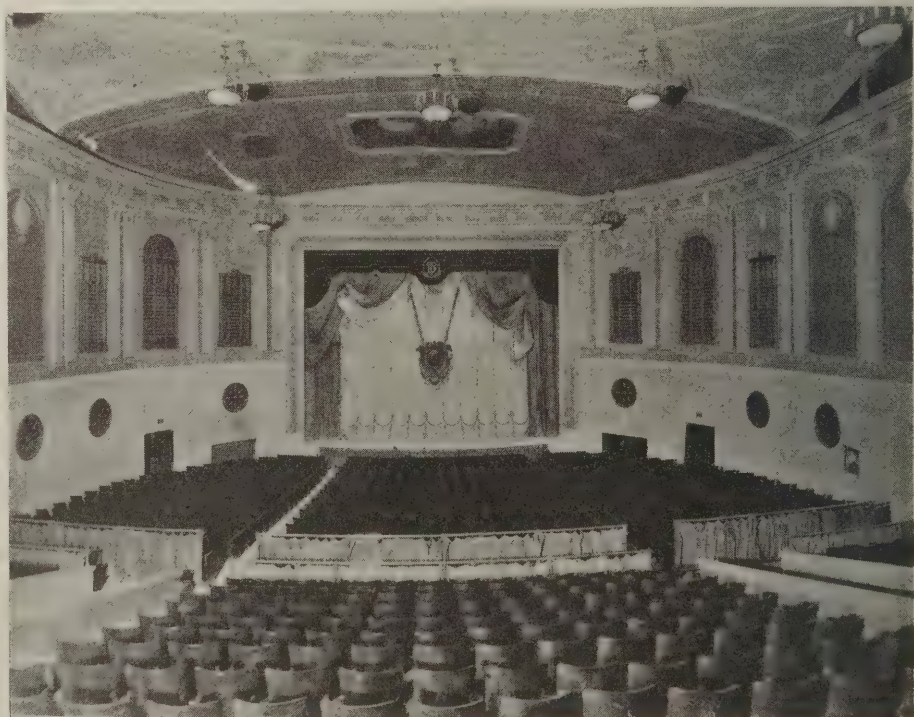


Plate 4—View of auditorium from the mezzanine foyer. Note how the bleacher merges with the main floor portion

How to Estimate--By I. P. Hicks

IN ESTIMATING material for interior finish it is quite an advantage to go over the plans and take down some of the necessary data from which to make the estimate something after the following form. This gives you the data in a convenient form and saves the time of looking over the plans an extra time for each different item in the estimate.

	Size Feet	Feet Base.
Rooms		
Vestibule	4x 6	20
Living Room	14x18	64
Dining Room	12x16	56
Kitchen	10x14	48
Pantry	6x 7	26
Rear Entry	6x 6	24
Stair Hall	8x12	40
Second Story--		
Bedroom	12x14	52
Bedroom	13x16	58
Bedroom	12x15	54
Bath Room	8x 8	32
Closet	4x 4	16
Closet	4x 5	18
Closet	3x 5	16
Stairway	4x10	22
Hallway	5x16	42
Totals		594

In the above estimate the plastering has been figured for a 9-foot ceiling for the first story and for an 8-foot ceiling for the second story. Small fractional parts of a yard have been discarded.

Note that the actual size of the rooms have been figured and in the matter of base it is safe to deduct 2½ feet for each outside doorway and 5 feet for each inside doorway. With the picture molding it is different. On this there is nothing to take out and a few feet should be added to make up for the waste in cutting, say about 5 per cent.

Beam ceiling should be carefully figured according to the way indicated on the plans, and enough should be added to each length to cut on. Room cornice should be figured in like manner. With the plate rail the doorways are figured out, but do not figure too close for there is sure to be some waste in cutting plate rails.

It will be found that this form of estimating saves some time and tends to accuracy as well. Rooms that have no picture mold, beam ceiling, room cornice and the like, such parts are left blank in the form, but all rooms have base and plastering, and in this way you catch the many items you must figure on in just once going over the plans.

From the yards of plastering you can estimate the lath required. Four-foot lath require 15 lath per yard. 32-inch lath will require 22½ lath per yard. If you want to use some of both lengths of lath divide the yards something like this, ¼ of 734

yards would be 183 which you would multiply by 22½ to get the short lath required. You would then have left 551 yards on which to figure the 4-foot lath, thus you would multiply 551 by 15 for the long lath. This makes the figuring very easy for using the mixed lengths of lath and as some lath have to be cut any way it is all O K to have some of the 32-inch

Feet Picture Mold.	Feet Beam Ceil.	Feet Room Cor.	Feet Plate Rail.	Yards Plaster
				23
64	128			92
56			56	77
				64
				31
				28
		40		51
52				65
58				74
54				68
				36
				16
				18
				16
				29
				46
284	128	40	56	734

lath, but do not figure too many of the short lath for where 4-foot lath can be used without cutting they work to a better advantage than the short lath.

From the yards of plastering you can also estimate the sand, hard wall plaster and lime for the white coat. The quantities of sand, plaster and lime per 100 square yards of plaster we gave in a former article.

Estimating Carpenter Labor

There has always been a demand for some short cut in estimating carpenter labor, but the unreliable methods of these short cut ways of estimating have always been a serious drawback to the short cut work.

We will give a system which we think the average contractor can work out to meet his own needs. Don't take it for granted that our prices are exactly right but use the system and make your own prices. It has been our aim to make the prices average up approximately \$1.00 per hour. It is quite likely that the contractor would make good at the prices given. It is the method and system that we want to set forth more than the prices. By keeping a cost record of work by this system the contractor should in a short time be able to perfect his prices so that he could make this plan of estimating a complete success. We do not offer it as an extremely short cut in estimating but as a method of shortening the work to quite a considerable extent and without any hazardous risk to the contractor. The short

cuts in estimating that are so short that they result in just a mere guess are not the kind to benefit by, they are more than likely to prove your financial ruin than a benefit, so do not trifle with them.

The way to go after an estimate by our method is like this:

The Estimate

Framing floors, including rough floors, 18 squares, \$6.....	\$108.00
Laying finish floor, oak, 10 squares, \$6	60.00
Laying finish floor, pine, 8 squares, \$5	40.00
Framing partitions, 16 squares, \$3....	48.00
Framing ceilings, 8 squares, \$1.50....	12.00
Framing porch floors, 3 squares, \$3....	9.00
Framing porch ceilings, 3 squares, \$1.50	4.50
Outside walls, framing and sheathing, 24 squares, \$5.....	120.00
Putting on stucco board, 24 squares, \$1	24.00
If ½x4-inch siding is used, figure per square, \$4.	
If shingles are used on outside walls, figure per square, \$6.	
Roofs, framing, sheathing and shingles, 20 squares, \$10.....	200.00
Main cornice, 160 lineal feet, 25c....	40.00
Porch cornice, 120 lineal feet, 30c....	36.00
Porch steps, 20 lineal feet, 30c.....	6.00
Porch rail, 110 lineal feet, 20c.....	22.00
Inside base, 600 lineal feet, 10c.....	60.00
Picture mold, 360 lineal feet, 3c.....	10.80
One sidelight doorway	14.00
One grade entrance doorway.....	10.00
One rear entrance doorway.....	9.00
One set folding doors.....	14.00
Main door openings, 18, \$8.....	144.00
Window openings--	

2 mullion frames, 4 windows, each, \$18	72.00
2 triple frames, \$14.....	28.00
4 twin frames, \$9	36.00
7 single frames, \$5.....	35.00
6 cellar frames, \$1.50.....	9.00
Main stairs, 16 steps, \$2.50.....	40.00
Cellar stairs, 11 steps, \$1.....	11.00
Pantry cases, etc., \$3; each door, \$2; each drawer, shelving per lineal foot, 10c.	
Hook strips and shelf, ordinary closets, each closet, \$2.	
Mantel shelf	12.00

We have now shown the system, keep cost records by this method and make your prices to suit the work you have. Extend the system by adding new items as they suggest themselves to you in your business and you will soon have something worth all the little time it will take you to attend to it. Shorten the work where you see a chance to do it with safety but do not sacrifice safety for shortness.

Some Tile Problems of the Architect

By D. Knickerbacker Boyd, Architect

Extracts from an Address Delivered Before the Convention of the Tile & Mantel Contractors' Association

LET us begin by clearing up the mystery which has surrounded the grading of tile by having it thoroughly understood that the three grades, in white glazed wall tiles, are not the result of any intent of the manufacturer to produce different qualities. It is surprising how many architects and others do not realize that tiles are not manufactured in predetermined grades and qualities, but that the grades result from the selection made in the product which the manufacturer has tried with all the ma-

fore designated by that unfortunate name were most suitable for him.

On the other hand it would be equally unfortunate to specify for such a building first quality tiles only, free from all blemishes and defects, yet such has been a very general practice due to lack of knowledge.

I am sure, too, that almost all architects, if they knew of the great amount of time which is spent on the mere "shading" of glazed wall tiles, would feel as those do to whom I have made the fact known, that

of characteristics, colors, and proper uses. There are now too many names for kinds. With fewer basic names, no matter how many trade names might be given by manufacturers, this part of the architect's problem would be solved.

Take for instance vitreous and semi-vitreous as words to conjure with. In most instances the same kind of tile is either vitreous or semi-vitreous, but none seem to know the relative difference in hardness, absorption, or reasonable appropriate-

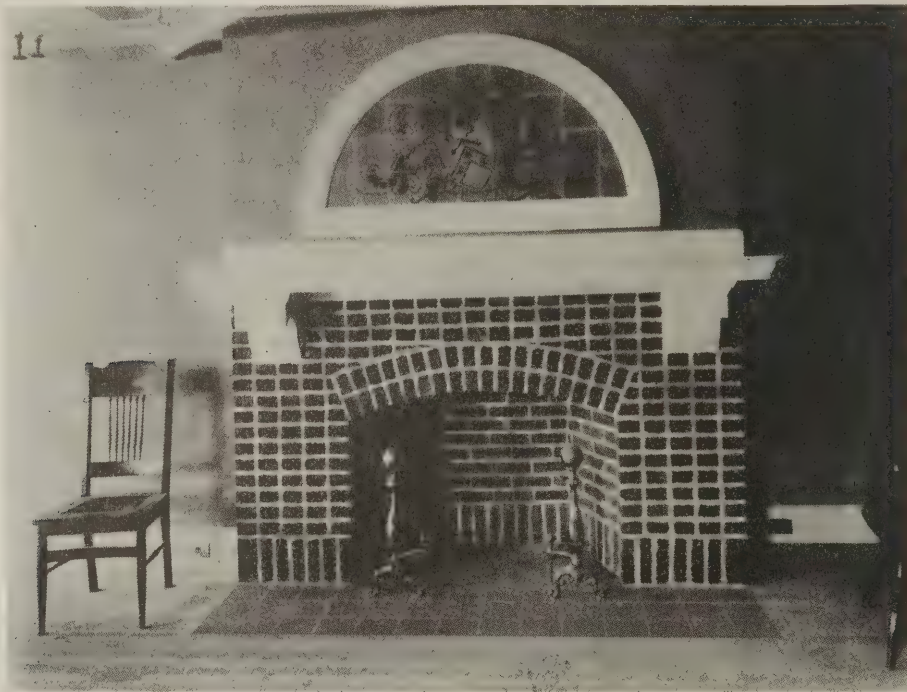


Plate 1—A faience tile panel over a small mantle. Quarry tile hearth

terials and forces at his command so to make and burn as to produce but one grade, the highest quality obtainable.

Architects and their clients, and in fact all users of tile, must be informed that, due to limitations and firing conditions, certain variations in shades, sizes, etc., are inherent in the manufacture of clay products.

Helpful Classification

The recent adoption by the manufacturers of the classification "selected," "standard," and "commercial" will go a long way to help us all to secure the tiles intended. In the past even a person of limited means has objected to the term "second quality," when as a matter of fact the tiles hereto-

every encouragement should be given to the use of "run of kiln" tiles, so far as color is concerned.

The time and effort now spent on shading could thus be given to more creative effort—an end most devoutly to be sought in these days of labor shortage. And in the opinion of many of us the result would be much more satisfactory from the point of appearance alone, removing at the same time much of the mechanical effect obtained when all tiles are uniformly white.

Would Change Some Names

It is very important, it seems to me, that some simplification of titles and names be considered to make them more significant

ness for exposure or use as between them; and few know that the only reason why a semi-vitreous tile is not vitreous is that the nature of the materials used to produce certain colors (red, brown, chocolate, and black) is such that it is impossible to burn them to the same degree of hardness without destroying not only the color but the body of the tile as well. It is very simple once it is known.

But take the same vitreous and semi-vitreous and consider them from the standpoint of size, and it appears that if the size is smaller than $1\frac{1}{4}$ inch the tiles are known as ceramic mosaic. Between that size and 3 inches the same kind of tile is known as floor tile. From that size up to

6 inches if the tiles are vitreous they are known as flint tile, but if semi-vitreous they are known as floor tile. And all the while we have with us the quarry tile in sizes both under and over 6 inches, and all semi-vitreous.

Surely it is up to the industry and the tile contractor to make all simplifications possible, and to put out this information for the benefit of architects and users. Through cooperation we will surely accomplish great results in that direction, but let me say that in the meantime it is my belief that these complications and lack of information have deprived architects of the opportunity to take fullest advantage of tile, through the erroneous impression that but three general classes of tile were available and only the first named two in "regu-

Architects Must Know Materials

Architects are designers, but before they can design they must have complete data as to the materials with which they are to work out the designs—should know source, production, and characteristics of tile, and colors and sizes readily obtainable.

Take for instance the white glazed wall tile, for which I have made the plea for variety in shading. An architect, desiring to design sidewall treatments with flush panels formed by "header" effects or "row-locks," or desiring to use a "soldier" course with small bands, intending for good reasons to tile the wall to the ceiling instead of using a wainscot, consults the white tile list, and finds that apparently nothing is made in this class of tile, whether bright, semi-matt, or matt glaze,

and he said that small sizes take the enamel list.

And there you have it in a nutshell—all right from the industry standpoint, but where do the specifier and the user come in? They are left absolutely in the dark just because it happens that colored tiles naturally cost more than white tiles and that small tiles cost more than large ones. The cost being the same, they have heretofore both taken the same list.

And while of course architects want to know relative costs, they have been deprived all these years of the knowledge that they can really design in white tiles, the small units being available in 6 inch, $4\frac{1}{4}$ inch, and 3 inch lengths down to half and quarter inch widths, with a range of intermediate sizes.



Plate 2—Quarry tiles give distinction to this driveway

lar" colors and but few standard sizes, namely:

White tiles for bathrooms, toilet rooms, lunch rooms, barber shops, drug stores, etc., in bright and dull glazes and not in small sizes, for walls; unglazed or vitreous tiles, not in large sizes, for floors—and the latter, when not white, furnished in fixed atrocious combinations of pattern and color;

Quarry tiles and light or plain colored unglazed tiles for floors, and

Faience or decorative tiles, in which class were thought to be included all those attractive colors and units to be seen in hotels, libraries, clubs, fine residences, and similar buildings—the belief in most cases prevailing that the tiles in each of such installations were especially made to fit each pattern or design and consequently involved considerable cost, and hence were to be avoided for ordinary usage.

smaller than $4\frac{1}{4} \times 2\frac{1}{8}$ inches.

He probably gives up his idea of securing original effects in the case intended and specifies the usual wainscot with the usual stereotyped field of 3×6 or 6×6 , or he may risk what seems to be certain increased expense and use a 3×3 or $4\frac{1}{4} \times 4\frac{1}{4}$ square with any one of the 57 varieties of caps made before the present standardization program was inaugurated.

He may have noticed in the list of enamel tiles some small sizes very suitable for his design if they could be had "self-colored" with the wall, but as he does not want them in any other color his determination to stick to the conventional "wainscot" increases.

Now what are the facts? I asked the secretary of the Associated Tile Manufacturers why these small sizes were not made in the white tiles and he said they are. I showed him the list of white sizes

With faience work and with tiles which are made to conform to special locations and designs, the situation is of course different, even though here the desirability of complete information is apparent.

But where the information is most sadly lacking is with regard to that class of tile at once colorful, durable, and impervious (if not always entirely vitreous), with or without glaze, and if with glaze containing texture and but little gloss—that class of tile which is commercially available in every desirable color and necessary size and shape to accomplish every effect desired by a capable designer. An, here is the material and here is the man, each waiting to be made better acquainted with the other to the benefit of both.

Architect's Opportunity

What opportunities await the eager designer if his palette is filled with just what

he wants! And what opportunities confront the industry fulfilling these wants and continuing to develop! Having pulled itself through the Victorian era of the varicolored geometric pattern, and erred since on the side of the white ceramic mosaic floor with its many colored dots and dashes, let the industry now get away from some of these present-day effects, and come into its own in cooperation with those who design with feeling for the product they use. Let floors be so designed and laid as not to require rugs except where rugs properly belong. Let corridors, lobbies, and appropriate spaces and rooms be made more attractive as well as

utilitarian through the use of tiling designed with thorough knowledge of the materials, colors, and textures available.

And remember that jointing in tilework is an essential feature of design, a feature frequently desirable structurally as well as artistically. Do not lose sight for one moment of the proper methods of application, which vie in importance with the making of tiles.

With the hearty cooperation of many architects in addition to the cooperation which the members of your association have given the tile manufacturers, it will soon be possible for architects everywhere

to specify that all tile shall be set in accordance with the basic specifications of The Associated Tile Manufacturers. Nearly all architects with whom I have talked have assured me that it will afford them the greatest satisfaction as well as assistance so to specify their tilework. And if you members of the Tile & Mantel Contractors' Association will maintain your association in accordance with the traditions of your craft, and help architects to see the provisions of these specifications faithfully carried out, you will take your rightful part in solving tile problems for the benefit of all concerned.

Oddities of Workmen's Compensation Law--By Elton J. Buckley

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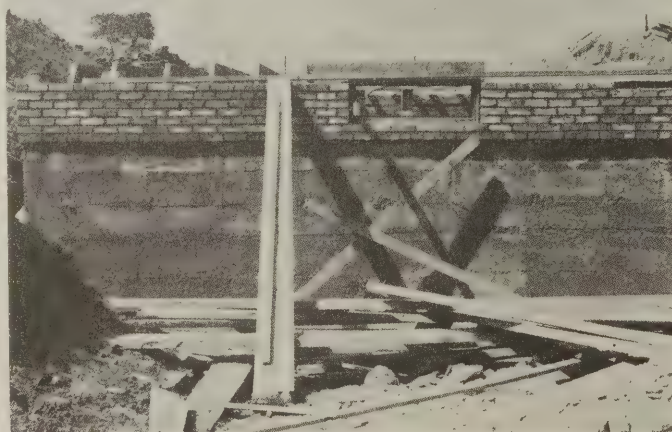
Builders Who do not Take into Account the Risks They Run from Loss Through the Operations of the Workmen's Compensation Laws May Take Warning from the Cases Here Cited and Take Out Adequate Insurance

INASMUCH as workmen's compensation was a new department of the law, and for the first few years would be in the making, I have made it a point to keep in touch with the decisions of the various States in order to see how far the law would go in executing the most excellent idea which lies at the bottom of workmen's compensation, viz.: that where a man is injured or killed in the course of his employment, keeping him and his family from starving to death ought to be considered a public duty and figured in the cost of doing business, which is borne by the public in the mass.

Probably every reader of this article is subject to the workmen's compensation law of his State, and he will therefore be interested in the report of some recently decided cases. These cases show that the law has widely departed from the original idea of workmen's compensation, which was that a workman who caught his hand in a machine on which he was working, or was hurt by the explosion of chemicals which he was handling—in other words, where he was the victim of some accident growing directly out of his work, he should be compensated by workmen's compensation insurance. Read the few sample cases which I report and see what a difference there is between the original principle of

compensation and the one enforced now.

It is remarkable how close the States are in workmen's compensation cases. Recognizing that they represent, as I have said, a new phase of the law, they have evidently felt the need of deciding their cases along the same line. Therefore the following cases practically represent the general law:—



Waste and Accidents—Lumber piled carelessly on a job not only results in breakage or waste, but implies carelessness in other particulars, and is the cause of many accidents to workmen

Case No. 1

In this case an employer had a man who delivered goods. While at his regular work he had an epileptic fit,—he was subject to them—fell to the ground and fractured his skull so that he died. His employer contended that he was not responsible for compensation insurance, because

epilepsy was not an accident, but a disease. The court however, held that the driver was entitled to compensation.

Case No. 2

In this case another delivery man, while out on his route, was overtaken by a storm, from which he sought shelter. While there he was killed by a lightning stroke. The court gave him insurance.

Case No. 3

A man employed about a wholesale house lifted some heavy stuff one day, this being his regular work, and strained himself. Some time afterward he died of an abscess on his back. This case was fought hard, but the court finally held that abscess might have come from the strain and allowed insurance.

Case No. 4

Two employes of the defendant concern got to fighting one day, and one was seriously injured. The fight grew out of an order which the injured man had properly given his assailant, and which the latter resented. One finds it hard to see where the employer was in any sense responsible for this, but the court nevertheless held that he was and made him pay the injured employe compensation.

Case No. 5

In this case also a driver figured. The delivery wagon was horse driven, and one day while the driver was standing over the horse, the animal threw up his head and struck him in the face. It appears that at this time the driver was suffering with syphilis, which he claimed was made worse by the blow. Eventually syphilis destroyed one of his eyes. The court took this view and made the employer pay.

Case No. 6

A manufacturer of proprietary goods employed a demonstrator to show goods in a department store. While proceeding to her place she tripped over a torn rug and

fell heavily, doing herself considerable damage. At first the referee said this accident did not arise out of the employment, but the court reversed him and made her employer pay her \$7.50 a week as long as her disability lasted.

Case No. 7

Two competitors did business in very friendly relations in the same town. One day one of them was short a man and borrowed one from the other. While doing the work for which he was loaned, on the borrower's premises, the employe was overcome by gas and killed. At first glance it would appear as if the dead man's regular employer should certainly not be

held responsible for this, since the accident didn't even happen on his premises. Nevertheless, the court said he must pay \$10 a week for 500 weeks.

These cases and many others like them show that the courts now strain a point to protect employes from about anything that may happen to them during working hours, whether it had any connection with the real work or not. If the injured employe is in his working hours, and engaged in, or at or near his regular work—he need not even be on his employe's premises—he is apparently entitled to claim compensation from his employer if anything happens to him.

CHIMNEYS

IT has been determined that the origin of one-fifth of our dwelling house fire losses may be traced to defective chimneys.

In practically all cases a defective chimney is due to carelessness or ignorance on the part of the builder. The time is approaching, if it is not already here, when

tion than will all the warnings that may be given.

In building a chimney there are a few points that should be considered by every conscientious man.

Chimneys should never be supported on wood construction, but should always be carried well below the frost line and sup-

ported on a chimney. No nails or other objects should be driven into the mortar joints.

All portions of the chimney should be laid up in Portland cement mortar, and the face of the chimney should be plastered with a coat of mortar where it passes between floor joists or other wood construc-



Plate 1—The slight "batter" in the sides of the chimney of this Akron, Ohio, house is well done. Often the batter is made too great to be pleasing

a builder may be held financially responsible for any damage which may occur to a building due to faulty construction on his part. A few heavy damage suits of this character will doubtless do more to raise the standards of building construc-

tion. Chimneys should be lined with tile flue linings and the flues should be separated by brick partitions or withes bonded into the chimney. The lining in adjacent flues should be staggered, and all linings should be set in cement mortar, and the

ported on an independent foundation or footing. Beams, joists, rafters, should never rest on chimneys, but should be carried by headers or other independent supports. No woodwork-studding and so forth, should approach nearer than two



Plate 2—The chimneys of Hawthorne's "House of the Seven Gables," built about 1669. The chimney in the gable is comparatively modern

space between the lining and the brickwork should be well grouted with cement mortar. Ordinary sewer tile should never be used as flue lining. The lining should extend continuously from the bottom of the flue to the top and the openings for smoke pipes should be neatly made.

The connection of the chimney and the roof should be made with sheet metal and should allow free movement so that settlement of the roof will not disturb the chimney, or vice versa.

Where there are fireplaces in a chimney, an ash pit should be formed at the bottom of the chimney. The fireplaces should have ash dumps opening into ash flues leading to the ash pit. The ash pit and each of the flues should have iron clean out doors at the bottom.

Chimneys should never be constructed with brick set on edge. All portions of the walls should be at least 4 inches thick, and 8 inches is better and safer. The outside portion of chimneys in outside walls should be at least eight inches thick to prevent the interior from rapid cooling, which will often affect the draft. Stone chimneys should have walls at least twice the thickness of corresponding brick chimneys. If concrete blocks are of tried and proved quality they may be used for chimneys. Reinforcement is sometimes used in concrete chimney blocks, thus insuring added security.

Unlined chimneys should not be plastered smooth on the inside, but should merely have the jointer struck smooth. Flue plaster is subject to the action of gases and often flakes off pulling the mortar out of the joints and thus creating

openings for the passage of sparks, etc.

The size of flues for ordinary stoves and ranges should be about 8 by 8 inches. For household furnaces, boilers, etc., 8 by 12 or 12 by 12 flues are used. For fireplaces burning hard coal the area of the flue should be about one-twelfth that of the fireplace opening. For soft coal or wood the area of the flue should equal about one-tenth that of the fireplace open-

ing. The flues for fireplaces should have as few bends as possible and the bends as well as the straight portions should be lined with flue lining. Bends should be comparatively long and approaching the vertical rather than short and nearly horizontal.

The point just above the throat of a fireplace where the opening is gathered in to meet the flue should be carefully built, and should be gathered in quickly, as a large chamber at this point will often cause a smoke pocket that will prevent the flue from drawing properly. The throat should be about 3 or 4 inches wide and extend the full width of the fireplace, with a shelf formed on top of the back lining where it splay's out to from the hearth. This shelf will be effective in preventing gusts of wind from blowing smoke and soot into the room. On most of the good work of today, cast iron throats and dampers are in use. These have not only the throats and dampers formed in them, but also form the drawn-in connection between fireplace and flue and furnish a support for the brickwork over the fireplace opening. They may be obtained from several manufacturers and their use is recommended.

Chimney caps may be plain or moulded and may be made of stone, cement or terra cotta. Chimneys should be carried at least two feet above the ridge of adjacent roofs. Ornamental chimney pots are coming into general use on good work in America. They serve a double purpose, adding to the efficiency as well as the appearance of a chimney. They are commonly made of



Plate 3—The chimney of this house at Hartford, Connecticut, is an important feature, contributing to the homelike result



Plate 5—A combination of brick and stone at Beloit, Wis.



Plate 4—The stone and brick chimneys of these old log houses near Altoona, Pa., are expressive of the sturdy men who built them



Plate 7—Tapered stone chimney on house at Rye, N. Y.



Plate 6—A plain paneled chimney on a house at Hartford, Conn.

terra cotta and may be had in a large variety of sizes and styles.

From a standpoint of appearance as well as safety, chimneys are usually made too small. A chimney which has a skimpy appearance will almost invariably spoil the effect of an otherwise attractive house. The decorative possibilities of the chimney has until recently been lost sight of in America, although an examination of colonial work shows that our forefathers recognized this fact fully. Brick patterns and panels, either alone or combined with

stucco add interest. Cut stone and terra cotta ornament are also useful for this purpose. Moulded bricks are extremely useful in working out ornamental chimneys and they may be had in a variety of stock patterns that may be combined to form an unlimited number of designs. They deserve more general use in this country.

Lumber Prices

"From the standpoint of national welfare, the raising of the lumber price level to a plane more nearly equal to the 'all commodities' group may be regarded with favor," says Prof. R. C. Bryant of Yale University in a recent article on "Lumber

Prices" in "The Annals." He continues: "This is true since prices in former years have been too low to encourage timber land owners to engage in the production of timber for our future needs. With the present price level, it now becomes practicable to urge the growing of timber crops, since the returns promise to be such as to insure a reasonable profit on the investment.

"It is not a matter of surprise that the 'lumber group' values have risen at a rate at least 50 per cent higher than those for the 'all commodity group' during 1919, since for many years lumber was sold on a narrow margin of profit and did not share to the same degree in the advances made by some other groups."

Two Bungalows

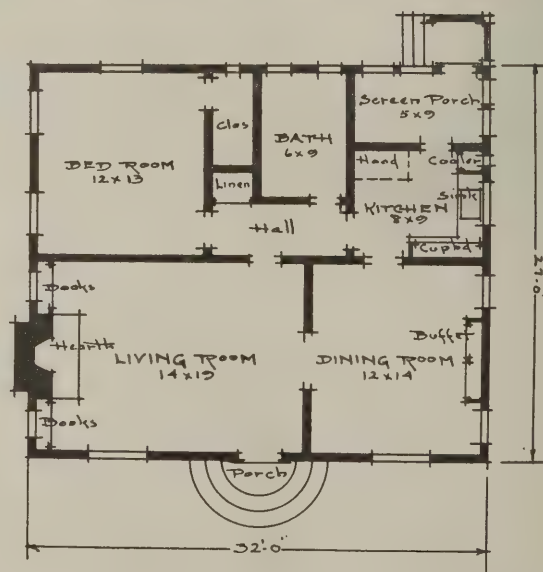
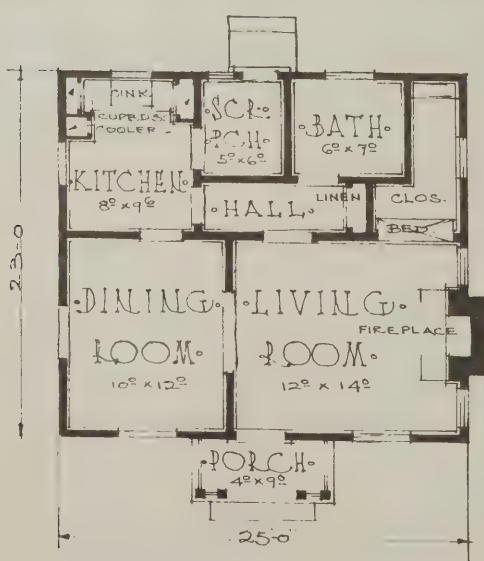
THE popularity of the bungalow has been somewhat diminished by the carefree abandon in design that has been exhibited by a large number of its proponents. In far too many cases the design of bungalows has been left to men who not only are not

among a great many people, and has in some localities become an outcast among houses. Some of the worst offenders in bungalow design confidently assert that they are "giving the public what they want," and that the number of bungalows that

choice the average person will discriminate between the "jerry-built" bungalow and the one that is well designed, and will choose the latter. This is proven in an increasing number of instances, some of which have put a decided crimp in the ambitions—or



Plate 1—Dignity and charm are combined in this small house



designers, but are also utterly lacking in even the first elements of good taste.

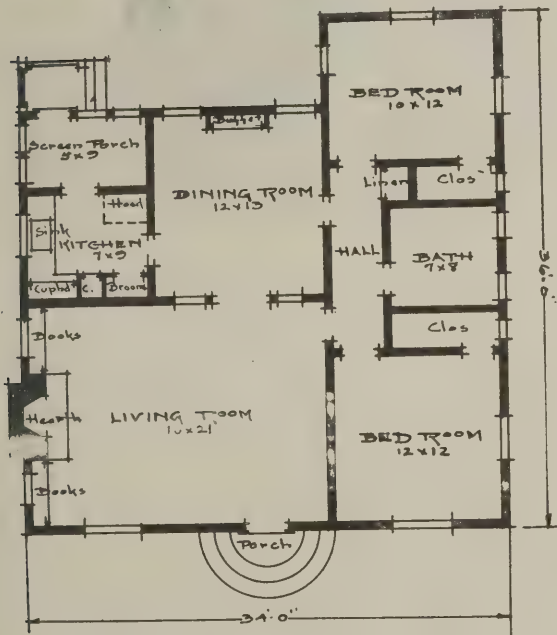
Under such conditions it is indeed small wonder that the bungalow has lost favor

they have designed proves it. In such cases, however, an investigation will often show that the public has been taking what was offered, and that when allowed a fair

rather the pocketbooks—of a number of flagrant violators of good taste. Men who ply the market with shoddy products are easy game for the competitor who has real



Plate 2—Simple houses like this one will always be "in style"



ability and the intention to produce a superior product.

The bungalows which illustrate this article were designed by Ye Planry of Dallas, Texas. They are "different" without being freakish, and are attractive examples of small house design. Both are of frame construction and two plans are shown for each of them.

The exterior of Plate 1 is made interesting by means of the gables over the French doors and the well designed entrance. The wooden balconies and the "ears" formed

in the upper part of the architrave around the French doors are unusual features. The tiny dormer could probably be omitted with good results.

The larger floor plan for this house contains five rooms and a bath. All of the rooms with the exception of the kitchen are of good size and all are well arranged. The closets are roomy and the bathroom is conveniently placed. The bedrooms have crosscross ventilation, one of them having windows on three sides.

The smaller floor plan for this house

shows four rooms and a bath. The living-room and the dining-room are placed across the front of the house, with the fireplace in the living-room balanced by the buffet in the dining-room. The bathroom in this plan is more economically placed with respect to the kitchen plumbing.

The house shown in Plate 2 is somewhat smaller than the other and the design is even more simple, the front porch being the only feature of note. This is a good example of the effectiveness of well-considered simplicity.

Roll-Seams on a Curved Roof

By John V. Dunlop

ROLLS which do not require a wooden core are especially adapted for curved surfaces where the formation of curved wood rolls would be somewhat costly.

In this particular job 6-lb. sheet-lead was used for the roof surfaces and 5 lbs. per sq. ft. for the flashings and gutter. The

After the roll has been formed turn the end over into the gutter, taking care that as the nose of the roll is turned down it does not broaden out too much. Any lead which remains after this operation should be trimmed off, but the roll should not be cut at the sides.

the top end without a joint. At the corners of the sheets where there is an apparent surplus of material the lead is dressed forward either to the side or the end up-stand until they have taken up the portion which at first it seemed necessary to trim. The rolls are formed as for the other sheets.



A curved porch roof

roof has the usual wood framing and roof boarding which is felted underneath the lead. The gutter is made of a solid wood moulding lined with lead. The gutter lining extends up the roof slope to a distance of three inches. Where the joints in the gutter lining cross the wood gutter the wood is grooved across and the ends of the gutter sheets are wrought into the groove and soldered across, as shown in the sketch.

Begin on the roof proper by dressing up the edges of the two lower sheets located at each corner, setting up the up-stand at the straight joint and also at the hip roll.

Two-inch broad strips of lead, known as "tacks," are now sunk into the roof boarding and nailed at one end. The top end of the tacks is left standing vertical and in line with one side of the roll. Draw the two sheets into position and dress the end of the tacks over the edge of the undercloak and then turn the upper edge of the overcloak over both the end of the tack and the edge of the inner sheet, as shown in the line drawing of the sheets dressed up. This joint is now ready to be turned over to form a roll.

Then one of the sheets next to the house should be dressed up in the same manner, only the up-stand next to the wall is to be finished with a flashing, while the up-stand next to the corner sheet is to be "tacked" and have the hollow roll formed as just described. It is considered good practice to turn intersecting rolls toward the hips.

Close attention should be paid to the upper end of the up-stands and the sheets should be made long enough so that the upper ends of the up-stands may be flattened and continued along the wall for a short distance. Also on the hips, be sure to have sufficient lead at the lower end of the upper roll so that it may be lapped over the upper end of the lower roll. This lap joint is not difficult to make as the rolls are hollow and the upper end of the lower roll may be easily reduced with a lead dresser to such a size that the lower end of the upper roll may be folded over the compressed part, thus forming a swaged or flush joint.

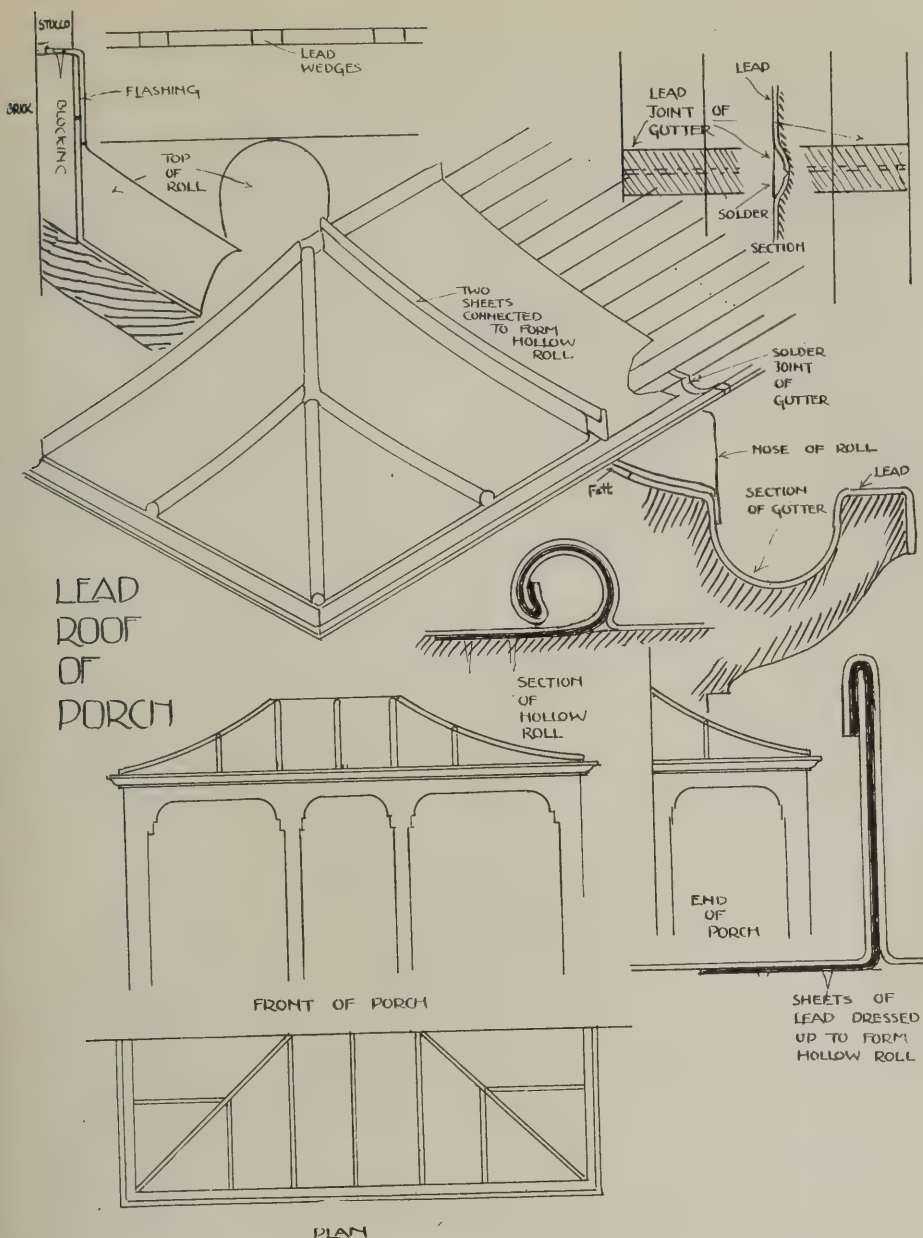
We now have the middle sheets to put on. These should be dressed up as were the other sheets, only that the up-stands on the sides of these sheets are continued around

The lower ends of the rolls should now be dressed up as shown in the sketch or they might simply be turned over the gutter making the ends form a quarter of a circle and trimming them off level.

The principal objection to merely turning the ends of the rolls over as in the latter method is that they project out into the gutter and do not have so finished an appearance.

Zinc is sometimes used in place of lead for this class of work, being much cheaper and lighter, but where lightness and durability are of the first importance copper is the ideal material. Copper sheets weighing only 16 oz. per sq. ft. are quite thick enough for work of this kind, and the durability of sheet copper weighing only 16 oz. per sq. ft. is equal to that of lead weighing 6 lbs., and its hardness renders it suitable for roofs over which there is traffic.

The junctions of zinc or copper roofs are made by means of aprons and flashing, as with lead sheets, although very often the lower edges of the flashing are beaded to stiffen them.



Light Creosote Oils in Wood Preservation

Light creosote oils properly injected into wood apparently will prevent decay until the wood wears out or until it checks so badly that the untreated portions are exposed. Such is the indication of service records collected by the Forest Products Laboratory on railway ties and telegraph poles preserved with low boiling creosotes.

Creosotes used in ties from 25 to 50 years ago were for the most part oils having 50 per cent or more distilling below 235° C., with a residue not to exceed per cent at 315° C. The ties so treated lasted from 15 to 20 years, and failure was traceable in most cases to mechanical wear, such as rail cutting and spike killing. In no case was failure found to be the fault of the preservative.

Of 1558 telegraph poles in the Montgomery-New Orleans line, which were

pressure-treated with a light creosote oil, 1049 poles were still sound after 16 years. In 91 per cent of the cases of decay, the fungi had entered the wood through checks and shakes. Representative sections in the Norfolk-Washington line showed that after 17 years' service, of the 161 poles inspected, 1469 were sound, 92 decayed at the top, and 105 decayed at the ground line. The decay at the top was caused chiefly by cutting off the poles. In those decayed at the ground line, the causes of failure, as determined in 88 per cent of the cases, were checks or shakes. Here again as in the ties, the preservative outlasted the mechanical life of the wood.

Unless some other factor than protection from decay is considered important, therefore, there is apparently no need to specify high boiling oils. The important point is that any coal tar creosote which is not extremely low boiling or extremely high boiling will satisfactorily prevent decay,

and in the selection of an oil, factors such as price, penetrability, and convenience in handling should receive greater consideration than moderate differences in volatility.

Comparative Value of Timber Cut from Live and Dead Trees

Prejudice exists in certain quarters against the use of timber cut from dead trees, and some purchase specifications insist that only timber cut from live trees will be acceptable, says the Forest Products Laboratory. As a matter of fact when sound dead trees are sawed into lumber, and the weathered or charred outside is cut away, there is no method known to the Forest Products Laboratory by which the lumber can be distinguished from that cut from live trees, except that the lumber from dead trees may be partly seasoned when sawed.

All the information available at the laboratory indicates that timber cut from insect or fire killed trees is just as good for any structural purpose as that cut from live trees of similar quality, providing the wood has not been subsequently injured by decay or further insect attack. If a tree stands on the stump too long after it is killed, the sapwood is likely to become decayed or badly infected by wood-boring insects; and in time the heartwood also will be similarly affected. The same thing is true of logs cut from live trees and not properly cared for. Until the wood becomes affected by these destructive agents, dead tree wood should be just as strong and just as durable as sound live tree wood.

In considering the subject it may be useful to remember that the heartwood of a living tree is entirely dead, and in the sapwood only a comparatively few cells are living. Most of the wood cut from trees is dead, therefore, regardless of whether the tree itself is living or not. Such being the case, purchase specifications, instead of providing that material must not be from dead trees, should state that material showing evidence of decay or insect infestation exceeding a specified limit will not be accepted.

New Pine Manual

The Southern Pine Association is preparing to issue a revised and enlarged edition of its "Southern Pine Manual of Standard Wood Construction," for distribution to architects, engineers, etc. New tables and formulas will be incorporated, together with Benjamin E. Winslow's article on "Short Cuts in the Design of Roof Tree Houses." A supplement containing all the additional matter will be published also for distribution to those who have copies of the old Manual.

Business Buildings

THE commercial development of the past few years has been characterized by a more or less definite tendency to specialize and separate the different business groups. This has multiplied the problems of the

tions in the requirements for shelving, show-window space and arrangement and so forth. The modern department store has many varied requirements that are constantly being extended, and the growing

Mich. The design of such a building demands a tremendous amount of work before all of the practical features associated with the baking industry may be met. Bread making is only one phase of the



Plate 1—Wagner Baking Company's Building, Detroit, Michigan. John Ahlschlager & Son, Architects

architect and the builder. Where a few years ago the butcher, the baker and the candlestick maker usually conducted their businesses under one roof, or at least under roofs that were almost precisely alike, we now have each group demanding a place of business especially designed for its particular needs.

Of course the requirements of the average retail merchant have remained fairly constant, but even here we find wide varia-

separation of such groups as bakers, confectionery makers, meat packers and others who are gravitating toward the manufacturing and wholesaling class of business rather than the retail end, has developed special building problems and requirements that must be well considered before they may be properly worked out.

Plate 1 shows a large building designed by John Ahlschlager & Son, architects, for the Wagner Baking Company of Detroit,

baking industry; fancy cakes, cookies, crackers, pies, rolls, and sometimes confectionery and other specialties must be considered. Storage space for liquids, flour, sugar and so forth must be arranged for; office space must be provided and room must be made for the wagons or trucks used for hauling. To these should be added the thousand and one requirements incidental to the economical conduct of the manufacturing processes.



Plate 2—Recreation, store and post office building owned by the Firestone Tire & Rubber Company, Akron, Ohio

This building is an interesting example of the effective use of brickwork trimmed with terra cotta. The construction is of reinforced concrete and the brickwork is frankly used as a veneer with patterns and lines worked out without regard for bond.



Plate 3—Finnegan Building, Houston, Texas. Alfred C. Finn, Architect

The combination of the ornamental brick-work and the terra cotta details results in a crisp, clean-cut building that is highly effective.

Plate 2 shows a combination store, recreation and postoffice building built by the Firestone Tire & Rubber Company near its plant in Akron, Ohio.

The trimmings around the show windows and the entrance to the upper stories are of wood. The trimmings of the post-office are of cement stone, as are the pilas-

ter trim and the belt course of the larger building. The sheet metal cornice of the larger building is cheap—and looks it. It detracts considerably from the appearance of the whole.

The recreation building is designed to provide for the social activities of the company's employees. Dances, club meetings and other social gatherings are held here at frequent intervals.

Plate 3 shows a department store building

of Houston, Texas, designed by Alfred C. Finn, architect. This building is of steel construction faced with cement stone. The windows of the upper floor as well as those of the first floor are designed for use as show windows, as many articles such as furniture, clothing and other bulky merchandise may be effectively displayed from such heights. People from the opposite side of the street are often attracted by such displays when the first story displays remain hidden or unnoticed.

The Tractor Versus Mules

LOUIS W. SLOCUM, a builder of Hartford, Conn., says that he has solved his excavating and grading problems for all time. By using a tractor he claims that he can move as much earth as he formerly could with three teams, and at the same time eliminate the use of several men, thus reducing the labor cost and also simplifying the problem of obtaining sufficient help.

Mr. Slocum admits that when the use of a tractor was first suggested to him he was somewhat skeptical of its practicability for his work. After testing its performance for one day, however, he became convinced that he held a solution of the excavating problem and could dispense with teams on his work.

Mr. Slocum uses an ordinary "wheeler"

in combination with the tractor. The wheeler has a capacity of about 18 cubic feet of earth at a load. With this equipment he says that he has taken 118 cubic yards of earth out of a cellar excavation in six hours. The earth is hauled from the excavation and distributed on the ground by the tractor, and for hauls up to 1,000 feet this method has proved economical.



Plate 1—The tractor at work. L. W. Slocum is shown operating the "wheeler"



Plate 2



Plate 3



Plate 4

Plates 2, 3 and 4—Some of the houses recently built by Mr. Slocum

A House in Syracuse, N. Y.



This house seems to belong to its hillside site

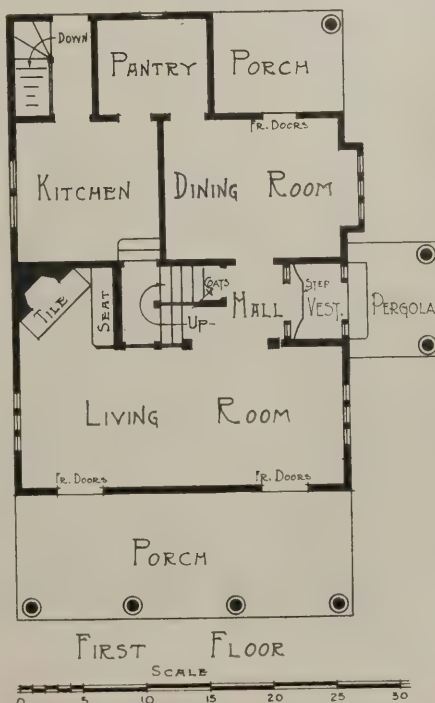
THE accompanying illustrations show a house at Rochester, N. Y., designed by Harry D. Phoenix, architect.

The house is of frame construction with wide clapboards. The lines of the building are excellent for its hillside site and seem to harmonize with the surroundings.

The entrance is at the side and is dignified by a pergola treatment. A vestibule and small hall lead to the dining room on one side and to the living room on the other. French doors open from the living room onto the porch which extends across the front of the house. The stair and the hall are open on the living room side and give an impression of spaciousness to this room. A nook containing a fireplace and built-in seat is formed at the end of the stair. A coat closet is formed under the stair.

The dining-room contains a bay window and has French doors leading to a breakfast porch.

The kitchen has a small entry which contains the basement stair. Three steps lead



from the kitchen to the landing of the main stair, making it possible to reach the second floor without passing through the front portion of the house. A large pantry is placed between the kitchen and the dining-room.

The second floor contains a bath and four corner bedrooms, all of which have cross ventilation, and each of which contains a large closet. A stair leads from the second floor to the attic.

To Our Readers

This convenient corner is seized on to tell our readers that delay in deliveries of NATIONAL BUILDER by the post-office department is as bad as any other form of transportation, if not worse. Be sure when you change your address to notify us of the change. Subscriptions can only be filled beginning with the current issue at the time of subscribing. Back numbers cannot be supplied. There are none. If you have not received your paper ask your postmaster about it.



SECOND FLOOR

SCALE



A House in Syracuse

A Mixer Attachment

The accompanying illustration shows a concrete mixer with the charging platform permanently attached to the frame. The platform is attached by means of short

angle-irons bolted to the frame of the mixer. It is hinged in place so that it may be folded up against the hopper when moving from job to job.

The Use of Wet and Dry Sand for Concrete

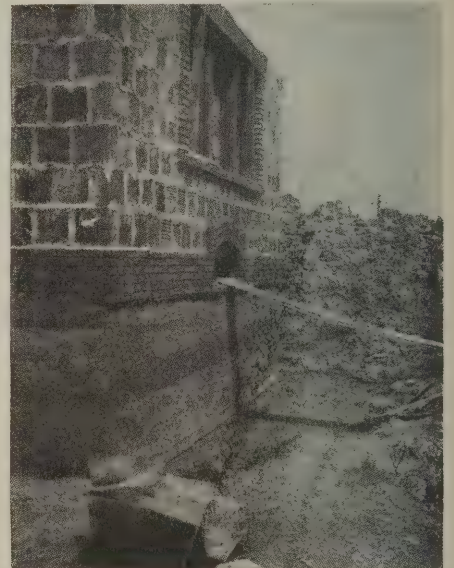
The Technical News Bulletin, No. 38, issued June 4, by the Bureau of Standards, Department of Commerce, Washington, D. C., announces that during the past month (May) several series of tests of concrete made from Potomac River sand and gravel have been carried out, using various proportions of cement to aggregate from $1:1\frac{1}{2}:3$ to $1:3:6$ and with the extremes of flowability used in practical concrete construction work. The results of these tests emphasize a feature of considerable importance to the contractor. When aggregates are proportioned by volume measure, as is customary on most construction work, it is found that the use of wet aggregates requires one-half to 1 bag more cement per cubic yard of concrete than do dry aggregates. Sand is generally wet or at least moist when used, so that the full difference may never be apparent in field practice, yet the use of sand from a pile which has just been exposed to rain will result in the employment of more cement for a given volume of concrete than would have been the case had the work been done on a dry day. The excess strength resulting from the increase in cement is unnecessary providing that designed strengths were obtained with the dryer materials. As above mentioned, this increased quantity of cement may be as high as one bag per cubic yard of concrete, and the increase in strength due to the added cement in a

cubic yard of concrete made with wet aggregates is roughly proportional to the increase in cement. Therefore, if there is a marked increase at any time in the moisture carried by the sand, the tendency on the job should be to use larger volumes of sand in the batch.

Marked improvement in the working qualities of the concrete will be noted under usual conditions when the relative volume of sand is increased and the gravel proportionately reduced. With well-graded river sand and gravel, such as is available in the District of Columbia, the "oversanding" may be beneficial up to the point where the volume of sand in the batch is equal to the volume of the gravel. Such concrete will not segregate for maximum flowability commonly used in construction work; it will be easier working, the quantity of cement required per cubic yard will be slightly less, and there will be no reduction in compressive strength.

Drainage

A good specification provides flat surface water shall be drained from around all foundations. But a specification clause has no value if it is ignored.



In the accompanying illustration the water standing against the foundation probably does no great harm, as the temperature is well above freezing. It might, however, have a bad appearance to a prospective client and the builder might easily lose a chance at a good job by not keeping his jobs ship-shape.

RIGHTLY NAMED

"I don't see why you call your place a bungalow," said Smith to his neighbor.

"Well, if it isn't a bungalow, what is it?" said the neighbor. "The job was a bungle, and I still owe for it!"—Pearson's Weekly.



A mixer attachment

A Small Bank



Plate 1—Exterior view of the Phoenix Bank. Harry D. Phoenix, Architect

A SMALL bank building designed by Harry D. Phoenix, architect, of Syracuse, New York, is shown in the illustrations herewith.

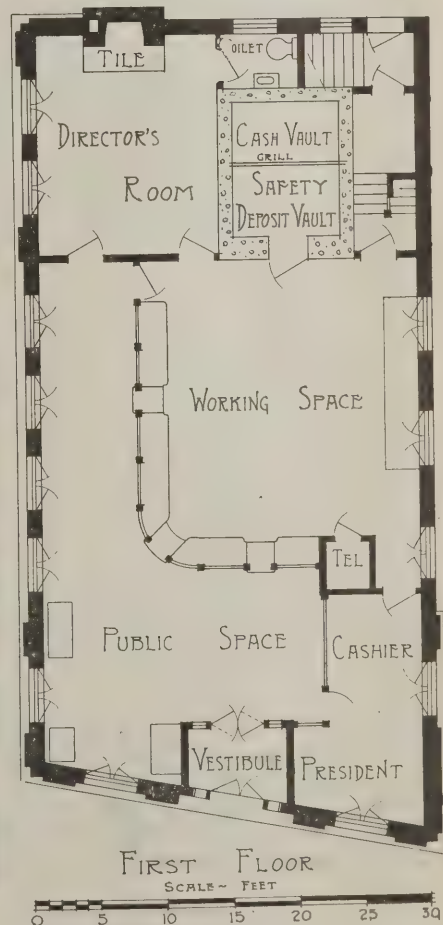
The exterior is of gray brick with stone trimmings. The detailing is simple and the general effect is pleasing, but an improvement would result if the pilasters were not

broken by the belt course above the windows. As it is the pilasters have a squat appearance.

The plan of the bank is simple and well arranged. The entrance is through a vestibule into the public square. At the right is the cashier's and the president's space, separated from the public square by a low



Plate 2—The interior of the Phoenix Bank showing the banking screen



railing. At the end of the public space is the directors' room which contains a fireplace and a toilet room.

The working space is separated from the public space by a metal and marble screen which has three wickets. The vault is of reinforced concrete with the safety deposit boxes and the cash vault separated by a metal grille. A telephone booth opens into the working space.

The space may be entered from the public space, the cashier's space or from an entry at the rear. The rear entry has a stair leading to the basement which contains toilet facilities as well as the boiler and fuel rooms. Another stair in the entry leads to the attic which furnishes additional storage space.

The trim throughout is of birch. The directors' room has a white oak floor. The working space has a cork tile floor. The remaining floors are of mosaic tile. The banking room has a marble base and wainscot.

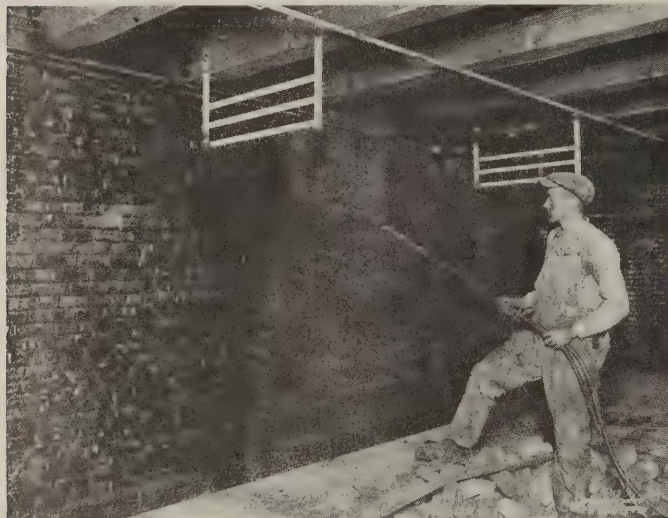
A Method of Dispensing With Furring and Lath

A product which its manufacturers claim does away with the necessity of using furring and lath on solid masonry walls, is now on the market. Its producers claim that it forms an ideal surface on which to plaster and that it forms a perfect seal against the action of air, moisture and stain and that it has important value as a wall insulator. It is pointed out that the process has been used on the underside of concrete roof slabs that are exposed to the direct action of severe weather and that no condensation has resulted, even though the roofs were covered with snow and ice.

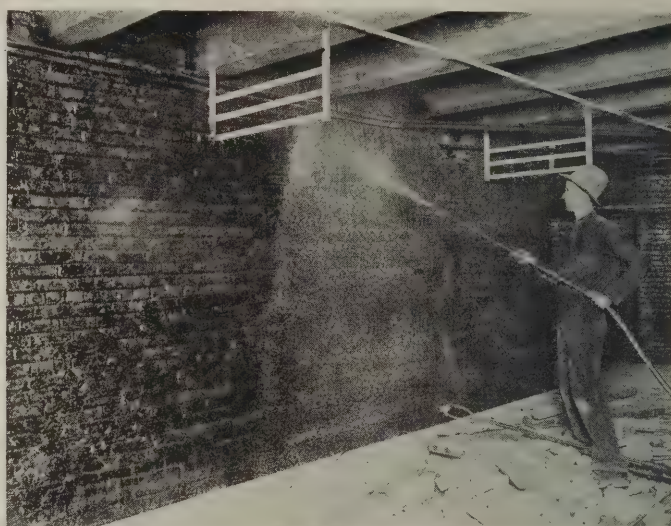
The process consists of a heavy coating of asphalt into which is embedded a coarse rock grit. Each of these materials are

applied separately by means of special pneumatic appliances that deposit the materials under high pressure. After the asphalt has hardened for from 36 to 48 hours, plaster may be applied to the surface.

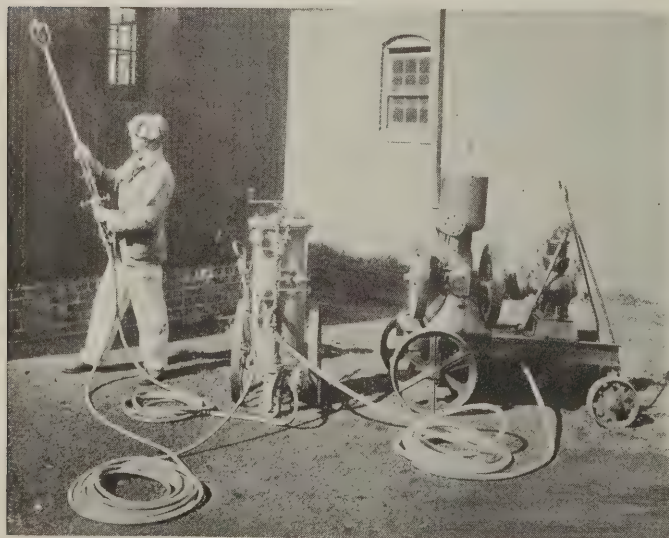
The first coat is a heavy liquid asphalt which is used to fill all cracks and crevices. This is allowed to become thoroughly dry, when a second and an extra heavy coat is applied and on this while still fluid the grit is impelled as shown in the illustration. Specially devised sprayers are used. By the same concern a new pattern of painting by air pressure is employed in the form of an air-confined paint jet that confines the painting material to the surface and does not atomize it. The illustrations show the methods of application.



Applying the liquid asphalt



Shooting the coarse grit



The same type of equipment is used for painting—all but the pipe and nozzle



Painting structural iron, tanks and stacks with the air-confined jet is speedy, economical and cleanly

ENTRANCES



Plate 1—Entrance to the library at Swampscott, Mass. Kelly & Graves, architects. A well designed piece of stonework, beautifully detailed



Plate 2—Entrance to a Kansas City, Mo., residence, Keene & Simpson, architects. An Italian Renaissance type in terra cotta combined with ornamental ironwork



Plate 3—A colonial type in which the trellises and the red brick of the porch and steps add to the interest



Plate 4—A well designed colonial entrance that will be improved by the planting. The soffit is of stucco and the floor is of brick

Design and Construction of High School Buildings--By Charles E. White, Jr.

PRINCIPLES applied to the design and construction of grade school buildings are only partially applicable to high school buildings as many details of education involved in the latter do not apply to grade schools.

In the United States there is a marked departure from the mode of teaching when

tude of adults and their interest in studies and loyalty to school must be reached through very nearly the same appeals as would be addressed to adults in similar situations.

The High School in the Country

The difference between the country high

possible upon first thought. All that is necessary is to devote a single entrance, corridor and staircase to each branch of the school; when possible these entrances should be upon different sides of the building, each with its separate playground, so that pupils need not mingle outside the building. In the school administration dif-



Very complete modern High School building built for a township in the middle west; several towns in the township combined to secure a single building and thus saved considerable money to taxpayers besides securing an unusually fine building.

pupils leave grade schools to enter high school. For this reason the size of class rooms and general arrangement of study rooms is along somewhat different lines from those pursued in grade schools, and the designer of school buildings should recognize and understand the tendency of modern educators to draw more closely to the ideals of college educational work in the high school course.

There are many practical reasons why methods of teaching change when pupils reach high school age. With more mature minds and increased judgment they can be put more on their honor than would be possible with pupils of tender age. At the same time discipline becomes more irksome as boys and girls reach the age of adolescence. They adopt more nearly the atti-

school building and one in the city lies chiefly in the fact that the former frequently combines grade schools and high school in a single structure. For this reason country school buildings will be considered here as a separate problem.

Many most successful buildings have been erected within recent years in different parts of the country, combining facilities for high school training as well as grade schools. Indeed, several notable structures include, also, primary schools.

In planning a combination building a fact of first importance is the necessity for separating pupils of different ages even to the extent of providing separate entrances for primary school pupils, grammar school and high school pupils. With a little study this will be found less difficult than seems

ferent hours of opening and closing school can be arranged for each department so that pupils will not be needlessly thrown together.

As a general rule, rooms for high school pupils are at the top of the building with quarters for primary grades on the ground floor. In other words it has been found easier in administration to keep the younger pupils by themselves with as little necessity for using stairways as possible.

In some of the most modern combination high school buildings the general arrangement provides for small recitation rooms for high school purposes, each accommodating about 30 pupils, with one or more separate study halls. Study halls are larger rooms providing for up to 150 pupils, the idea being to accommodate portions of



Large three-story High School building for a large city. This building includes a community auditorium, study halls, recitation rooms, domestic science department, dining room and very complete toilet rooms.

many classes when these pupils are not engaged in recitation.

With the study hall plan, recitation rooms may be smaller than modern grade school rooms because they are usually equipped with shelf-arm chairs instead of seats and desks. In recitation rooms it is merely necessary to provide sufficient space for pupils to take notes comfortably, so the space required may be as small as 400 to 500 square feet (for 30 pupils); a frequent dimension is 25 by 22 feet. The height of ceiling, however, and size and location of windows should follow, proportionately,

standards employed in modern grade schools.

Study halls frequently accommodate 150 pupils and may reach the dimensions of approximately 30 by 60 feet, with a height in the clear of 17 feet. They are usually equipped with desks and seats for it is here that registered pupils maintain their headquarters when not reciting.

If no study hall is to be provided it will be necessary to build larger class rooms, each accommodating two classes. These rooms can then provide for recitation as well as study periods. In size, class rooms

of this nature should have about 800 to 1,000 square feet, but should not be too long to be easily supervised.

Town and City High Schools

The study hall-recitation room idea applies as well to town and city schools as it does to combination schools in the country and the size of rooms for each purpose should follow the same rules. The only difference between city and country schools is that more rooms must be provided for the former to accommodate a larger number of pupils.



Two-story and English basement arrangement, with the central (auditorium) portion continued into a third story. This is a good example of Bedford stone and pressed brick. In a small but growing city the central portion might be built, first, to be followed, later, by the side wings.



Large community high school practical for a number of small towns combining their educational features in a single, fine building. The high roof was used purposely to give a suburban flavor to the design.

Corridors and staircases in high school buildings should be designed along the lines of best grade-school practice. Staircases should be the full width of corridors, and two runs of stairs should be between floors with a single landing (full width of stairs) about half way up.

In high schools, lockers instead of coat rooms are usually provided, either along corridors (in which case the corridors must be widened to accommodate them) or in separate locker rooms elsewhere. A very practical locker is the steel locker with combination lock, one locker for each pupil; in some cases a single locker is used for two pupils.

Toilet facilities for both sexes should be more liberal than in grade schools, and where it is desirable for young pupils in grade schools to provide small toilet rooms on each floor (in addition to the general toilets) this is not necessary in high schools. A larger number of wash bowls is required in high schools than in grade schools as it has been found that older pupils desire to wash their hands more frequently.

Every modern high school building, whether combination building or not, should contain as far as possible a first-class auditorium of sufficient size to accommodate every pupil in the building. This auditorium should be considered not merely as a feature of high school life, but as a community benefit to be used and enjoyed by every family in the vicinity. No modern school building can be said to contribute properly to the welfare of a community unless its doors are open to educational progress for the entire community, and not merely for pupils attending school.

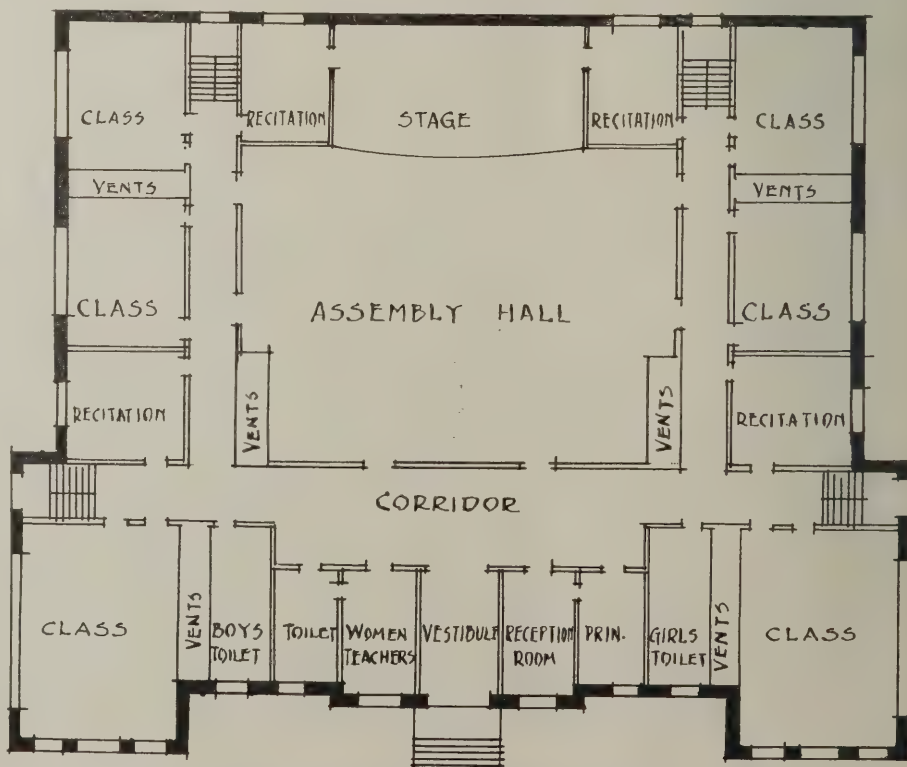
Every auditorium should be on the ground floor when possible and it is excellent practice to build it in a separate wing so that its use for general community pur-

poses will not interfere in any way with school work.

A growing tendency to build community buildings and auditoriums as memorials for soldiers and sailors who gave up their lives for their country is most laudable. School boards in several communities have interested themselves in these projects with the result that in many towns and villages plans are already on foot to build memorial auditorium wings on existing school buildings. Thus, patriotism can be better taught in the schools and pupils will be in

close touch with all that patriotism implies when a memorial auditorium, perpetually maintained as part of a school building, exists in connection therewith. At the same time, taxpayers, who are never prone to be very extravagant with their money, appreciate a war memorial that proves of practical benefit to the entire community every day in the year.

Various other departments are now standard in the modern high school structure. Manual training occupies a large place in the curriculum of city schools,



First floor plan of a modern High School building containing an auditorium on the first floor. Such an assembly hall can be used as a general community center.

especially, and country high schools usually maintain an important course in training in agriculture. For manual training the average school (having 400 to 500 pupils) requires space of about 1,000 square feet, located preferably on the ground floor where noise will not disturb pupils in the class rooms.

Domestic science requires about the same amount of space as manual training and the ground floor usually yields the best location for this very important department. The demands of an agricultural course vary in different localities but 1,000 to 1,200 feet of space is usually sufficient for the average school; the commercial department also requires about the same amount.

Many modern educators are very strong in their attitude toward the rapidly growing movement for Junior high schools, as they feel the entire school system is benefited by an intermediate grade between the ordinary grade school and the high school. In most towns and cities the influx of freshmen into high schools is more or less disturbing to older pupils. Frequently high schools are badly crowded and it takes several months to assimilate the new pupils so recently arrived (or supposed to have arrived) at the age of discretion. Old methods of grade school training are difficult to eradicate from the mind of the new high school pupil who adjusts himself with some difficulty to newer and more "grown-up" ideals.

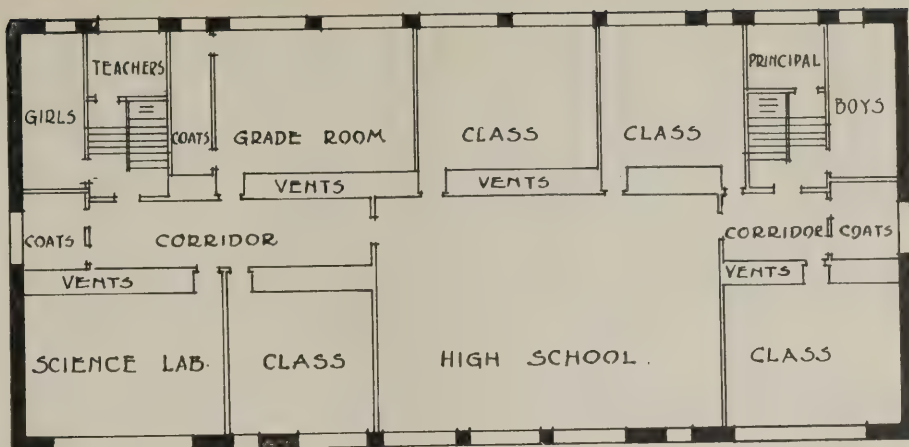
The Junior High School bridges over the gap between extreme youth and more mature youth. It relieves the crowded condition of the last grade or two of grammar school and the first grade of high school and provides a means of taking care of any unusual overflow of pupils.

In smaller communities the Junior High School may consist of class and assembly rooms in the main building, but in larger towns or cities it should be contained in a separate structure, built as to size and arrangement similar to the high school building itself.

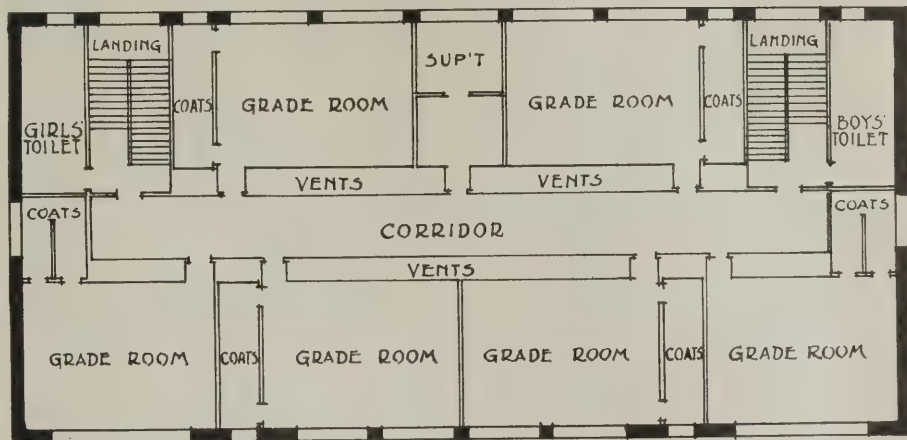
A department of high school which should be carefully accommodated in the structure is the department of administration. In a small building merely an office for the superintendent of schools or principal of the high school is sufficient, but in more pretentious structures a board room for the school board should be included and a secretary's office with sufficient space for filing cases, books and tables. In some of the later buildings space for a small school library is provided in connection with the administrative department and pupils are encouraged to read books of an educational nature. The library contains tables and chairs and an attendant issues books from the stock room as in any town library.

A toilet room and vault should be provided in the administrative department.

Physical training is, of course, of great-



Second floor plan



First floor plan

First and second floor plans of a combination Grade and High School building with both departments operated separately. This is an economical type for towns and small cities. G. L. Lockhart, architect.

est necessity in the high school and an adequate gymnasium should be provided whenever possible. On the ground floor is the best place for it and there should be a running track in the balcony. Sometimes, a gymnasium and auditorium may be combined though it is very inconvenient to move seats in and out and do away with gymnastic apparatus, temporarily. A storeroom should be provided for movable seats and for storing portable apparatus.

A dining room or lunch room is often found desirable in connection with the domestic science department, not only to demonstrate the work of girls in this important department but to provide lunch-rooms for pupils who come to school from a distance. The kitchen should be removed as far as possible from school rooms and in it, ventilation should be perfect. In some larger school buildings a kitchen and cafeteria is placed on the top floor and meals are served to pupils at cost. It has been found that a surprising number of school children are undernourished and the school house luncheon is a great help to these.

Laboratories may be located wherever convenient but the prevailing custom is to place them on the ground floor when possible.

Weathered Newels

Piling these newel posts out in the weather won't do the builder's reputation any good.



The action of rain and sun is already apparent in checks and splits. Although they were good stock to begin with, the owner will always believe that cheap materials were used in their construction.

A Southern School

A SCHOOL building designed by B. B. Burnham, architect, for Sheffield, Alabama, is illustrated and described in this article. The exterior of the school is of brick with stone trimmings, forming a simple and effective design. The interior construction is of a semi-mill type. That

locker room is novel in that only a low partition or dwarf wall separates the rooms.

The domestic science room is provided with a range hood to carry away the odors of cooking, and the lunch room is convenient to the domestic science room so

A rearrangement of this feature would be worth while. Otherwise this floor is well planned and the space is well utilized.

The first floor contains four class rooms and a large study hall all of which have unilateral lighting. Additional light for the corridors is gained by means of "bor-



School at Sheffield, Alabama. B. B. Burnham, Architect; P. E. Bostic, Builder

is, iron columns supporting wooden beams and girders. Steel girders are used on the longer spans. The lintels are of reinforced concrete.

A feature worthy of note is the use of patented sash of the pivoted type which permits thorough ventilation even during rainy weather.

The building has three exits, well separated and therefore insuring against the danger of panic on account of fire or other cause. The grade is irregular and two of the entrances to the ground floor are at the floor level while the third is located at a landing midway between the ground floor and the first floor.

The toilet and locker rooms for the girls are grouped at one end of the ground floor while the boys' toilet and locker room and the manual training department are located at the other end, thus insuring almost complete segregation of the sexes when away from the class rooms during school hours. The arrangement of the girls' toilet and

locker room is novel in that only a low partition or dwarf wall separates the rooms. The chemistry and physics laboratories adjoin and are near the manual training room. All of these departments are provided with modern equipment.

The gymnasium floor is located two feet below the ground floor level to provide extra headroom. Two of the gymnasium walls are formed with heavy wire mesh to protect the spectators and at the same time allow an unobstructed view of the players. Three tiers of bleachers provide for about 80 seats at one side of the gymnasium.

The boiler room is separated from the remainder of the rooms by fire walls. The boilers are set in a pit which is surrounded by a dwarf wall to keep back the coal. A large storage room provides space for storing bulky supplies extra chairs, and so forth.

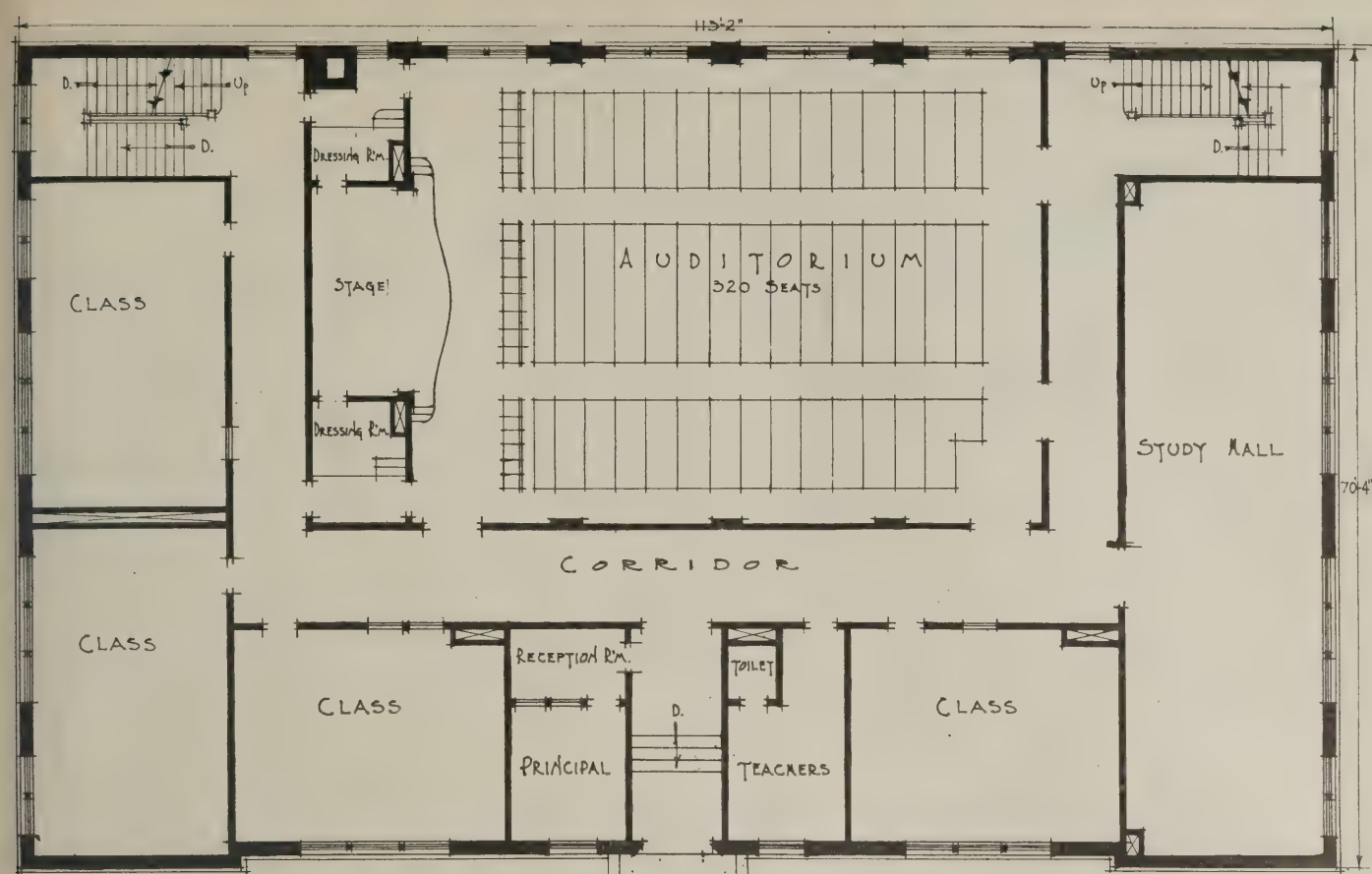
The steps to the gymnasium which project into the corridor near the boys' locker room, are a dangerous feature that might prove disastrous in case of a panic.

rowed" light from the class rooms. The study hall is long and narrow, thus providing uniform lighting and also aiding in reducing the distraction caused by students passing in and out of the room during study periods.

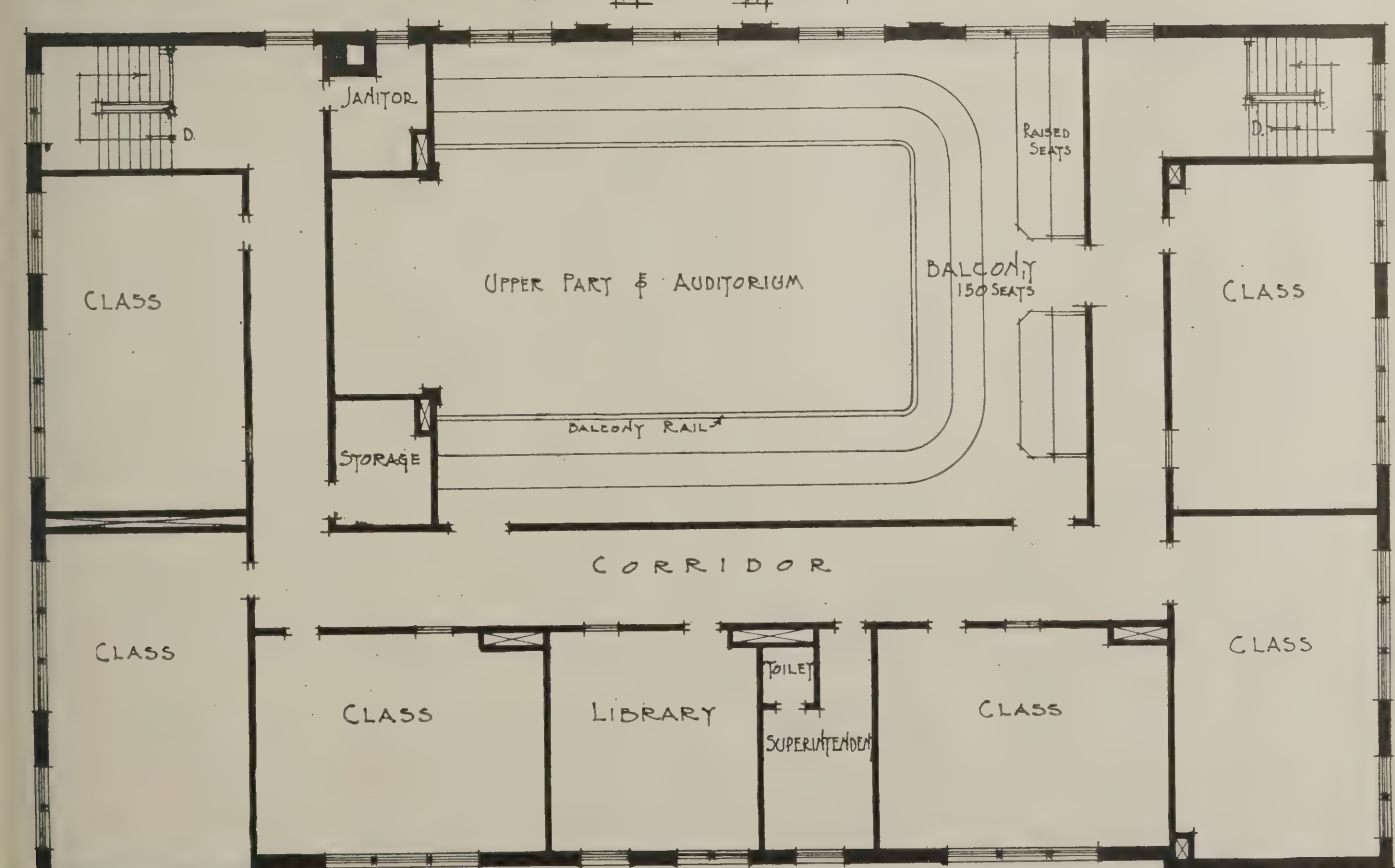
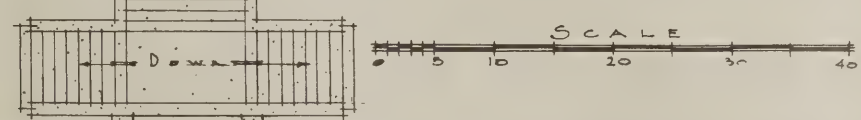
The principal's office is located near the main entrance and has a small reception room partitioned off at one end by a glazed partition. A teacher's room is also provided near the main entrance. The teachers' room has a private toilet room in one corner.

The auditorium is located on the first floor and extends through the second story. At one end of the auditorium is a stage with dressing rooms at each side. The auditorium is well supplied with exits and it is difficult to imagine that an audience could become trapped in such a room. Each corner of this room has at least one exit and in two of the corners there are two exits.

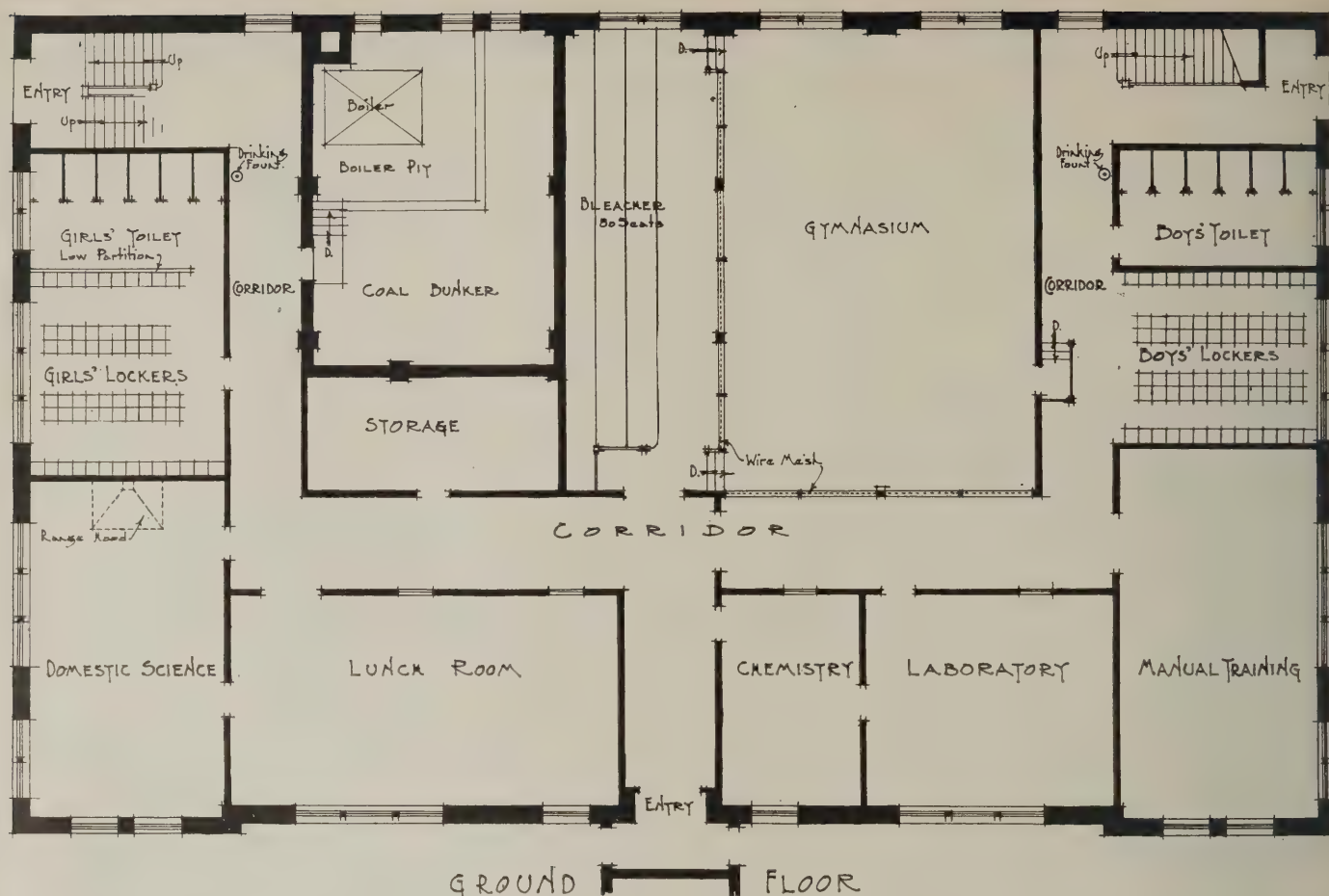
The second floor contains six class rooms



• FIRST FLOOR •



• SECOND FLOOR •



GROUND FLOOR

and the library. The superintendent's office adjoins the library and is also provided with a private toilet room.

The upper portion of the auditorium and the stage extend through this story, and a balcony is placed at the second floor level. The balcony is supported by means of cantilevers and iron rods which are hung from the trusses that support the roof over the auditorium. The spaces over the dressing rooms are utilized as a storage room in one case and as a janitor's closet in the other.

The Efficiency of Insulation Used in Cold-Storage Work

During the last few years, says the Technical News Bulletin No. 38 of the Bureau of Standards, there has been a great demand for information concerning the relative values of various materials that are used for insulation, and this has led to extensive experimental investigations in different laboratories. While a great many factors, such as resistance to moisture, inflammability, strength, durability, etc., must be considered in choosing an insulating material, the material must of necessity be a good insulator, and the measurement of its thermal conductivity is, therefore, the matter of most importance. The bureau

has developed and used for several years a very satisfactory apparatus for measuring thermal conductivity. The results obtained have been assembled and a standardized form of apparatus suitable for general use has been designed. The American Society of Refrigerating Engineers has taken an active interest in this work, so that a standard apparatus may be available, the use of which will eliminate disputes due to differences resulting from the employment of unsuitable testing methods.

It may be said that the technical difficulties which led to such discrepancies have been largely overcome, but a considerable amount of educational work is still necessary among the manufacturers and users of insulating materials in order to eliminate misunderstandings. The results of the bureau's work will be published in a forthcoming number of the Journal of the American Society of Refrigerating Engineers and will also be issued as a Bureau of Standards scientific paper.

What Is Dry Rot?

The term "dry rot," the Forest Products Laboratory finds, is applied by many persons to any decay which is found in wood in a comparatively dry situation. Thus loosely used the term actually includes all decay in wood, since wood kept sufficiently wet can not decay.

In the more limited sense in which pathologists use the term, "dry rot" applies only to the work of a certain house fungus called *Merulius lacrymans*. This fungus gains its distinction from the fact that it is frequently found growing in timbers without any apparent moisture supply; in reality it does not grow without moisture and is as powerless as any other fungus to infect thoroughly dry wood. Given moist wood in which to germinate, it is able to make its way a surprisingly long distance in dry timbers, drawing the water it needs from the moist wood through a conduit system of slender, minutely-porous strands.

Wood in the typical advanced stage of dry rot is shrunken, yellow to brown in color, and filled with radial and longitudinal shrinkage cracks, roughly forming cubes. In many instances these cracks are filled with a white felty mass, the interwoven strands of the fungus. The decayed wood is so brittle and friable that it can easily be crushed into powder.

The dry rot fungus is active in nearly every region of this country, in Canada, and in Europe. It is very destructive to factory and house timbers and to logs in storage. Coniferous or soft woods are more commonly infected by it than hardwoods.

Building a Stair--By John Y. Dunlop

ON first-class work the stairs are built as a rule with the steps housed into the side supports or stringers, and the treads and risers are either nailed through from the outside of the stringer, or are wedged and glued on the under side of the grooves into which the steps are fitted.

In cheaper classes of work many of the stairs are bracketted. That is, in place of grooving the stringer to receive the ends of the steps, a rough triangular shaped piece of wood is nailed onto the stringer and the steps are nailed to the blocks. Recently, however, this method has got very much out of fashion and only in temporary work of the roughest type are bracketted stairs now to be seen.

Another method of forming a stair is to cut out the stringers on their upper edges sufficiently to receive the steps and risers. In this way the risers are nailed to the vertical cuts, and the treads are nailed in the same way to the horizontal cuts of the stringer. This is often described as a cut stringer and is a contrivance for cheapening the work and economizing space taken up by the stringers.

The important idea in designing a stair for a small house is to obtain an easy flight of steps in the least possible size of staircase. In even the smallest house the flight of steps should always be arranged so that two persons can pass each other.

A very important point to stair builders is the relation of the tread and the riser. It is a general rule that the greater the breadth of the tread the less should be the height of the riser, and conversely the less the breadth of the tread the greater should be the height of the riser.

Several rules have been devised for proportioning treads and risers. The three following are in common use.

The sum of the tread and riser should equal from 17 to 17½.

The sum of two risers and one tread should equal not less than 24 nor more than 25.

The riser multiplied by the tread should equal not less than 70 nor more than 75.

These rules are for the dimensions of treads from face to face of risers and do not include the nosings. For ordinary use a stair having risers from 7 to 7½ inches high makes a comfortable stair.

In the most of cases where a builder is given the job to put up a new stair he is supplied with a working drawing showing exactly how the flights and landings are to be arranged, but that is the most which can be expected from the average working drawing of a stair. The breadth of the treads and the height of the risers should be obtained from the actual measurements

obtained from the building itself. The stair builders should ascertain the exact position of the first and last riser and the height of the story wherein the stair is to be placed.

Another very important point which should be examined is to see if the space in which the stair is to be built has the angles of the walls at right angles to each other. This appears a very small matter, but in cases where a stair has a few winding steps it means a lot of trouble in putting the stair in position, if the lines are not laid down in the shop to the exact angles which the walls are set up in the building.

When taking the sizes from the actual building it is a good idea to make a sketch of the plan of the space to be occupied by the stair, indicating all the doorways, passages and windows which can come in contact with the stair from its commencement to its expected termination.

The height of the story should be exactly determined and may be accurately taken on a straight rod.

Then divide the story height by the number of risers shown on the architect's plan. This gives the height of each riser and by using one of the methods just given the width of the treads may be made proportionate. Now multiply the width of the tread by the number of treads, which will give the plan space to be occupied by the stair. Make sure that this checks with the dimensions found at the building. Remember that there is always one less tread than there are risers in a stair.

Armed with these particulars we should now be able to lay down the stair to get the development of the wall stringer.

Presuming that the stair is to be built as shown in the accompanying line drawings, we, in the first place, lay down in a corner of the shop the plan of the winding steps which is partly shown in the drawing, and from this make three skeleton templates of the winding steps.

To set out both the outer or face stringer and the wall stringer we need a pitch board. This is a set square adjusted to the breadth of the tread and the riser of the step and having a distant set off equal to the distance which the solid of the step is from the top edge of the stringer.

The tread template is made equal to the combined thickness of the tread and its wedge, which is $\frac{3}{8}$ of an inch at the point and $\frac{5}{8}$ at the heel. The width of the tread template also includes the nosing.

The riser template is the thickness of the riser plus its wedge.

These three templates are used in setting out the wall and face stringers.

In setting out the wall stringers the

length may be obtained by multiplying the longest sloping edge of the pitch board by the number of steps. Then the distance from the last riser to the return stringer,—this length can be obtained from the full size drawing of the winding steps,—and finally add about 12 inches at the lower end to allow for the stringer running forward to meet the skirting.

Plane the top edge of the stringer and run down the nosing line of the steps on the inside of the stringer where the steps are to be marked off. Set a compass exactly to the length of the pitch line on the pitch board template and run the compass along the nosing line, starting about 10 inches from the lower end of the stringer.

Mark off eleven steps with the pitch board and set off the housing with the tread and riser template. Next mark the twelfth step, taking the length of the housing from the full size drawing of the winder. Then set off that part of the thirteenth step which is cut into this stringer.

In making the lower wall stringer a board will have to be jointed to the under edge to allow the last two steps to be housed in. Draw the line of the curved part of the stringer by bending a thin lath.

When stringers are cut out by hand it is usual to mortise out the nosing of the steps first and then to saw in the remaining parts of the housing with a tenor saw.

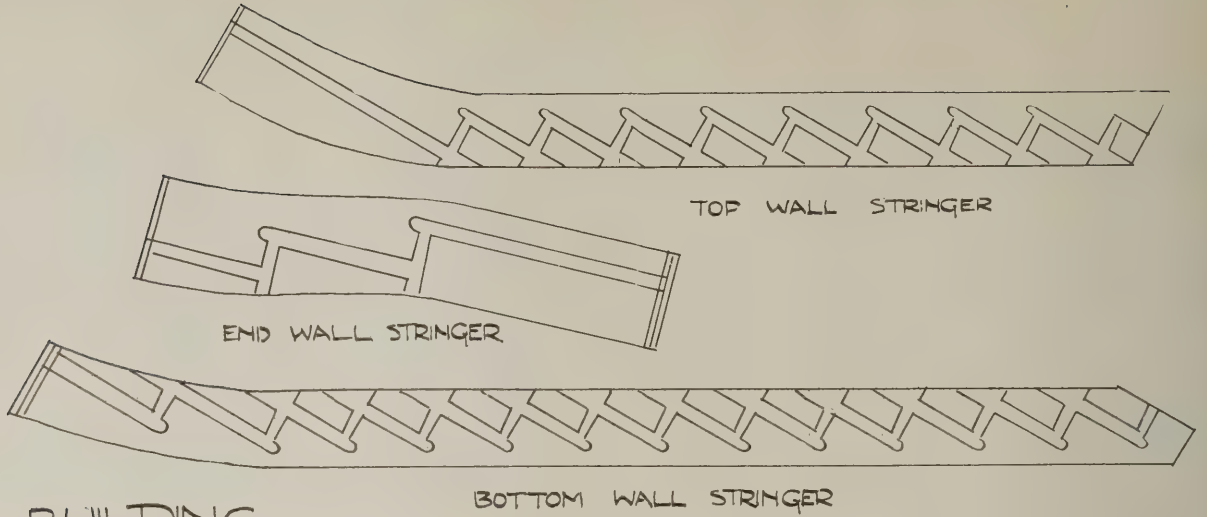
The drawings show the three wall stringers which are all drawn out in much the same way.

At the junction of the two stringers the joint is a tongued one, so that in the case of the mid wall stringer the lower end is tongued to fit into the bottom stringer while the top end is grooved.

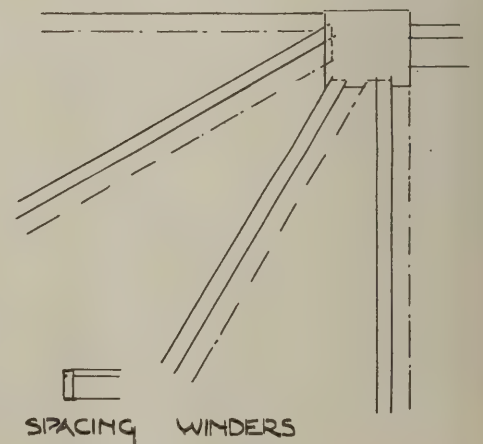
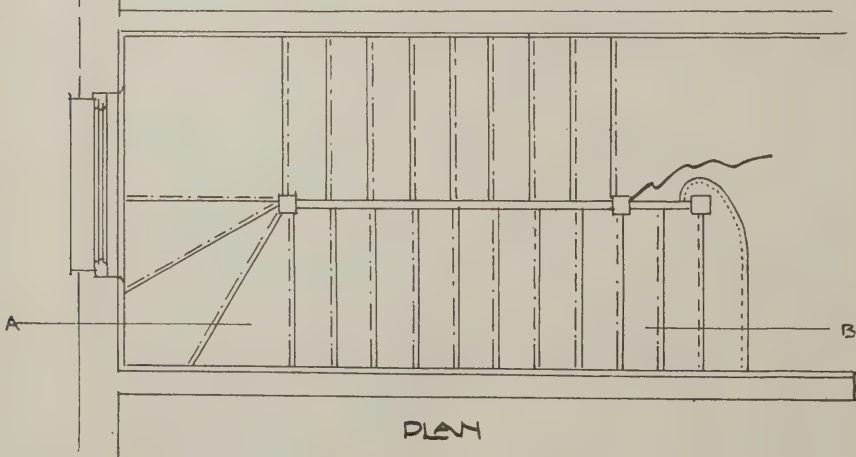
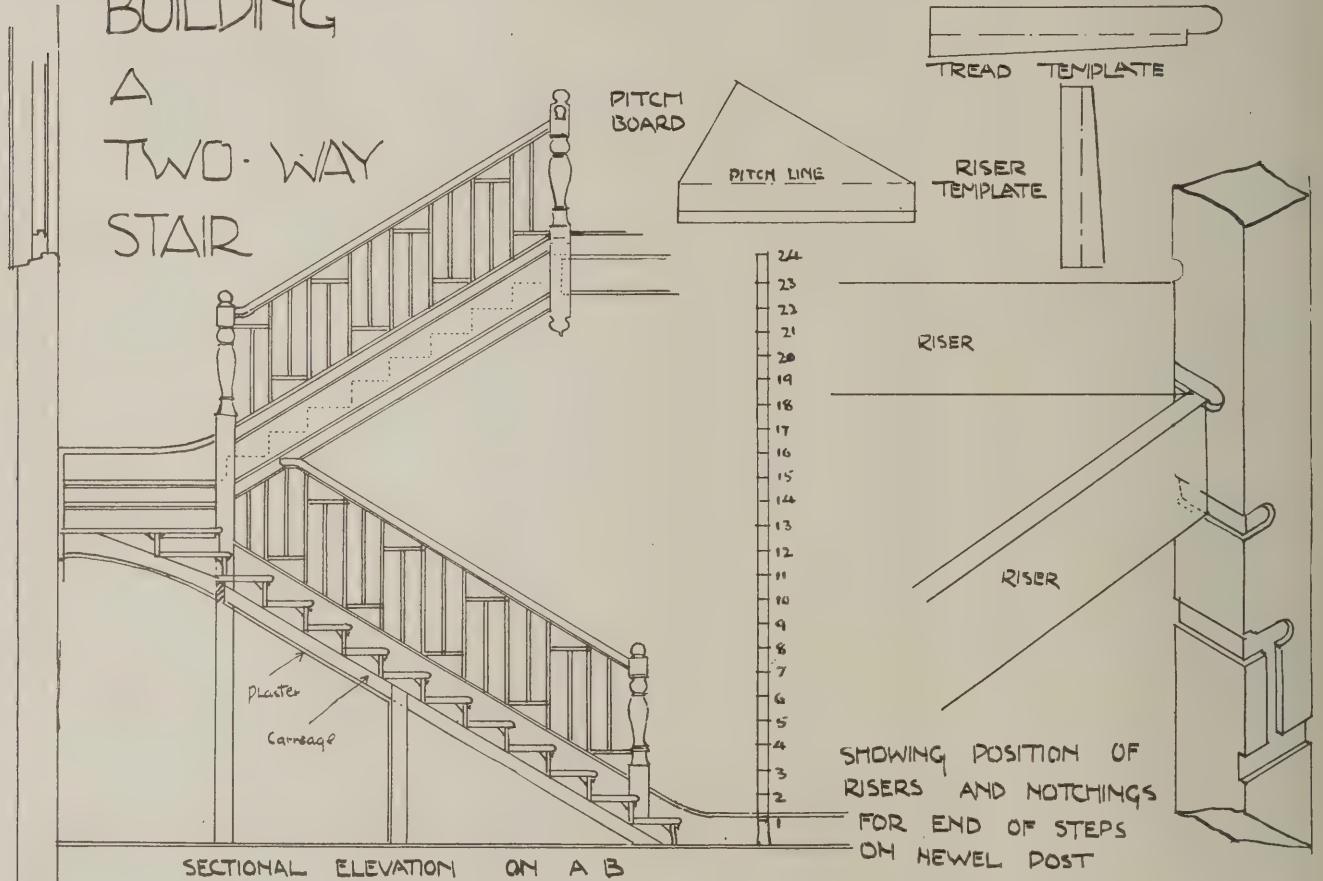
In marking off the outer stringers the pitch board is used throughout and both ends of these stringers are prepared. The outer stringers have tenoned ends so that they may be fitted into the newel posts at top and bottom.

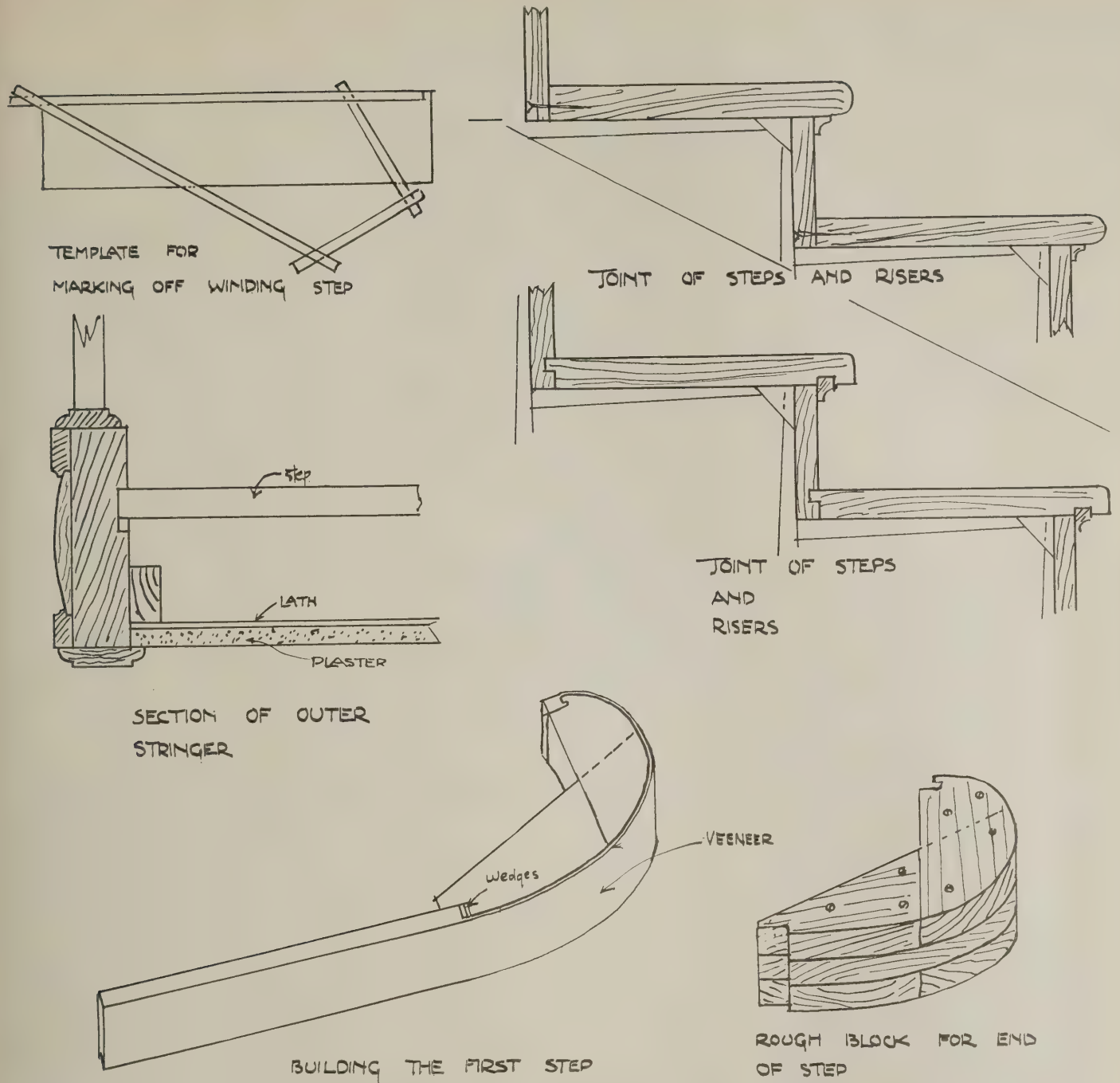
In laying out and preparing the stuff for the treads and risers, consideration must be given to the method of jointing these two members together. Two methods are shown, the top one being the method in general use all over England. The second method, which is a most desirable arrangement, is used in the better class of work.

The winder steps are cut from skeleton templates which have been made from the full size winder plan. From this same drawing the landing newel post is set off so that housings for the four radiating risers and the tapered steps can be cut



BUILDING
A
TWO-WAY
STAIR





out at the same time as the mortises for the stringers.

In erecting a stair of this type one of the first jobs is to fit the wall stringers in position on the outer wall. Usually we would securely fix the bottom stringer to begin with, while the other two stringers would be fitted in position only temporarily.

With the stringers in position, next would come the fitting in position of the bottom step. This curtail step is built as shown in the line drawing and when it has been fixed in position the newel post is fitted on the top and is usually secured by a bolt from the underside of the step into the base of the newel post. To get the nut fixed in the post a slot is cut in the back of the post at a height just suffi-

cient to place the nut in position and so that it can be tightened up with a hammer and chisel.

The next thing is the cutting of the landing newel post and the fitting together of the two newel posts and the stringer. The landing newel post also receives the top stringer so that its lower end is tenoned into the same side of the post as the lower stringer.

The newel on the top floor is checked onto the trimmer at the floor so that with the top newel in position we are able to complete the fitting of the top outer stringer and thus securely fix the three newel posts and the stringers together. This can only be done when the housings for the corresponding steps are level

across and when the top edge of the housings are level from front to back.

With the main parts of the framing to receive the steps in position three risers are cut the exact length. These are fixed in place temporarily; one at the top of the first flight; the second in line with the outer stringers and the third at the beginning of the second flight. After that comes the real building of the steps when each step is fitted in and the wedges well glued as they are driven home.

A 3 feet 6 inch step is usually glued with bevelled blocks in the angle between the tread and riser. The blocks are spaced at three points in the length of the step.

With all the steps in position comes the fixing of the molding on the under side of

the nosing and the finishing of the outer faces of the stringer which is shown in the drawing.

A stair of this type would be plastered or lined with match boards on the under side and where the soft finish meets the

edge of the stringer the joint is covered with a molded strip of wood.

* * *

Cutting Rafters

By John Upton

THE first and most common problem which the young mechanic will be likely to want to solve with the steel square, is that of cutting rafters for a common gable roof.

Suppose we have a building sixteen foot wide, and wish to put on a roof having a one-third pitch; that is, have a rise of one-third of sixteen or five feet, four inches.

is extra or outside of the building and has nothing to do with the length of the rafter except that one must allow for it in deciding what length of timber is needed to make the rafter. Then lay the square on the pattern so that the 12 on the blade and 8 on the tongue come at the edge intended for the crown or top edge of the rafter. Mark against the blade which must be

of the rafter. Mark on the tongue. This will give you the length of rafter for one foot in width of the building and you can apply the square eight times (See Fig. 3) and get the full length of the rafter. Or measure across the square from 8 to 12 and get fourteen and four-tenths inches which is the length of the rafter per foot of run. This multiplied by 8 gives nine and six-tenths feet or nine feet seven inches as the total length. Or measure from the five and one-third,—representing the rise,—across to eight, the run, and get nine and seven-twelfths inches, which taken as feet gives the same, in fact this is about the best way to get the length, using the figures for the rise and run on the square. It is well, however, to use two methods and see that they agree.

In measuring across the square do not use an old loose jointed rule but apply the square to the edge of a smooth board and mark each side, then measure between the marks with the square, and use the edge of the rule which is divided into twelfths, then each one-twelfth equals one inch.

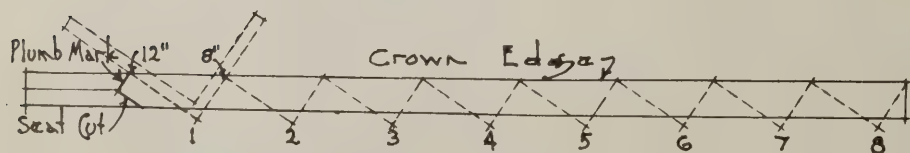
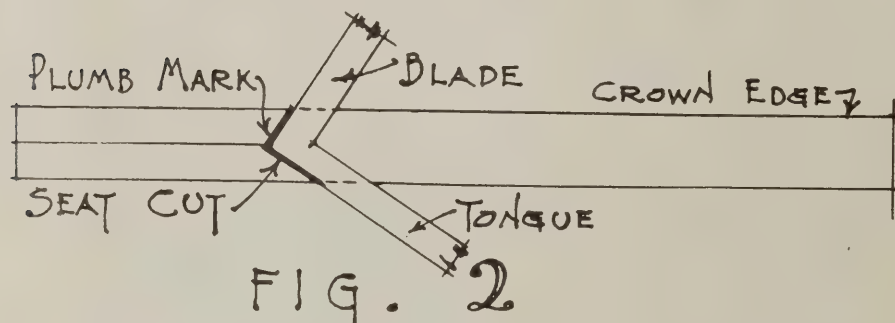
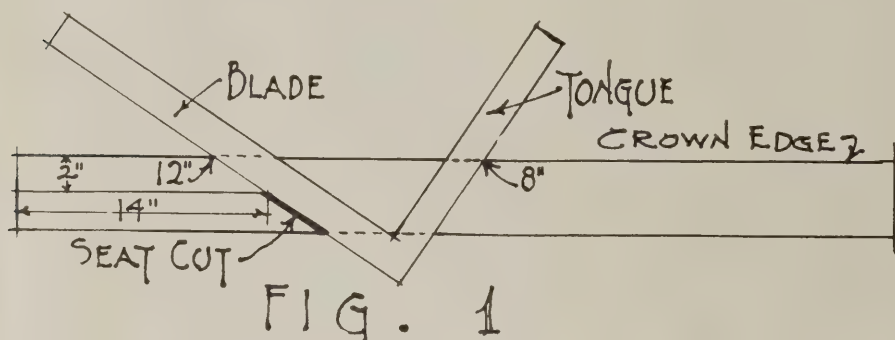
To mark the top end of the rafter apply the square as at first using 8 on the tongue and 12 on the blade. Mark on the tongue.

In case there is a fraction— $\frac{1}{2}$ inches—in the run and you get the length by applying the square as many times as the even feet, you may get the fractional part by measuring out from the last plumb line as many inches as the run is more than the even feet.

In using the pattern to mark the other rafters, use the square and mark square across the top or crown of the rafter at the plumb line instead of marking in on the side as with the pattern.

It may be well also to remember that as the top edge of the rafter starts something more than two inches above the plate the peak will be that much more than the given rise above the plate. This might make a difference in case you wanted it to come under the eaves of another building.

This gives a chance to show how much simpler it may be to refer directly to the square to get the length of the rafter than to use any other way. Suppose you have a building between two windows so it is thirteen feet wide, and after the plates are on you have room below the eaves for a roof with a rise of five feet, seven inches. You can get the length of the rafters by measuring across from six and one-half,—the run—to five and seven-twelfths, the rise.



Also as the run of the rafter is one-half of the span, the use will equal two-thirds of the run—in the present example the run equals eight feet, and as eight is two-thirds of twelve, we will use eight and twelve on the square to mark the rafters. We could, of course, use other numbers having the same ratio, as 10 and 15 or 16 and 24, but as the roof actually rises eight inches for each foot of its run, it seems more logical to use 8 and 12.

Get a straight 2x4 or 1x4 to use as a pattern. Lay the square on this so as to mark a line two inches from one edge for a distance of fourteen inches or more, for the tail or projection of the rafter. This

toward the end intended for the bottom. This mark gives you the seat cut which is to rest on the plate. See Fig. 1.

Now shift the square (see Fig. 2) so that its outside corner or heel comes where the two lines join and so that the tongue is even with the line just drawn and the blade crosses the crown edge of the rafter. Make a mark along the blade known as the plumb mark, which when the rafter is in place will run straight up just at the outside edge of the plate.

To get the length of the rafter you may apply the 8 and 12 on the square as before only moving it so that the 12 on the blade comes where the plumb line meets the edge

Selling Silos

THE successful builder must be an expert salesman, and to be an expert salesman one must have a plausible line of "sales talk." Take silos for instance. There's a lot of money in building silos and the builder who can "talk" silos to the farmers is in a good position to cash in on his knowledge.

It is of course understood that the builder should have a thorough knowledge of silo construction, but this alone is not enough. He must also be able to point out the economic advantages of silos. In other words he should be prepared to "sell the idea" to the farmer. Here are a few pointers on the advantages of a silo, that might prove of value in working up business in this line.

The largest item of expense in keeping a herd of cattle is the feed bill, and therefore, it is the first question demanding our attention. Labor comes next, but the bill is generally twice that of labor, the silo strikes directly at this overhead, making a big saving in the cost of feeding. It also produces better young stock and increases production. Practically all of the great milk and butter records of the country are held by cows that have been fed silage. Large, vigorous stock are easily



conditions enter in which make a variation in the result, but it is safe to assume that from ten to twenty-five per cent of the expense—some practical farmers affirm twice as much—can be saved in the cost of feeding a cow one year by the use of the silo. It is also safe to say that with silage, the cost of butterfat can be reduced six to twelve cents a pound, and the cost of producing a hundred pounds of milk thirty to fifty cents, a hundred pounds of beef a dollar to two dollars, and a hundred pounds of mutton nearly as much. With such saving, it can easily be figured that a silo would soon pay for itself when only a small herd of stock is kept.

The convenience of the silo is well recognized by men who have given it a thorough trial. By properly arranging the silo and the barn, it is possible for one man to feed forty cows in thirty minutes, and the work can be done with ease and without the use of a horse or wagon. The silo can be considered a time and labor saver.

The silo is the most economical equipment for the storing of forage. When space is considered, eight times more feed can be kept in a silo than in a hay mow. It would be difficult, indeed, to construct a barn which would hold two or three hundred tons of forage, while it is an easy and simple matter to put up a silo that would hold this amount. There is less deterioration in holding over silage than in holding over dry fodder. I have seen excellent silage that was six years old, and

this same silage was fed successfully to cattle, who seemed to relish it more than new silage.

The silo stands ever as an insurance against forage failures, especially damage by frost and drought. Any kind of feed which can be grown can be saved in the silo, though it may not mature a grain crop. It makes farming more secure, and warrants a cheap and excellent forage for all kinds of stock, in both winter and summer seasons.

The heavy, bulky feed on a stock farm should be produced at home, and the concentrates, such as grain and mill feed, can best be purchased. With the fertilizer, which is always found on the stock farm, big crops of forage can be grown. It is not uncommon to see fodder produce as much as twenty tons of silage per acre. This feed, grown close at home, can, in an



and cheaply obtained by the liberal use of silage.

It is difficult to determine accurately the saving made by the silo when the cost of the ration is considered, for so many con-



emergency, be rushed into the silo and the bulky ration for the year is supplied.

Silos should be provided for both winter and summer. Consider carefully the earnings of a pasture. Six times more feed can be furnished on pasture ground, if it is put in the form of corn and siloed. The pasturing of land worth a hundred dollars and up per acre is questionable, especially in sections where summer droughts are frequent. As one old farmer stated, "the summer season is more severe on our dairy cows than the winter."

It may be fortunate that our summer is



no longer, for if it were the chances are that we would force our herds dry or starve them to death. The summer silo in many sections is needed more than the winter silo. It is better to build two or three small silos than one big one. Like canned fruit, make your silos so you can feed off a good layer each day and thus keep the forage fresh and sweet. "Why should I build a silo?" can be answered by considering all of these items; consider the cost of feeding an animal; the cost of production; the cost of land, the earning power of the farm. Scientifically stated, the silo will lower the cost of digestible carbohydrates, it will make a farm earn more; stock will earn more; work will be easier, storage capacity greater; the production of the cows higher, the farm richer. With these advantages the farmer will derive more pleasure and profit from his labor.

Pipe Fittings and Bricks

Pipe fittings will stand a lot of rough treatment, but they are too expensive to invite breakage by being thrown around like bricks.



A plumber can waste a lot of time searching through a miscellaneous assortment like this before he finds the fitting that he wants. Thieves, however, would have "easy pickings." These fittings should be sorted and stored in a supply shed.

Side Porch Converted Into a Sun Room



A porch g. and

In addition to a more or less publicly exposed front porch, this house possessed, as originally built, a small and more private porch on one side. It was finally decided, however, that a sun room would prove the more enjoyable, even in summer, and would be especially practical for the winter. Accordingly, since it already possessed a boarded-up railing, the change from a porch to a sun room only entailed the work of enclosing the space with glass or windows. These windows, incidentally, are so designed that they may be removed entirely and stored away during the summer, or slid in grooves so as to permit a free circulation of air. The porch or room is also screened in. Furnished in wicker, the place is especially enjoyable as a lounging retreat, and for serving afternoon tea, or even meals.

Drying Periods of Various Woods

Conservative figures to use in estimating the kiln output possible with various woods are given in the following table prepared by the Forest Products Laboratory. Drying time as here given is not limited by the type of kiln, but by the physical behavior of the wood. Any dry kiln in which the circulation is adequate and the temperature and humidity are properly controlled should produce in the time specified material of high quality, free from visible degrade, if not quite equal in strength properties to air seasoned stock.

For stock over 1 inch and not more than 3 inches thick the drying time is proportional to the thickness. For example, 3-inch stock requires 3 times as long to

to a sun room the figur

dry as 1-inch stock. Quarter-sawed stock requires from 25 to 35 per cent more time to dry than plain sawed. Drying to 10 or 14 per cent moisture content takes from one-fourth to one-third less time than drying to 6 per cent.

Approximate time required to kiln dry, under mild conditions, one-inch plain sawed green and partially air dry stock to moisture content of six per cent, based on weight of dry wood

Species	Days drying time—	
	Green from the saw	Partially air dry (25 per cent moisture content)
Hardwoods		
Swamp oak	45 to 50	20 to 25
Northern oak.....	30 to 40	17 to 20
Walnut, Cherry	22 to 30	13 to 15
Mahogany, Beech.....	16 to 22	9 to 12
Tupelo, Gum	20 to 26	10 to 14
Birch, Ash, Sycamore	15 to 21	9 to 12
Poplar, Basswood, Chestnut, Butternut, Elm, Cherry.....	8 to 10	4 to 6
Maple, Hickory	17 to 23	9 to 13
Conifers—		
Western larch	9 to 12	4 to 6
Cypress, Redwood.....	10 to 18	6 to 8
Douglas fir, Yellow pine, Incense cedar, Spruce	4 to 6	3 to 4

Knew What Was Coming

"You remember the real estate men who used to advertise that buying your own home was better than paying rent."

"Yes."

"Well," they certainly knew what they were talking about, didn't they?"—Detroit Free Press.

Questions and Answers

Architects and Builders are Invited to Contribute to this Department Either by Asking Questions or Answering Them. National Builder Will Pay for Answers to Questions Asked and for Better Answers from Wider Experience

Brick Construction in Holland

A subscriber in Amsterdam writes regarding the article on "Bond and Decoration of Brickwork," by John Y. Dunlop, in the March issue of NATIONAL BUILDER. This is what he says about Mr. Dunlop's sketches and description of English methods.

We, the Dutch, have a different way in bondmaking than described and shown in the sketches. The Dutch are famous in all their work, almost every building being erected with brick, some very plain, others



1

very elaborate and ornamental. Brick making and brick building are therefore national, and owing to the very wet climate and low lands, the best adapted material for all buildings, small or large.

In the first place, Mr. Dunlop describes the English bond, using a closer immediately after the first header. This is, for us (the Dutch) a wrong way. This bond was used here perhaps hundreds of years ago, at least in some very old buildings it can be found. In later years, and now, a better bond is used, a bond easier to make,



2

and to my idea stronger and even more pleasing.

The English bond (we call it cross bond because it forms a regular cross) is here made with whole, half and three-quarter bricks, the smaller part of a brick, or closer, being a full header. The corner made in this bond is the strongest. Sketch

No. 1 shows how English or Cross bond is made here, the overlapping or bond being regular and uniform.



3

The corner or starting place of the course is always formed by a full header in the header course, and with a three-quarter brick in the stretcher course. For instance, the first course is started with all headers, the second course starts with a three-quarter brick and is immediately followed by a full header or closer and then continued as stretcher course. The third



4

course is started and continues as all headers, the same as the first course. The fourth course is started with a three-quarter brick and continued with stretchers. The fifth course is again all headers, the sixth course is again the same as the second course (see sketch).

This bond can easily be made by using the following rule: "Every fifth course must start with a three-quarter brick and immediately followed by a header or closer."

The bond made this way gives a stronger corner, is more regular in overlapping or bond, and has the big advantage that the corner can be worked up to height at advantage, leaving a backwardly falling overlapping or tooth as it is called here of uniform size. (See dark line in sketch No. 1.)

The closer used in the sketch of English bond by Mr. Dunlop has an ugly appearance and gives the idea that the brick mason came too short and just filled the opening with a hat. We Dutch, at least, have this idea.

Another bond, also used in the country, and which has almost the same appearance as English bond, here called standing or



5

upright bond is given in Sketch No. 2. In this bond the closer is omitted, the overlapping or bond not being as regular as in cross bond. (See dark line in Sketch No. 2.)

In Flemish bond here used, the closer is also omitted, all corners are started with a header or three-quarter brick. Flemish bond is used where both sides of the wall are to be pointed or jointed (Sketch No. 3).

Common bond, here called half brick bond, is alone used in half brick work or wall. Headers are never needed. (Sketch No. 4).

Good and substantial brick work is always made in cross bond. In some cases standing or upright bond is used. Flemish bond is used for garden or so-called fence walls, in which case both sides of the wall are treated as face work and jointed. For light piers Flemish bond is often used as shown in Sketch No. 5.



6

In Sketch No. 6 is shown how the corner is formed in good cross bond. All face work or, as we call it, "Clean Work" is raked out, washed with muriatic acid, rewashed with water and then jointed, which gives a clean and very good looking job.

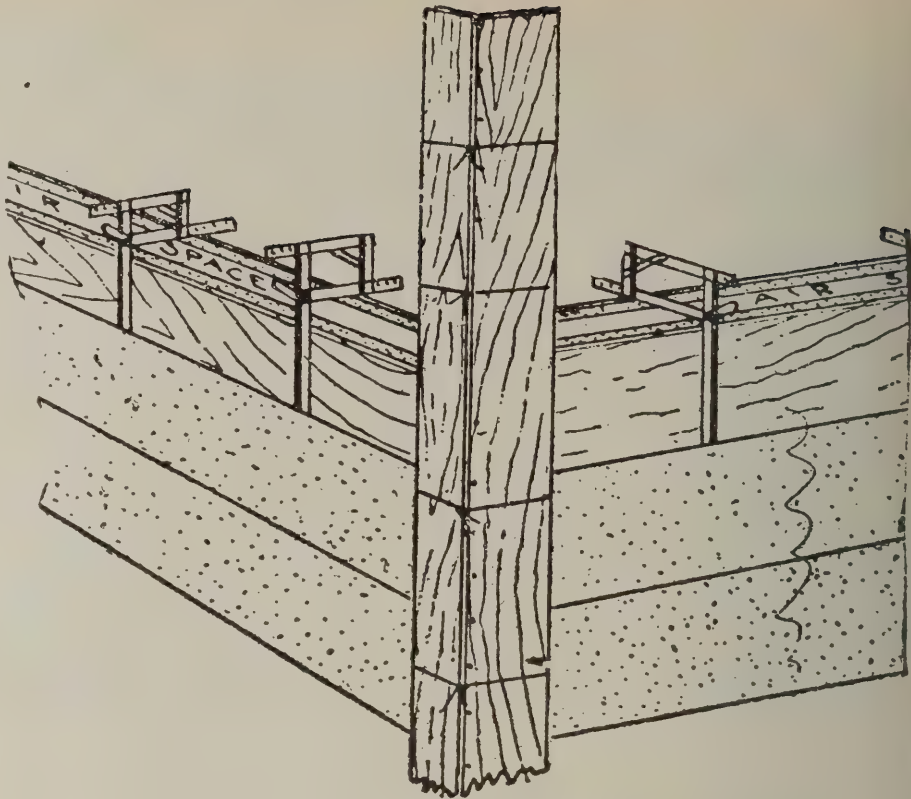
Duplex Wall Construction

The accompanying illustrations show a system of double-wall concrete construction invented and patented by D. C. Patterson, of Omaha, Nebraska.

The value of a dead air space in walls is too well known to merit explanation. A novelty of this system, however, lies in the fact that basement floors are also made with an air space between two slabs, thus increasing their resistance against moisture.

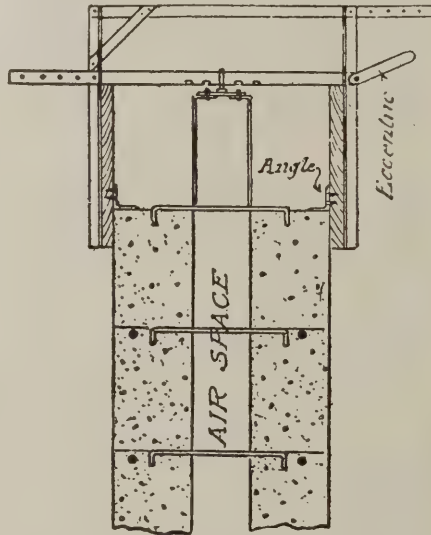
It is claimed that this system is not expensive, but really reduces the cost of building.

The illustrations show the essentials of this type of construction. It is built by placing a 12-inch plank inside and outside. Between the planks is placed a No. 14 sheet metal core, four feet long by nine inches deep, and adjustable to suit any desired thickness of air space and of duplex walls. The concrete is tamped in place, and the core is then raised and



Forms and plumb board at corners

moved forward. After each course is completed, galvanized steel anchors are laid across the wall every two feet and steel rods placed horizontally along the walls.



Adjustable clamp in wall

Vertical reinforcing rods may be used when desired. It is claimed that a crew of five men with a power mixer can build 400 feet of wall daily, or say 3 to 4 courses on the average house.

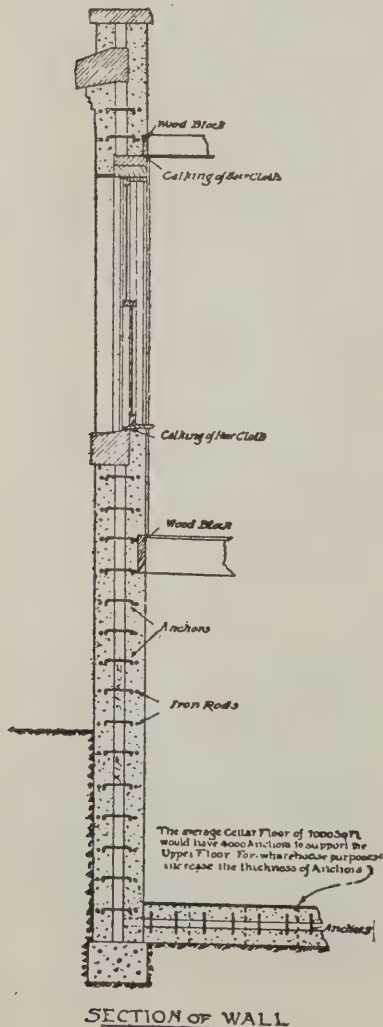
It is said that the inventor offers the free use of the process to churches, school boards and hospital committees, and also to owners of dwellings destroyed by war.

Careless Truck Drivers

An estimator always includes an allowance for breakage or waste, but when materials are carelessly treated by workmen the percentage of waste often becomes unduly large.



Portions of this pile of hollow tile have been used as a driveway by careless and indifferent truck drivers, even though there is apparently about 40 acres of clear ground to drive on. The result is that the proportion of breakage is already away out of proportion and is constantly increasing. A few more trips and this tile will apparently figure as a substantial loss.



The average floor of 1,000 square feet would have 4,000 anchors to support the upper floor

An "Ocean Wave"

Last spring the Franklin Outing Club, Franklin, Illinois, built an "ocean wave" at their club grounds for the entertainment of the children of the members and their guests, but as there were no restrictions as to the age of the riders on the swing, it soon proved that the older people almost



Making an "Ocean Wave"

took possession. The fixture was designed and built to carry riders in "all-the-traffic-will-bear" style, and at one time thirty-three youngsters were counted on the swing at one load. Once a baldheaded club member rode so long at one stretch that an interested bystander suggested that the elderly gentleman was trying out the swing to see if the dizzy feeling he might have when he got off would in any ways solace him for the dry state of our country.

This circle swing was made of material obtained locally and can be duplicated almost anywhere. The post is a piece of clear fir 8 in. by 8 in. by 16 ft. of which 12 ft. is above the ground level. The post hole was dug 20 in. in diameter and concrete was placed at the bottom to form a footing, then dirt was tamped in to within about a foot of the surface. The rest of the filling and the collar about the post is concrete. Plenty of wire reinforcement in the concrete at the ground level prevents cracking and pushing away from the post, as there is quite a strain at this point when there is a full load on the swing.

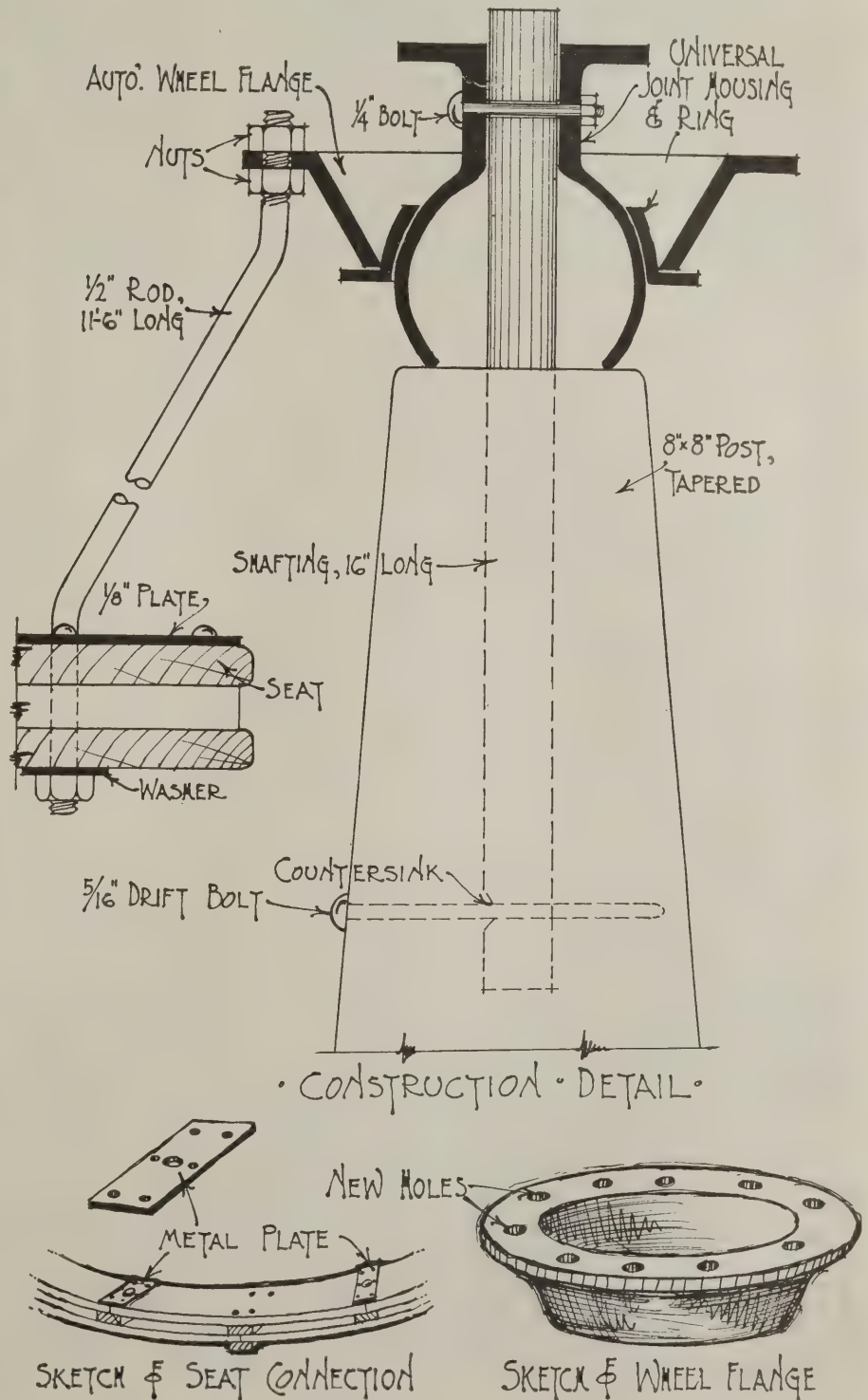
The "head" or the joint that allows the rotary and oscillating motions at the same time and carries the entire weight of the swing and load, was made of the "universal joint housing and ring" from a common Ford, a part found in almost any junk pile back of a Ford garage. The flange on this Ford part is too small to bolt the long seat supporting rods into, so an old wheel flange from a Studebaker car was cut off

and fitted over the Ford part. The wheel flange had a rim that was just right in which to drill the necessary ten holes for the $\frac{1}{2}$ -in. rods. The detail drawing shows the arrangement.

The circular seat or ring 36 ft. in circumference and 8 in. wide is supported by ten $\frac{1}{2}$ -in. round iron rods 11 ft. 6 in. long. By making the seat double it was possible to break joints and make the whole out of material easy to get. The twenty segments required for the seat were cut from $\frac{3}{8}$ in. by 12 in. selected pieces of yellow pine. The ends of the ten top pieces come

under iron plates $\frac{1}{8}$ in. by 3 in. by 8 in. and a supporting rod passes through the exact center of this plate, down through one of the 3-in. spacers, and then through the center of a lower segment. The rod passing through the center of the lower segment breaks the joint above and makes the whole ring so built up strong but flexible. The iron plate has a $\frac{5}{16}$ in. hole drilled about $\frac{1}{2}$ in. from the side and end at each corner and a hole the same size $\frac{1}{2}$ in. from the edge at the center of each side, making six holes in all for bolting.

As there are half of the twenty seat



boards on the lower half of the ring the ten best pieces can be selected for the top and the edges carefully rounded to save wear and tear on the riders. The spacing blocks and the inner surfaces of the segments should be painted before assembling as there is no way to get paint on them afterward. A good grade of auto paint, brewster green, made a durable finish on the swing illustrated. The post was painted vermilion.

The $\frac{1}{2}$ -in. iron rods were purchased from a mail order house in lengths of 14 ft., cut to the required 11 ft. 6 in., and threaded back $1\frac{3}{4}$ in. on each end. About 2 in. from the top end and 4 in. from the bottom end the rod was bent enough so that when the swing was assembled the rod ends would be perpendicular to the parts through which they passed. Bore a $\frac{5}{8}$ -in. hole in the end of a piece of hardwood, making the hole about 2 in. deep. Slip this tool over the threaded end of a rod and it is easy to make the required bend. When one end on each rod is bent correctly use a hole 4 in. deep and bend the lower ends of the rods, laying the rods on a flat surface to be sure the bends come in the same plane.

A piece of steel shafting the exact diameter of the hole in the Ford part and about 16 in. long keeps the head joint on the post, and a $\frac{5}{16}$ -in. by 5-in. bolt as shown in the drawing keeps the pin from turning in the post. If the hole in the pin is counter-sunk with a large drill the bolt will pass through it easily. There should be a pin through the stationary piece of the Ford part and the piece of shafting also.

It will be easy to assemble the seat ring if at each joint but two holes are bored and bolts are placed in these holes only loosely until the whole circle is so bolted up. Then go back, bore all holes and place all bolts. Do not bore the $\frac{1}{2}$ -in. holes for the ten rods until the ring is com-

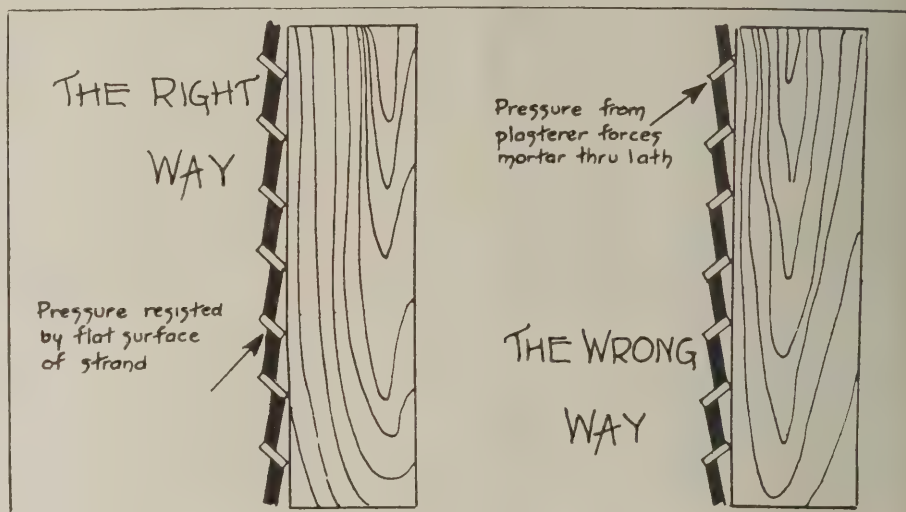
pletely bolted up, then the boring or drilling will not spread the segments apart.

If the swing is on slightly uneven ground care should be taken to see that the post is above ground an inch or two more than the distance from the outer bottom edge of the ring up to the head, measuring along a supporting rod. This is so that the ring will not strike the ground when swung up close to the post.

The parts required are: a post at least 8 in. in diameter and 16 ft. long, and of good stiff material; the Ford parts for the

How to Place Metal Lath

Waste of plaster will result where metal lath is applied in the wrong way, notes the Metal Lath News. Where the strands do not dip down and away from the workman as he applies the scratch coat a myriad of knife edges is left for the plaster every time an upward stroke is taken. The illustration is explanatory of this. Metal lath is made in many designs but the principle involved is the same in all.



Metal Lath

head; ten $\frac{1}{2}$ -in. by 11 ft. 6 in. round iron rods; thirty $\frac{1}{2}$ -in. nuts and ten $\frac{1}{2}$ -in. washers; a piece of steel shafting the diameter of the hole in the Ford part and 16 in. long; ten iron plates $\frac{1}{8}$ in. by 3 in. by 8 in.; thirty wood spacers $\frac{7}{8}$ in. by 3 in. by $\frac{7}{8}$ in.; twenty seat segments cut from $\frac{7}{8}$ in. by 12 in. stock to pattern; sixty $\frac{5}{16}$ in. by 3 in. carriage bolts and forty $\frac{5}{16}$ in. by 4 in.; forty $\frac{5}{16}$ -in. washers; necessary paint for three coats.

Crane Hoists

A crane hoist is useful on almost any job, but especially so for work on which it does not pay to set up a power hoist. In these photographs crane hoists are being used to lift barrows of mortar to the second floor. A cable sling is rigged for attaching the barrows to the crane. Crane hoists are also useful for lifting framing timbers, lintels and other heavy materials into place.



Crane Hoists

Concrete Roofing Tile

Concrete roofing tile is comparatively new, and is one of the evidences of the movement to overcome the cost and delay of transportation of bulky or weighty materials by having such materials as far as possible produced in the vicinity. The concrete tile industry developed out of the

Hydrated lime used in the proportions you mention is an effective waterproofing agent. Many authorities consider it the best. But hydrated lime alone will not make a waterproof job. The cement, sand and gravel must be proportioned to give the maximum density. True enough, a 1-2-4 mix is usually the proper one, but the grading and the character of sand and gravel

"mushy" consistency so that it will flow to all portions of the forms and readily produce a compact mass.

As a further precaution it is frequently advisable to lay a 3- or 4-inch porous tile drain around the outer edge of the footings and connect it with a dry well or to the sewer. In such cases the backfilling around the walls should be of broken stone or



The roof surface though uniform has a pleasing irregular character



There is no essential difference in appearances of tiles made of cement and those made of clay

efforts of contractors to provide a substitute for clay tile. The experimenting to provide pleasing and durable colors have been successful in the development of permanent standard hues in red, green, gray and brown. Machinery has been devised to make all special shapes for any form required to complete a roof, and standard specifications have been drawn up under which more than 1400 roofs have been covered and with orders books ahead by one concern. The size of the tile is 9 inches by 14 $\frac{3}{4}$ inches. The illustrations show two of the houses roofed with this tile.

Concrete Basement

F. H., of South Dakota, asks these questions:

What sizes of reinforcing steel would you recommend for the basement shown in the sketch, and how should it be spaced?

Will 1-2-4 concrete mixed with about 50 pounds of hydrated lime to the cubic yard make a waterproof job for the above?

From the limited data given by the sketch your reason for using reinforcement is not clear. Even a wall as thin as eight inches should be safe for the load imposed by an ordinary building. If your purpose is to reinforce the wall against shrinkage and temperature stresses, it is suggested that you use $\frac{1}{4}$ - or $\frac{3}{8}$ -inch round rods placed near the middle of the wall and spaced from 18 to 20 inches apart both ways, forming a sort of gridiron or grillage. These rods should be placed throughout the wall, above as well as below the grade.

often varies greatly, and on important work the proper proportions should be carefully determined for each case. The presence of dirt or other impurities in the water or other ingredients often causes porous concrete. Improperly bonded concrete also is the cause of porous layers or cracks. This is caused by interruptions during the placing of the concrete, such as those which occur between the period when work is stopped for one day and begun the next. Even an hour at noon on hot days has caused improper bond between layers of concrete. To avoid this fault make an effort to pour all of the concrete below grade in one day. If this is impracticable, pour each section of wall complete before starting another, and be careful to remove all scum (laitance) from the surface before depositing fresh concrete. Also roughen the surface of the old work,—using a pick if necessary,—and wash the surface with a hose to remove dust and so forth. The concrete should be thoroughly mixed and should be of a

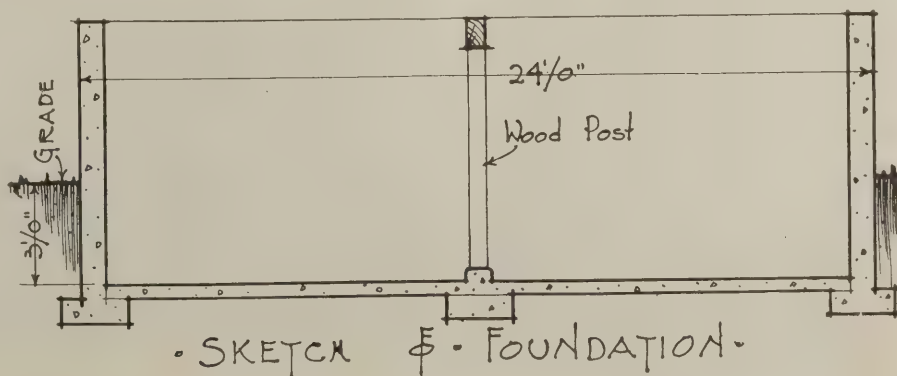
gravel so that the water may be led to the footing drains.

Putting on Siding

I want to tell you about a little stunt I figured out about putting on siding. I am young in this business—contracting and building—and probably my stunt is old to some. However, I never heard of it or saw it done.

Where metal corners are used, I first side up the ends of the building. Then to have the sides match the ends, I stretch a string tightly from nails driven under the edges of the end siding at the corners. Then I tack nails to the side walls about every four feet, just so they touch the string. I drive the nails on top of string so the string cannot get under the siding when putting it on. Then I have my siding boards squared at ends and put them on so they always rest on the nails. As the nails are in a straight line the siding has to be straight.

This stunt is especially good on long



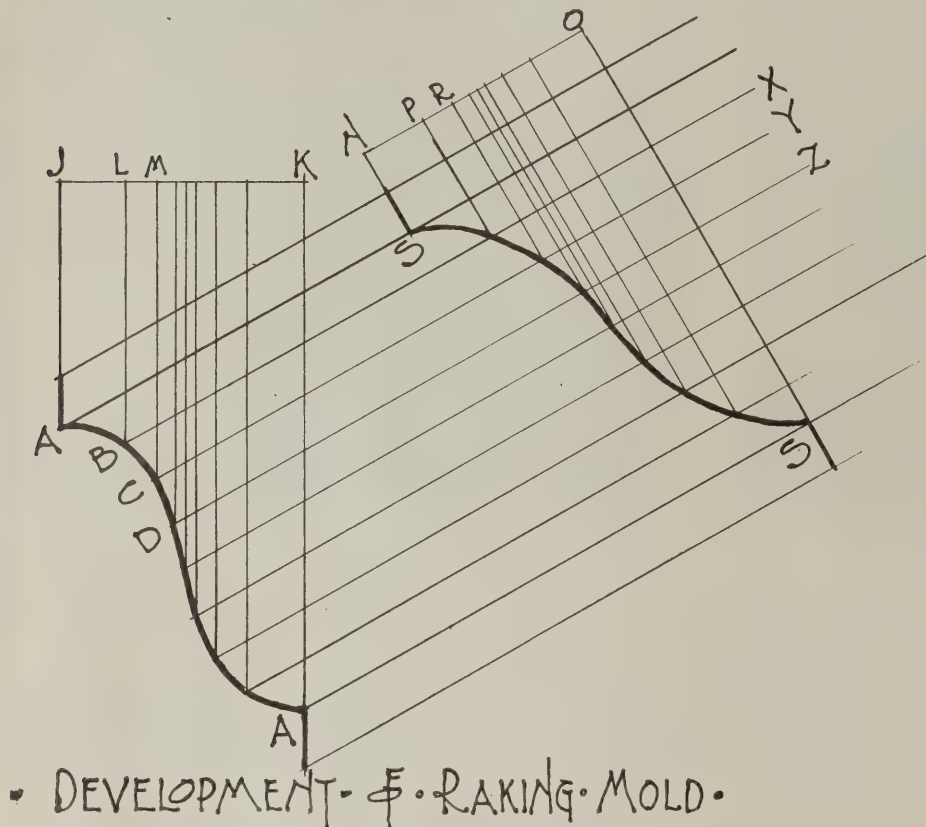
stretches with no openings, or for one man. Where two men are working together, one goes along and fits the joints together while the other follows up and nails. When one course is done, move string up to next end siding boards, and so on. The boards

horizontal line J-K, cutting these verticals as at L, M, etc.

Somewhere above the top line of the slope, draw the line N-O equal in length to J-K and parallel to the slope. On this line locate the points P-R equal to the

points L-M of the line J-K. From these points drop perpendiculars to the lines B-X, C-Y, etc.

The intersections thus found will locate points through which is drawn the curved line S-S which is the contour of the raking mold required to miter with the cave mold A-A.



you are putting on always rest on top of a row of tacked nails.

Try this once and don't forget to "speed up."—W. E. B., South Dakota.

Miter for Raking Molds

J. B., of South Dakota, wants to know how to make the cut in a miter box to miter a raking mold on a third pitch roof with the eave or crown mold.

Answer.—It is not possible to miter two members of the same size or shape one of which is horizontal while the other is sloping. In order to form a perfect miter, the raking mold must be developed as indicated by the sketch. This method will work on any pitch and for any type of moulding.

Lay out a contour as at A-A showing the true shape and position of the horizontal or eave mould. Divide the contour into several equal spaces as B-C-D, etc., drawing the lines, B-X, C-Y, D-Z, etc., parallel to the desired slope.

Then draw verticals, as A-J, B-L, C-M, etc., from the points B-C-D, etc. Draw a

Fifty Years of Contracting

The accompanying illustration shows the shop of W. T. Alexander, a Kansas City builder, who has been actively engaged in contracting since 1870.

For the past eight years Mr. Alexander has largely confined his work to jobbing work in the down town district of the city. He has installed a work shop which includes a wood working machine and a separate saw rig, both of which are driven by a 7 h. p. electric motor. With this equipment he keeps several men busy throughout the year making special furniture for offices, shelving, counters, partitions and so forth. He also does all kinds of special repair work from the foundations to the roofs of buildings.

Mr. Alexander says that his greatest difficulty arises in trying to match old materials such as hardware. Most of the old patterns are now discontinued and it is usually necessary to replace all of the old fittings with new ones. He says that probably the most useful material in his shop is wall board, and that he finds new uses for it almost every day.



Interior of the shop. Mr. Alexander, 50 years a contractor, is the figure in the right foreground

Reinforced Concrete Girders

As the use and design of reinforced concrete becomes better understood its applications become more frequent. Only a few

tions of it, if used, will result in poor concrete. The torn sacks have no refund value, and nowadays when sacks are charged against the builder at anywhere from 10 to 25 cents apiece. This loss alone is worth considering.



Reinforced concrete girders

years ago, cast or wrought iron was used for lintels or girders; then steel largely supplanted those materials, and now we have reinforced concrete encroaching on the use of steel even on small jobs.

The accompanying photograph shows a reinforced concrete girder and column system being used to support the wall over the show window openings on a small store building. A short while ago only a structural steel girder would have been considered appropriate for such a condition.

Dumping Cement

Here is shown a truck load of sacked cement that was carelessly dumped on damp ground. Several of the sacks were broken by the rough handling and their contents spilled. A considerable portion of this cement will be a total loss; other por-



Dumping cement

Saw Rigs

A saw-rig on the job will usually speed things up remarkably. If properly handled it will save its cost in a few weeks and will result in good work and lots of it. Some builders object to them on account of possible danger to the man, but if the machine is properly housed in as shown in the photograph, there is slight danger of accident.

Shooting Duck Ponds

Everybody knows what you mean when you say you have been shooting ducks, but most people look at you blankly when you tell them you have been shooting duck ponds. You shoot ducks with powder and shot, but use dynamite for shooting ponds.

Last fall the Crane Lake Gun Club of Mason City wanted five duck pools and a connecting ditch on their shooting grounds. They couldn't get labor to dig them in the good old-fashioned way, so they employed me to blast them out with dynamite. It took 1300 pounds to do the job.

After staking out the pool sites, I put down three rows of bore holes parallel



Saw rigs

to the long side. The two rows on the sides were located three feet in from where we wanted the water's edge to be. The middle row was three feet from each side row. The holes were eighteen inches apart in the rows. The holes in the side rows were three feet deep; in the middle row, three and a half feet deep.

The dynamite was loaded one pound in each hole in the side rows; a pound and a half to the hole in the middle row.

The holes, after being loaded, filled with water so no tamping was necessary.

The detonation was by propagation—a method that is only practical in wet, heavy soil. That means a central hole was loaded with a charge of straight N. G. dynamite, containing a cap and fuse. The shock from the discharge of the middle charge

fires the charges in the other holes. Only straight nitroglycerine dynamite can be used for propagated shots. Other kinds of dynamite are not sensitive enough to be used that way.

The pools were about seven feet deep in the center and 14 to 16 feet wide. The sides were very even and uniform, as very little of the mud shot up into the air fell back into the hole.—Charles M. Patterson, Illinois.

Wedge Tools

No workshop can afford to be without a good supply of steel wedges. Their uses are innumerable, and as the writer has had some experience in the use of them he can testify that the collection shown in the accompanying sketches will prove of great value when doing remodeling or demolishing. Any mechanic can make up three or four of each of these

With this type of wedge it is possible to drive in the split wedge a distance and then drive in the center solid wedge, and it really proves a way of using two wedges in one place where it is sometimes imperative to get more wedging in without taking out the first wedge. The old scheme of driving the first wedge, then blocking the work with a filled piece so as to remove that wedge and allow the next thicker one to be used is done away with when using this double wedge.—F. H. Sweet.



Wooden gutters

Wooden Gutters

Wooden gutters formed in one piece are coming into much favor, especially on large housing projects, where they have been used with considerable success.

They may be had in several styles, with cgee, cove, quarter-round and other mouldings worked on the face.

The accompanying photograph shows a stack of wooden gutters ready for use on a housing project.

types shown. They should be made of a good grade of steel—old wagon axles furnish good stock. I have found that slow thin-taper wedges are most successful and most powerful. A quick thick-taper wedge is hard to start and of little use.

The special bolt wedge shown in Figure 1 is perhaps the most useful of all. A size for each bolt is needed. A wedge of the writer's own design and one that is extremely useful is that shown in Figure 2—a split wedge or male-and-female wedge.

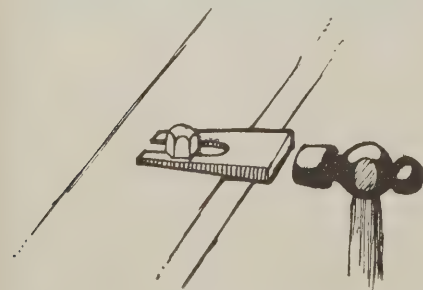


FIG. 1- BOLT WEDGE

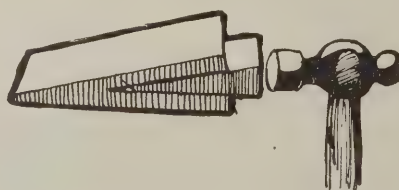


FIG. 2- SPLIT WEDGE

LONG, TWIN WEDGE WITH HANDLE

FAN WEDGE WITH HANDLE

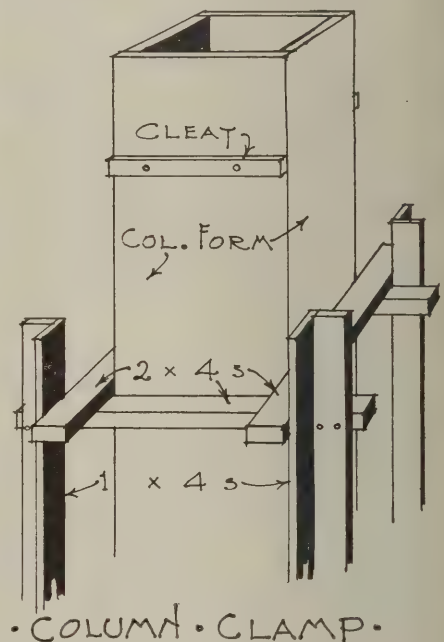
SHORT 2-WAY TAPER

ROUND NOSE, ELL HANDLE

Wedge tools

Concrete Column Clamps

Reading NATIONAL BUILDER the other day I saw an article on how to fasten the forms for concrete columns. Of course the correspondent is right about it taking a lot of time to fasten the forms together with ordinary wooden bands and wedges, but I have a method which makes a strong and sound job and takes only about one-fourth of the time used in doing this work in the old way.

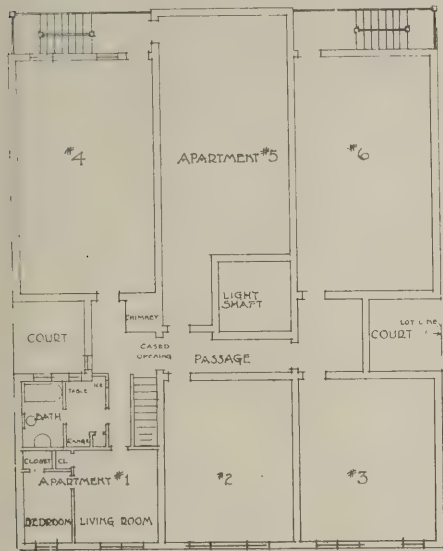


In the accompanying sketch the column forms are made with 2-inch lumber and 1-inch cleats are nailed to them as shown in the upper part of the sketch. The cleats should be from 18 to 24 inches apart according to strength required. Two by fours are then placed on top of the cleats as shown in the lower part of the sketch. The ends of the two by fours should project about nine inches beyond the column. One by four battens are then nailed close up in the angles of the two by fours. In the sketch, the one by fours are made short to make the drawing clear; in practice they would, of course, be in one piece extending from ring to ring.—A. Schofield, Cleveland, Ohio.

Planning Two-Story Store and Apartment Building

A Detroit builder submits sketch plans for a two-story store and apartment building, and asks:

"Which is best, Plan A or Plan B, for my 60-foot lot in the city? I wish to put three stores on the street floor and five or six flats above. Our building code provides for the following:



Plan A

"(a) Separate front and rear entrance for each flat.

"(b) One (living) room must have at least 150 sq. ft. (each apartment).

"(c) Bed rooms to have at least 80 sq. ft. floor area.

"(d) Bath rooms to be not less than 6 ft. wide; 36 sq. ft.

"(e) No regulations for kitchenettes.

"(f) Second floor bath rooms may be lighted and ventilated by means of skylights.

"(g) Light courts must contain not less than 10 sq. ft.; side courts may extend 5 ft. to rear of building."

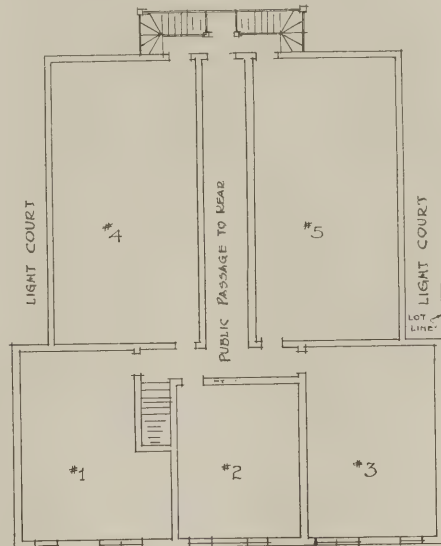
Answer—The above code is not so severe as in many cities and should be taken as a reasonable attempt by city authorities to provide healthful, sanitary living quarters for citizens.

Plan A is along the lines of an "apartment hotel" in which there are two entrances and all apartments open from a general corridor, as in hotels. This kind of a building is permissible according to many building codes, when the walls of each apartment are of hollow tile, magnesite, gypsum or other fireproof material. It is not the best arrangement for this lot, however, because there would be such a low rental value on the rear flats. Only the poorest families would be willing to live in rear apartments lighted solely from a rear yard unless the latter was of considerable size, contained a garden, or had an unusually pleasant outlook.

Plan B should yield more gross rent because the two rear flats are also lighted from the side and would prove more popular with tenants than the rear flats of Plan A. The passage between the two rear apartments is to give access from the rear, to the three front apartments.

Plan B, however, would appear to violate the building code mentioned because there are not "separate front and rear entrances to each apartment."

Plan C, "apartment hotel" type in which all apartments open from a general corridor might work out satisfactorily. This provides for an entrance court (or enclosed vestibule) at both sides of the (two) stores. The court gives access to a side entrance to the apartments above. This



Plan B

scheme cuts off a portion of the store frontage but would seem to have some advantages over Plans A and B because there would be no outside rear stairs to cut off light from the rear apartments. The main staircases would be both "front and rear" and no other staircases would be required. In this case the building should be what is known as "fireproof" construction and the two staircases should be ample in width (at least 5 ft.)

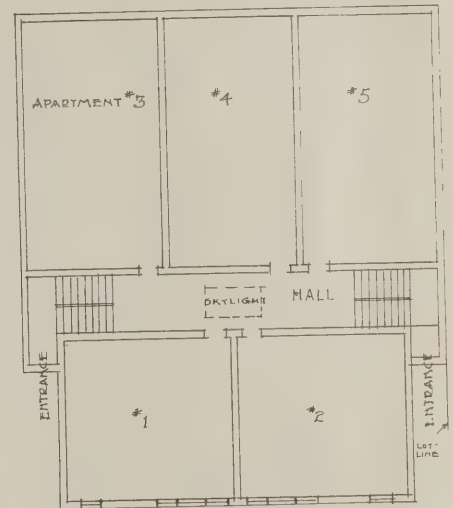
How Can We Increase Production?

In an address before the engineering section of the National Safety Council, June 24, Sidney J. Williams, secretary and chief engineer of the section declared that production depends primarily on two factors—machines and men. Production also requires materials but these in turn are produced by other machines and men—using "machines" broadly to include all equipment. Production also requires capital to provide the machines and the men, and management to direct them. But machines and men are the immediate pro-

ducers. They and they only can increase or decrease production. The things that cause them to do the one or the other are the things that we must study.

The basis of modern production, with respect to both machines and men, is regularity—standardization. We as a nation are committed to the principle of mass production, and while we may deplore the vanishing of the old craftsman, few will seriously suggest a return to the former order.

But we do not stop with standardizing machine operations. We standardize also the operations of men. The motion study expert tells us that practically every man wastes a large percentage of his time and effort in even the simplest operation—that a dozen skilled mechanics will do the same thing in a dozen different ways, all of them wrong. So the motion study expert determines the one best way to do a job, and in one case after another we find that by following his method we not only increase production but we decrease fatigue. While so-called "efficiency engineering," like other pioneer movements, has suffered from the pretensions of quacks, there can be no serious question that modern industry demands the elimination of lost motion and the standardization, so far as



Plan C

is practicable, of every job in the plant.

If this is true, as it is true, I do not believe that any one will question the next proposition that I want to make—that anything which interferes with this absolute regularity of operation is inefficient and uneconomical, and that it is one of the chief functions of the engineer and the executive to hunt out these disturbing influences and eliminate them.

A laborer pushing a truck strikes an uneven place in the floor and a casting falls off the top of the load. The casting is heavy and he goes for help to put it on again. Meanwhile the lathe operator is waiting for the casting. The blockade of the passageway stops another truck coming

up with material for another operator, who must also wait. The total loss of time may not be more than four minutes for each of five men—twenty minutes in all or, say, twenty-five cents worth of time.

What does the foreman do when he finds that the lathe operator is waiting for material? If he is a foreman of the old school, he goes back and bawls out the "blankety blank wop" for running his truck into a hole in the floor. The man, thus admonished, is henceforth more careful—that is, he is slower in his movements. He takes pains to avoid the holes in the floor, the posts in dark passageway, the other various sundry obstructions which sprinkle his pathway. A little later the foreman is surprised and grieved to find that he must put another man on to help the truckers because they cannot keep up. He discourses feelingly and eloquently with the assistant superintendent on the total depravity of laborers in general and of his laborers in particular. Am I exaggerating? Not very much. How many of us carefully walk around a hole in the floor, or a slippery place, ten times a day, because it would take a little mental and physical energy to fix it up?

Of course, the foreman who is really on to his job has the floor fixed at once. If he is unusually intelligent, he also looks around for other things which interfere with efficient trucking. He may find that the lighting in the passageway is poor, and recommend to the superintendent that it be improved. He may find that the truck itself can be slightly changed so as to make it less likely that anything will fall off. The up-to-date foreman realizes that when his laborers each lose twenty-five cents worth of time a day it is up to him, not to bawl them out for it, but to find out what is wrong and correct it. And it is up to the superintendent and higher executive officers to supply what the foreman lacks in this regard. Once labor was the cheapest part of the cost—but the dollar-a-day man is gone.

In the past, so vast were our resources that we could overlook these "small" losses, just as the city of Chicago pumps millions of gallons of water that are wasted through leaky pipes. But now the time has come, with our diminishing man power, diminishing natural resources, and prospective sharp competition from abroad, when we must meter and stop these leaks if we are to maintain our volume of production and our economic place in the front rank of the nations.

Now I come at last to the point where Safety enters into the proposition. Some of the "accidents" which I have mentioned—some of the things which happen unexpectedly—result in personal injury. From the standpoint of the man interested only in production, the accidents which happen to injure some one are no more and no less important than those which do

not. It is true that from other standpoints the accidents causing personal injury are much more important. To the Legal Department, they mean the payment of compensation. To the Employment Department, they mean the necessity of providing another man. To any man with a spark of human feeling in his heart they mean pain and suffering to a fellow human being, perhaps poverty and distress to his dependents. But leaving these considerations out of account, considering ourselves as absolutely non-human engineers or executives, with an abundant supply of skilled labor and no compensation laws to worry about, even then we must recognize that at the very least the accident which injures some one is no less important than the accident which does not injure any one, and all these accidents—all these things happening unexpectedly—interfere with the regularity of our operation, and cut down our production. No engineer or executive living can afford to say "I am not interested in accident prevention," unless he is willing to say, "I am not interested in efficiency"—because accidents and efficiency are absolutely incompatible; they cannot exist in the same plant; the plant where things are permitted to happen unexpectedly is an inefficient plant. Every accident is an indication that there is something wrong with men, methods, equipment, or material.

The rough shod methods of American industry a generation ago, which left a trail of human wreckage, were not only inhuman—they were inefficient. They and the men who stood for them are gone on the scrap heap, and will never return.

Gypsum-Block Buildings

That a new use for gypsum has been found as a structural material is announced by R. W. Stone in a recent issue of *Rock Products*.

"Gypsum blocks or tile are now extensively used in modern office buildings and apartment houses. These tile are 24

to 30 in. long, 12 in. wide, 3 or 4 in. thick, and have 3 round holes through them. They are made of gypsum plaster mixed with wood pulp or other filler and are used for interior partitions in steel frame buildings. Partitions built of them are sound-retarding and fire-resistant, and large quantities of gypsum tile are used annually for this purpose. Because they will not bear a heavy burden these tiles are not used where much strain will come on them.

Gypsum can be molded in blocks of various shapes and sizes in much the same manner as concrete blocks are made. The blocks may be solid or hollow, rough or smooth faced, large or small, white or colored.

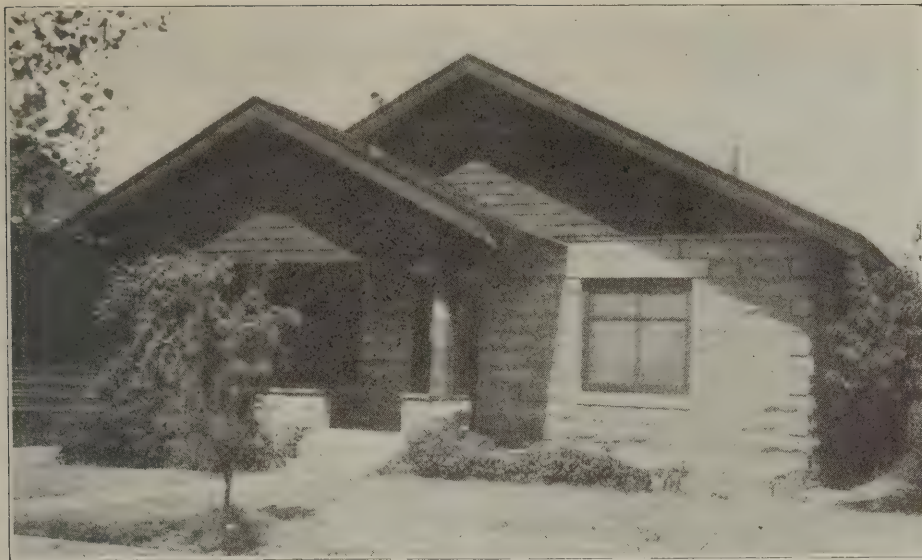
For Residence Walls

The use of gypsum blocks as the principal material in the construction of houses, however, has as yet received little attention in the United States. Such use is feasible. The principal restriction is probably the weight of the load they will carry. For gypsum block walls without addition framing to support the weight probably should not be more than that of a building one or one-and-a-half stories high. Walls of gypsum blocks are much softer than concrete and somewhat porous, but the surfaces probably indurate slightly on exposure to weather. In many parts of the United States they should stand the climate without waterproofing; elsewhere a waterproof coat should insure their enduring without deterioration for many years.

Hollow gypsum blocks have been used for the exterior walls of buildings in two localities known to the writer. These are the Big Horn Basin, Wyoming; and Douglas, Arizona. There may be others. In both places timber is scarce and gypsum is abundant. In both places also the climate is arid, the average annual rainfall being less than 12 in. In Wyoming, low temperatures are experienced, but at Douglas frost is almost unknown. Climatic conditions, however, need not be considered unless



Warehouse at Douglas, Ariz., built of hollow gypsum blocks



Bungalow built of gypsum blocks molded to imitate cut stone

they are particularly damp and cold, in which case frost action might have a harmful effect on unprotected blocks.

The accompanying illustrations are from photographs in the United States Geological Survey collection, made by the writer. One shows a residence built of the smooth blocks and surfaced with gypsum stucco or pebble dash. The stucco is coated with waterproof paint.

This gable-roofed house with its wood trim is constructed almost entirely of large gypsum blocks. The roof, built with wide overhang for additional protection to the walls, is of asbestos composition shingles. Hollow gypsum blocks are used at Douglas also as backing for brick veneer. Another type of hollow gypsum block used at Douglas is shown in the picture of a bungalow, with roof and gable of wood shingles. The blocks used here are molded to imitate cut-stone faces and make a very presentable exterior wall. The window caps and sills also are gypsum.

Molded gypsum blocks with cut-stone face are used for stores and one-story block houses. The effect is rather severe, but a fairly permanent construction is obtained that can be erected very quickly. Because of the size and light weight of the blocks, and their true edges, walls built of these blocks go up rapidly and the work can be done by amateur masons. For this reason it is said a gypsum-block building can be put up for 25 per cent less cost than other kinds of masonry.

The writer does not know of gypsum-block houses in other parts of the country, but sees no reason why this material should not be used for bungalows and other low buildings, especially in those localities which are rarely subject to severe frost. In the northern part of the United States, buildings of molded gypsum blocks would stand exposure to the weather for many years, especially if the

surface were water-proofed. Gypsum is abundant in many states.

Causing Gypsum to Adhere to Concrete

During the past month, the research on the above subject and also on a means for causing cement plaster to adhere to gypsum has been practically completed, says the Bureau of Standards. The findings may be divided into three parts:

action between the two materials; the tensile strength of the mixture of gypsum and cement is very nearly equal to their combined

1. There seems to be no detrimental recombined tensile strengths dependent upon the proportions of the two ingredients used.

2. The suction of the surface to which the plaster is applied is an extremely im-

portant factor; for example, if gypsum plaster is applied to a dry concrete surface, the suction of the concrete will take so much water out of the gypsum that it will prevent its proper hardening.

3. The expansion of neat cement, when wet, is of an entirely different order from the expansion of neat gypsum, and a bond between the two materials can be permanently maintained only when enough sand is added to both materials to reduce the same for both. The above mentioned research work has been supported by the Gypsum Industries Association and a report covering it has recently been made to them.

A Day's Work

A grand jury in Cleveland, after an exhaustive inquiry into the high cost of building, among other things says:

"We should be remiss in our duty did we not point to a lamentable condition which no doubt has injured the very group which created it as much, if not more so, than the public generally.

"We refer to the present tendency on the part of mechanics, artisans and laborers of all trades to do less than a full day's work. The testimony adduced before us indicates conclusively that it requires approximately twice as long, with the same number of men to erect a house today as it did in pre-war times."

Impartial tests, says this grand jury, show that it takes twice as many carpenters to do carpenter work on a building as it did five years ago, that bricklayers lay less than half the former number of bricks, that paperhangers, painters and plasterers all do less than half the work in a given time that they did five years ago.



House at Douglas, Ariz., built of hollow gypsum blocks and surfaced with gypsum stucco

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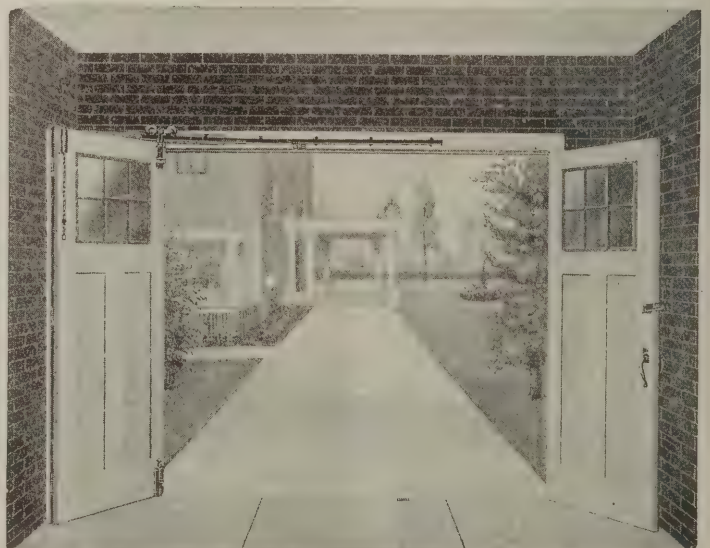
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Announcements and Publications

The Palmer-Taggart Investment and Construction Company have opened an office at 4628 Troost Avenue, Kansas City, Mo. They will appreciate receiving catalogues and samples of building materials at this address.

The Wooden Architecture of the Lower Delaware Valley is the feature of Number 3, Volume VI of the White Pine Series of Architectural Monographs, a most interesting collection, beautifully reproduced.

Competition For a Roadside Tavern, conducted by the White Pine Series of Architectural Monographs. This fifth annual architectural competition was judged at The Biltmore, New York, N. Y., on May fourteenth and fifteenth, 1920, by Cass Gilbert, New York; Chas. Z. Klauder, Philadelphia; Howard Shaw, Chicago; R. Clipston Sturgis, Boston; F. R. Walker, Cleveland. The first prize was awarded to Joseph Hudnut and Carl D. Montgomery, New York. The second prize was awarded to Robbins L. Conn, New York. The third prize was awarded to Thomas Bond Owings and Henry Herbert Dean, New York. The fourth prize was awarded to P. Donald Horgan, William J. Mooney, and Harold A. Rich, Boston. Mentions: Richard M. Powers and Joseph G. McGann, Boston, first mention; Atwell John King and Henry V. Capel, New York, second mention; Bernhard Dirks, Chicago; Wilmer Bruce Rabenold, New York; Donald Robb, Boston; R. J. Wadsworth, Philadelphia. The detailed report of the jury will be published in the August number of the White Pine Series, together with the prize and mention designs.

Test Data on Lime in Concrete and Mortar—A study of certain tests and experiments upon the effects of hydrated lime when added to concrete mixtures under varying conditions and for various purposes, together with comments and field observations. By Tyrrell D. Shertzer. This illustrated pamphlet of twenty pages is issued by the National Lime Association, Washington, D. C. Ask for Bulletin No. 303.

Elliott Combination Water Heater and Gas Stove Top—An illustrated circular issued by the Elliott Water Heater Co., Inc., 9 Willoughby street, Brooklyn, N. Y., describing a method of providing hot water without additional cost while cooking on a gas or oil stove.

Brick—How to Build and Estimate—Second edition—By William Carver, Architect. This illustrated "presentation of facts for prospective owners of brick houses and manual of construction data

on brickwork for contractors and builders" is issued by the Common Brick Manufacturers of America, 1300 Schofield building, Cleveland, Ohio. The nominal price of the book is \$1.00, but to contractors and architects the price is 25 cents.

Brick for the Average Man's Home is a collection of new and original designs for small houses, "with working drawings available," issued by the Common Brick Manufacturers of America, 1300 Schofield Building, Cleveland, Ohio. Estimated costs and plans and specifications of the buildings shown in the book are obtainable at prices ranging from \$5 to \$12.50, according to a schedule included in the book, the price of which is \$1.00.

Fairbanks-Morse Solid Top, Engine Driven Portable Wood Workers, is the title of Bulletin No. 705, issues by Fairbanks, Morse & Co., New York. Illustrations of the uses and applications of the standard and special equipments for this wood worker are given. Kerosene is the motive power.

The Aqua Instantaneous Electric Water Heat is an illustrated presentation of what has been hitherto considered impossible—the economical and practical heating of water by electricity to any desired temperature. Issued by the Aqua Electric Heater Company, 250 West 54th Street, New York City.

G-R Expansion Joints for Low Pressure are illustrated and described with specifications and dimension tables in Bulletin No. 1110, issued by the Griscom-Russell Company, 90 West Street, New York City.

Cyclopedia of Building, Loan and Savings Association—**How to Organize and Successfully Conduct Them**—Fourth edition, revised and enlarged. By Henry S. Rosenthal, A. S. Loan Building Association News, 15 West 6th Street, Cincinnati, Ohio. Price \$7. This compendious work of 100 pages contains, as its title indicates, an exhaustive digest of the subject with tables and all related data, with a bibliography and complete cross-reference subject index.

The Electric Rotary Machine for scrubbing, surfacing, sandpapering, grinding, waxing, polishing and refinishing all kinds of floors and flat surfaces, is the comprehensive title of a 19-page illustrated folder issued by the Electric Rotary Machine Co., 40 South Clinton Street, Chicago. Of particular interest to builders is the method shown of surfacing and polishing marble, mosaic, terrazzo and composition.

C. F. Beck & Son Co., Monroe, Michigan, announce a change in their firm name. This concern will be known as Beck Lumber Co., hereafter.

Architectural Drawing Plates—By Franklin George Elwood, B. Ar. Paper cover, 15 plates, 6½ by 9½ inches in size. The Manual Arts Press, Peoria, Illinois. Price, 50 cents. Although designed for use as a text book in schools, the many details of construction make the book useful around the drafting room, especially in those offices that specialize in residence construction.

Perry Lumber Reckoner.—An illustrated and descriptive folder of a ready reckoner for contractors, issued by B. L. Jenks, 1204 Marshall Building, Cleveland, Ohio.

Ten Years Work of the Chicago Plan Commission, issued by the Chicago Plan Commission, Hotel Sherman, Chicago, is a 70-page historical, illustrated and descriptive record with maps, showing the work accomplished so far.

Beaver Board and Vulcanite Consolidate—The Beaver Board Companies, Buffalo, N. Y., announce that the Beaver Board and Vulcanite sales forces have been consolidated and that in the future both products will be sold by the Beaver Board sales force. Vulcanite Roofing, the announcement states, will be handled by the roofing division of the Beaver Board Companies, under the direction of Mr. Frank L. Campbell, sales manager, and the sales administration offices of The Vulcanite Roofing Company will be moved to Buffalo, New York.

Water—Plenty of It for Man and Beast—is the attractive title of a handsome catalogue, copiously illustrated and with tables and specifications regarding the Humphreys complete water supply systems. Issued by the Humphreys Manufacturing Co., Mansfield, Ohio.

The Bestwall Age is the title of the house organ of the Bestwall Manufacturing Company, 332 South Michigan Avenue, Chicago, Ill. Number 5, volume 1, gives an interesting description of the company's new factory at Akron, Ohio, and the methods employed in the manufacture of the product.

Service Motor Trucks for Contracting and Construction Work is the title of Bulletin No. 5 issued by the Service Motor Truck Company of Wabash, Ind. The catalogue is elaborately illustrated with the various types of trucks and bodies for special service work and tables and specifications in general as well as special interests are given.

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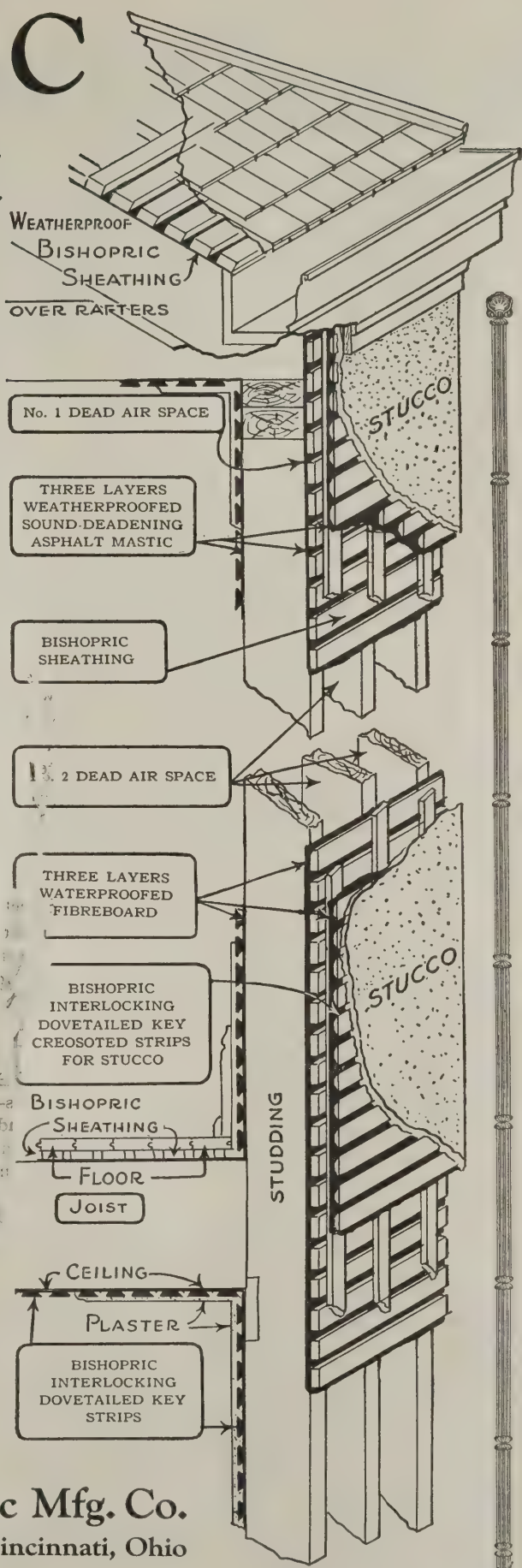
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National Builder

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August, 1920

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NATIONAL BUILDER

Volume 63

Chicago, August, 1920

Number 8

The Situation

NO general improvement in construction is reported though June showed a six per cent gain over May. The railroad situation, and the possibility of a strike in case the wage award was rejected by the employees, has been a disturbing and retarding influence. The Railway Labor Board created under the Esch-Cummins Transportation Act on July 20 announced its first award as approximately \$600,000,000, increasing the pay of virtually all of 2,000,000 railroad employees of the country 21 per cent above present rate, the increase to be retroactive ten weeks. Although the railway unions express dissatisfaction with the award a widespread strike against it is not likely.

Coal and Transportation Problem

The order of the Interstate Commerce Commission diverting open top rail equipment cars from the construction industry to the exclusive use of the coal mines has been extended for another thirty days, although vigorous protests were made against it by building construction interests. Strong representations have been made that the open top equipment is not being handled efficiently by the railroads and that cars are permitted to remain under load for weeks either awaiting export facilities or while coal in them is subject to the manipulation of jobbers and wholesale buyers. The cry of a coal shortage earlier in the year is believed to have stampeded consumers to demand coal against future needs to the detriment of consumers whose needs are immediate, with the result that in the face of plenty an artificial shortage forced manufacturers in the building industries to pay inordinate prices for fuel without regard to contract prices. The high price of coal is reflected in a stiffening of prices for nearly all kinds of building material, and with increased freight rates which must inevitably follow the increased labor costs to the railways, any reductions in prices for building material must come by way of increased production, better distribution and adequate transportation.

At present the Interstate Commerce Commission offers no relief to the building industry, beyond what may follow the single-minded course in taking care of the coal situation first.

The Future of Prices

The unsettled condition of the market for articles of personal consumption, the restriction of banking accommodations, and a disposition on the part of the public to make a stand against further price advances, has caused price reductions in these commodities, cancellation of orders, and considerable unemployment. The July bulletin of the National City Bank of New York in noting these facts states that the prevailing opinion about prices is that an effective stop has been put to the upward movement, and that stable conditions will be eventually reached thereby, but that the curtailment of production is unfortunate for the full product of these industries probably will be wanted.

As these commodities affect the living costs of building trades employees as well as other workers of every class they also influence the standard of wages in the building industries. What is required is a readjustment of wages particularly with regard to common labor.

The authority above quoted states that the general world situation is not favorable either to a rapid decline of prices or to prolonged industrial depression. There is too much work needing to be done.

More Families Than Houses

According to Chief Statistician Hunt of the United States Census Bureau the increase of families has steadily increased beyond the means to house them for the past thirty years and the normal supply of dwellings must steadily increase.

In 1890 families exceeded dwellings	10.5%
In 1900 families exceeded dwellings	12.2%
In 1910 families exceeded dwellings	13.8%
In 1915 families exceeded dwellings	14.8%
In 1916 families exceeded dwellings	14.5%
In 1917 families exceeded dwellings	15 %
In 1918 families exceeded dwellings	16.8%
In 1919 families exceeded dwellings	19 %
In 1920 families exceed dwellings	23 %

Encouraging Home Building

Among the various announcements of building developments being undertaken by industrial concerns the announcement of S. W. Straus & Co., on July 16, is significant

of the widespread awakening to the fact of the supreme importance of adequate housing for the people.

S. W. Straus & Co. announce that they will make loans in the form of first mortgage serial amortized bond issues in amounts of one-half million dollars and upwards to industrial corporations of established reliability engaged in the production of essential commodities, the proceeds of the loan to be devoted to the construction of dwellings for employees.

The opinion is expressed that large lending institutions of the country should develop this field of financing because of the enormous demand for housing facilities and the stabilizing influence which widespread ownership of home by the working classes will have.

The prediction also is made that, as a result of this co-operation between financial houses and industrial corporations, the next few years will be a period of very extensive home building activities.

Community Developments Marred and Made

Among the attempts of communities of various kinds to meet the problem of providing adequate housing the instances given in the interviews which follow show under what conditions citizens individually and collectively may be induced to co-operate with or retard not only the interests of the community but their own interests as well.

South Bend's Housing Movement Only Sleeps

"The housing situation in South Bend is about as bad as it is in any city that I know of," said A. Jacobson, commercial secretary of the South Bend Chamber of Commerce, to a representative of NATIONAL BUILDER. "But in spite of that shortage, there are here quite a number of empty houses belonging to people that will not rent them at any price. They want to sell them at a high price and believe that it is easier to do so if the houses can be occupied by new owners at once; for most of the people that buy houses at these high prices do so because they are forced to buy, and generally such people will not buy something to be delivered to them in the future."

(Continued on page 16)



A Nine Room Home

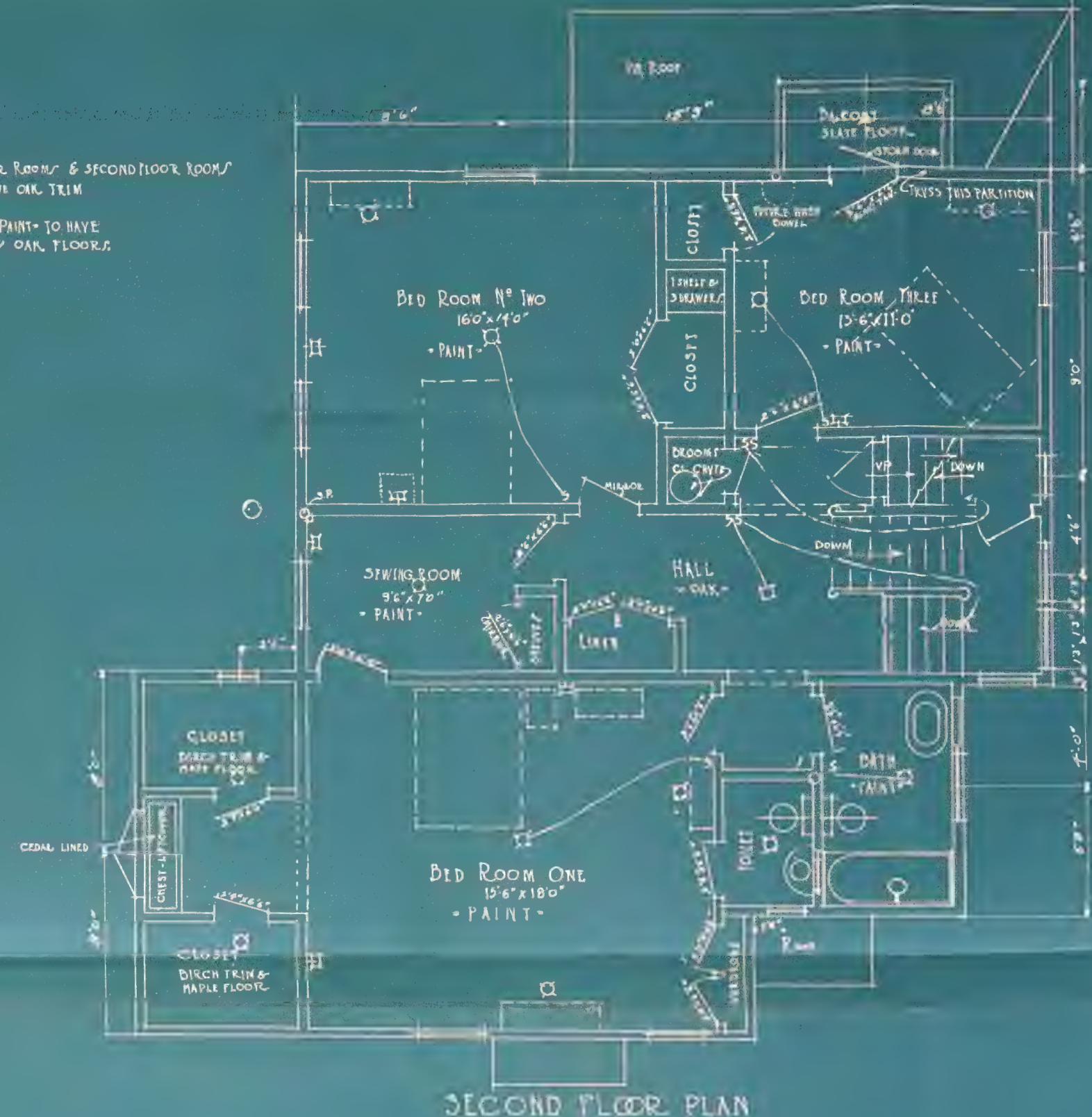
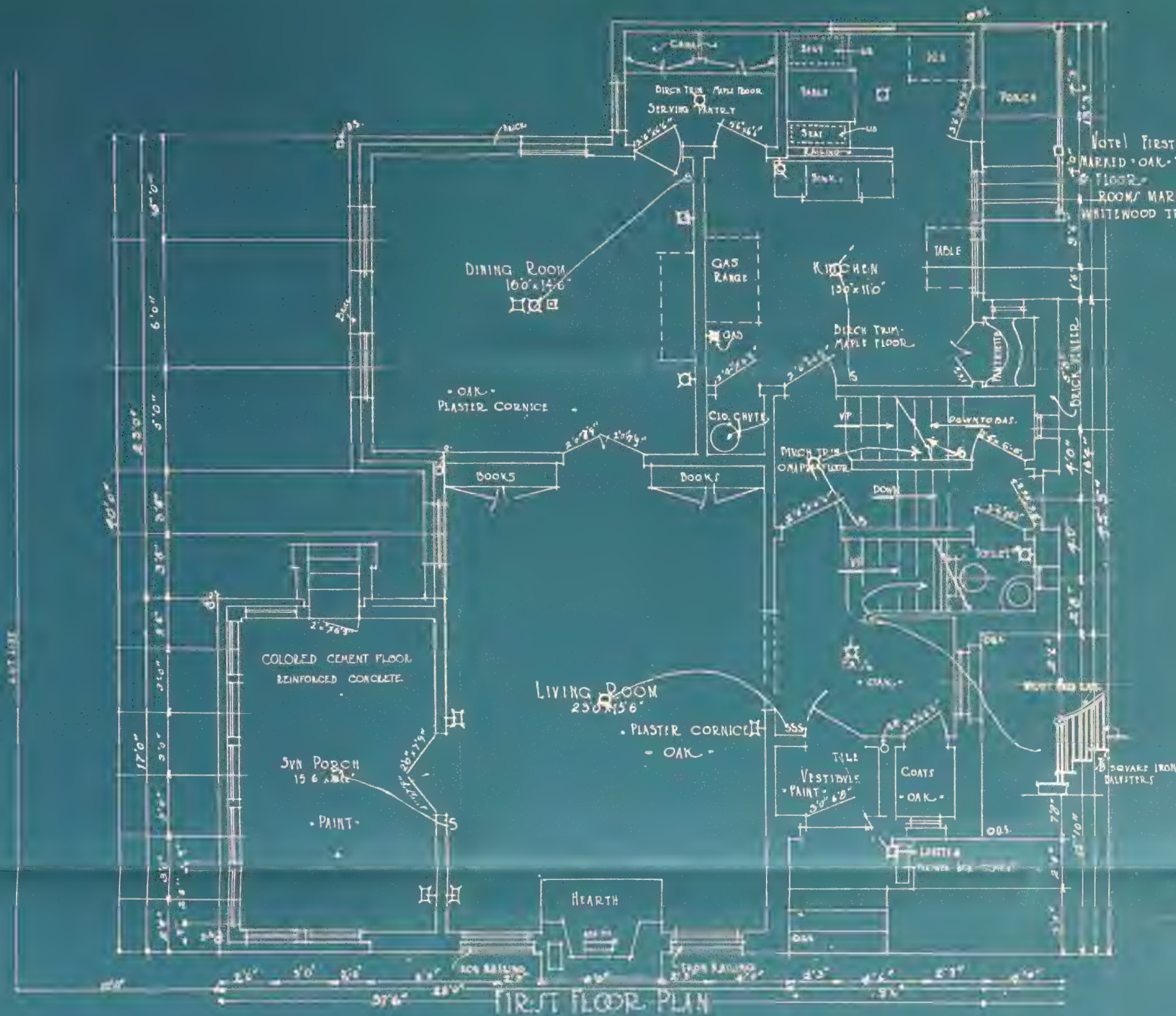
Chas. E. White, Jr., Architect

Complete working drawings of this house are given in the
Blueprint Supplement in this issue.

A hand-drawn floor plan of a room, oriented vertically. The plan includes the following elements:

- Dimensions:**
 - Top horizontal wall: 8'6"
 - Right vertical wall: 9'0"
 - Bottom horizontal wall: 4'6"
- Labels:**
 - Top left: "DOOR" with an arrow pointing right.
 - Center: "TRUSS THIS PARTITION" with a dashed line and a circle below it.
 - Bottom left: "FREE" with a dashed rectangular outline.
- Other Features:**
 - A diagonal line runs from the top right corner towards the center.
 - A horizontal line with an arrow points from the left wall towards the center.
 - A vertical line with an arrow points from the top wall towards the center.





NOTE: ROOMS IN THIS
FLOOR, MARKED - PAINT - TO
HAVE BRICK TRIM & OAK
FLOORS.



NATIONAL BUILDER
SUPPLEMENT
August, 1920
A NINE ROOM HOME
Chas. E. White, Jr., Architect
Scale: First and Second Floor Plans, 1/4 inch to foot
Elevations, Basement and Attic, 1/8 inch to foot
See Photograph and Description in Reading Pages

A Nine-Room House of Brick-Veneer and Stucco

THE possibilities of combining different building materials for the purpose of adding interest to a design are frequently overlooked. Or, if recognized, the principles are often abused. The successful combination of materials requires the application of sound common sense as well as a faculty for correctly judging values. That is, the eye must not be distracted by restless and unrestrained jumbling such as the use of a half dozen materials, each used in an equally prominent manner, nor should the mind be offended by the application of false principles of construction such as the use of a wooden first story with a masonry wall above. Even stucco is seldom pleasing when it is used for the upper portions of a wooden building.

In the design of the house which is the subject of this month's supplement, the architect, Charles E. White, jr., has combined different building materials to form a very refreshing and attractive composition.

The construction is of frame with brick veneer on the first story and stucco above. The belt course between the two materials is of wood, as is the general trim. Unlike most houses of this type, stained exterior woodwork is sparingly used, resulting in a quiet yet interesting treatment that offers a welcome contrast to the half-timber effects that so frequently overload small houses.

The entrance treatment is especially good, and gives a sheltered and inviting effect that expresses good taste and hospitality. The use of wrought iron work at the large front windows and beside the entrance, and the brick steps and curving walk also contribute largely to the success of the composition. The chimney has made an important element, but the haunches at its sides are not so pleasing as would be the regular batter from bottom to top as shown in the architect's drawing. The treatment above the living porch windows gives a rather "chopped" appearance to the wall at this point. Carrying the main belt course through just above the transoms would perhaps result in an improvement.

The basement is of concrete with plastered ceilings throughout. Iron columns with wooden girders support the floors and partitions above. The basement partitions are of sheathing, and the unusually large windows have concrete area walls with gravel floors to insure rapid drainage. The basement contains a heater and fuel room separated by a low partition; a cool room for the storage of vegetables, canned fruit and so forth, and the remainder of the

basement is used for storage and for the laundry and drying space. Gas outlets for fuel and for emergency lighting are placed near the laundry tubs. A clothes chute of metal instead of one of ordinary wooden construction is used, thus lessening the fire hazard.

The vestibule has a tile floor and enameled whitewood trim. The stair hall has oak floor and trim, and contains a large coat closet. The main stair is of oak with wrought iron balusters and walnut hand rail. The stair is of the duplex type with the main stair and the back stair connecting

the surface. The dining room has oak floor and trim and a moulded plaster cornice.

The service arrangement is well studied and is unusually complete for a house of this size. The kitchen wall spaces are ample for the proper arrangement of the range, sink, work table and other fittings, and contains a closet for the clothes chute, brooms and so forth, and a pantryette for the storage of food. The pantryette has a window for light and ventilation and has double doors so that its contents may be easily reached. A serving pantry connects the dining room and the kitchen and contains large cupboards for dishes. A low railing or partition forms a breakfast alcove at one end of the kitchen. The alcove contains a table and seats with hinged tops and offers an attractive eating or resting place for the maid. The refrigerator is also placed in this space and a glazed door opens from the rear porch. Birch trim and maple floors are used throughout the service portion.

The second floor contains three cross ventilated bedrooms, two of which are quite large. All of the bedrooms have oak floors and whitewood trim. Bedroom one extends across the front of the house and contains an alcove with a cedar lined window seat. Large closets are provided at the sides of the alcove and a wardrobe closet is placed at the other end of the room. This room has a private toilet, a very practical convenience. Bedroom two contains a wardrobe closet with a built-in chest of drawers and has a mirror door. Bedroom three opens onto a small balcony built into the kitchen roof and forming a convenient place for shaking rugs and airing bedding. Plumbing is roughed in for a future lavatory in this room.

A sewing room opens from the hall and from bedroom one and contains a closet with a mirror door. The bath room has a tile floor and wainscot, with whitewood trim. The hall is squared out with cased openings leading to the bath room and bedroom one at one side, and to bedroom three and the attic stair at the other. The hall is finished in oak and is well lighted by the large windows above the stair landing. It contains a closet for the clothes chute, brooms and so forth, and also a linen closet with double doors so that the contents are easily accessible.

The attic contains the maid's room and bath. There is a finished storage room, and doors open into the unfinished spaces under the roof which provide additional attic space.

Full
Working
Drawings
of this
House are
Given in
the Blueprint
Supplement
in this Issue

at the landing. A back hall connects the kitchen and the main stair hall and contains the back stair and a grade line entrance to the basement. A first floor toilet is placed under the main stair convenient to both the kitchen and the front portion of the house.

The living room has oak floor and trim and a moulded plaster cornice. There is a fireplace at one end with French doors flanked by bookcases, leading to the dining room. The living porch opens from the living room through French doors and is glazed on three sides with a door leading to the yard. The trim of the living porch is whitewood, painted, and the floor is of reinforced concrete, colored and jointed on

(Continued from page 13)

"Rents are abnormally high, and some of them have been made so by the would-be tenants bidding against each other. As an illustration: I know of one 6-room house that was renting at \$35 a month and the owner was satisfied. But two people began to bid for the place and one finally got it at \$50 a month.

"Last fall we started a house building campaign here. The first thing we did was to make an immense map of South Bend and vicinity showing every street and lot, where street improvements were in. We took the position that it was most economical to occupy the vacant lots where there were already sewer and street paving and other improvements, as that policy would save a great deal of work, a long delay in waiting for sewer and water and large expense for improvements. It seemed to us a mistake to go out into an unimproved area and dig sewers and build street car extensions.

"So we made a complete survey of the situation, and on the map we stuck a black-headed tack where there was a vacant lot that had sewer ready built in front of it. We stuck 8,000 tacks in that map, and it was a big job. We found that we had lots for 8,000 houses where the sewer and water were already provided. Then we had a mass meeting and laid the matter before the people.

"But as soon as we had created a public opinion favorable to building, the people who owned the vacant lots began to push up the prices till they had them up to such a height that very few people would build. We told the owners of the lots that it was useless to put up the prices, as not all of the lots could be built on anyway and that there was plenty of raw land a little farther out, out of which to make more lots. But our talk to them did no good. They put up the price of those lots till even in the most distant and undesirable locality they were held at \$400 to \$600 a lot, while in better neighborhoods the prices of lots went up to \$2,500 and \$3,000. That was a big factor in checking the building movement here.

"So altogether we got only about 25 people to build houses. However, we have not yet given up permanently the effort to get houses built. We believe that prices of lots, prices of material, and prices of labor will go down to what may be considered as normal, and that then people will take advantage of the opportunity to build houses. For we have an organization subsidiary to this by which 75 per cent of the money is provided for the person that wants to build and can provide the other 25 per cent.

"I believe that the solution of the house building problem lies in the creation of revolving funds bearing very small interest, combined with an intensive supervision of house construction. And I believe that many of the manufacturers of this coun-

try are coming to see that, since they must hunt so hard for efficient employees, they will have to help make it possible for those employees to secure suitable homes. Only in that way can the manufacturers save themselves from a disastrous turnover of labor."

Burlington Home Builders at Work

Burlington, Iowa, is one of the cities that is making progress in its house building scheme. The citizens have shown a great deal of public spirit and have proved themselves willing to sacrifice their private interests for the public good. This is especially true of the building material men, several of whom sold material for the work at wholesale prices. One of the most prominent mill work firms has done all possible to have the building of the houses actually begin.

E. G. Noelke, president of the Noelke-Lyon Manufacturing Co., manufacturers of mill products, is enthusiastic over the future of the housing scheme for Burlington.

"We organized here for the purpose of meeting conditions that we felt must be met," said he; in discussing the matter with a representative of NATIONAL BUILDER, "for we believe that our employees should have the chance to own their own homes. Also there are new workers coming into town, and there is no way of housing them at the present time.

"As a result of this movement, we have plans for 50 houses, and 47 of them are already under construction; and, if these houses prove attractive and in line with what people want, we expect to continue and build 50 or 100 more.

"It is our purpose to build these houses and furnish them at actual cost so far as we are concerned. We bought the land and contracted for the building of all the houses through our local contractors and building material people.

"We planned to construct all the houses at once, so that we could buy everything in bulk and thus avoid paying retail prices. We have thus been able to make a great saving over what it costs to build houses one at a time.

"The company was made up largely of the employees of Burlington. We raised \$250,000, and the money is all here for use.

"But we realized that this work of building would entail a large amount of labor on some one, as the work would have to be continually watched to make sure that everything would be done in the best way. So we employed an outside firm that is devoting itself to such plans as this. That firm has a very complete organization and takes over all of the work. It provided the plans for the houses and provides the supervision. There was, at first, a great outcry against bringing in outsiders, but we convinced the objectors that it was the right thing to do.

"We carefully worked out the exact cost of constructing each house. They vary some in size and shape and will not all cost the same, but the average cost will be around \$5,800.

"We are building each house just as we would build it for ourselves, if we wanted a house of that type, with heat, gas, electric light, bathroom, hardwood floors, and all other modern conveniences.

"In the plan for selling, we require 10 per cent down and 1 per cent a month on the principal. We have already sold some of the houses, and in several cases the buyers have asked to be allowed to pay more than the 10 per cent.

"The title to the property remains in the association till 35 per cent of the cost of the property has been paid for, when we give them a deed and take a mortgage for the balance of the money.

"We are determined that this work shall continue indefinitely, and we do not feel that we can always keep watch over it. So to provide a means by which the work may be eventually taken off our hands, we have already organized a building and loan association, which is entitled the Burlington Building and Loan Association. So the initial \$250,000 will come back in payments and be again paid out to build more houses and will become a perpetual revolving fund.

"There are several big companies on the point of locating in this city. One of them is bringing 200 employees. The company has already bought two of these houses for their employees.

"Should we find out later on that these houses are of a better class than demanded we can work out plans for building cheaper houses. But a cheaper house must necessarily mean a poorer house.

"The men that buy these houses are fortunate, for we can unhesitatingly make the statement that we are saving at least 25 per cent in the cost. This saving will offset any decline that may come in the value of the property.

"A big saving was in the price of the land on which we are building the houses. We bought it as acreage and broke it up into building lots, which brought down the lots to a very low price. They are located in different parts of the town and are of different shapes and sizes, but most of them have a frontage of 40 or 50 feet and are about 120 feet in depth.

"In one case we had a piece of land that would make two very long lots. The tract was too large to make into two lots and too small to make into four lots, so we located four houses near the four corners, with a big garage near the center of the tract. This garage is to be used by all.

"The cottages being erected contain four, five and six rooms each, to suit the needs of different sized families. Most of them are of one story. We have 10 different plans and 25 different elevations which may be applied to the different plans."

Development at Duluth, Minn.



Figure 1. Winding streets, good landscaping, irregular placing of houses and variation of design have done much to make Morgan Park, a suburb of Duluth, Minn., one of the most beautiful industrial communities in America



Figure 2. Concrete block residence, the home of a Morgan Park steel worker, which rents for \$5 per room per month. The floors, as well as the walls, are of concrete, the former of monolithic construction. In later buildings enclosed porches of concrete block were used in place of open wooden porches like the one shown in the picture

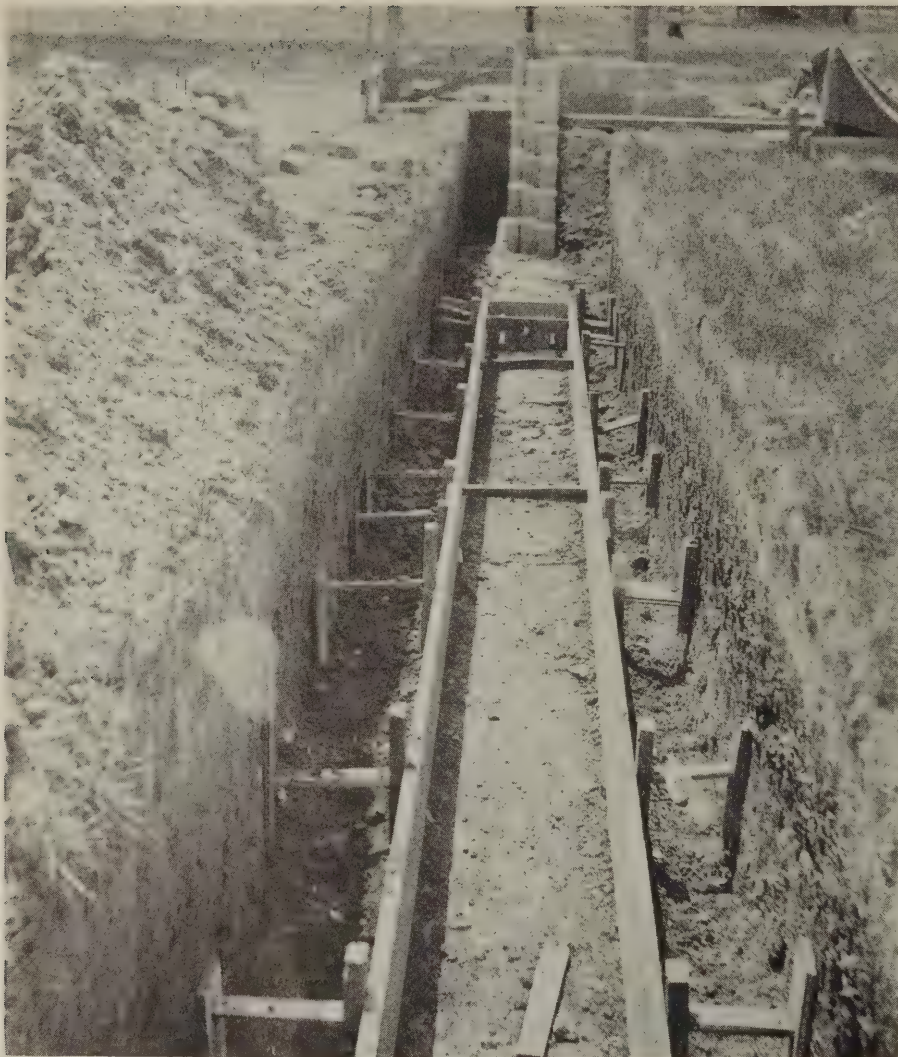


Figure 3. Construction view of house shown in Figure 2, showing forms for the footing, also portion of the footing in place and piece of the block wall constructed at the corner

THE town of Morgan Park, consisting entirely of a housing development of the Minnesota Steel Company, is within the city limits of Duluth, about seven miles west of the business district of the city. It lies mostly on a plateau overlooking Spirit Lake, an arm of the St. Louis River. The beauty of the site is enhanced by deep wooded ravines which surround it on two sides.

Morgan Park has 437 dwellings of which 349 are of concrete block construction with concrete floors; 46 of wood frame and concrete veneer block and 42 are of wood frame and stucco. There are also the following buildings, all of concrete block construction: general store, boarding house, general hospital, two office buildings and three large community garages. The construction of these houses had to be such as would withstand the rigorous winter weather experienced in the vicinity, taking into account high winds, driving rains and extreme changes of temperature. It was also necessary to construct good dwellings at a cost sufficiently moderate to make possible a low rate of rental.

Since the project was intended to furnish housing facilities for practically all classes of steel mill employees from unskilled day

laborers to those serving in managerial positions, an unusually wide range of types and sizes of dwellings had to be provided. The houses range from 4 to 10 rooms, attached and detached. Good single rooms for unmarried men are provided both in the boarding house and in spare or "thrift" bedrooms provided in many of the houses. The house rentals range from about \$4 to \$7 per room per month.

It must be said to the credit of both owners and architects that there is a complete absence of that monotony usually noticeable in groups of "workingmen's" houses. At Morgan Park no fewer than thirty different plans have been used. This was possible within the range of economical cost largely because of the wall material employed. Identical plans were repeated occasionally, but with elevations, roofs or landscaping changed slightly; winding roads made possible the placing of the houses in various directions and at angles to each other.

Figure 1 shows a residential street scene in Morgan Park, from which can be seen the irregular placing of the houses and the variation of building design, precluding the possibility of monotony. Figure 2 illustrates one of the older dwellings, having concrete block walls and concrete floors. It was erected in 1915. The buildings of this type have concrete block basement walls resting on concrete footings poured in place, as shown in Figure 3. The block used is of the hydrostone variety, consisting of two piece units forming inner and outer walls with air space between. The concrete floors rest on the inner walls as shown in Figure 4. Openings in the floors necessary for piping were made by means of tapered oiled plugs inserted in the forms.

Concrete block used in the walls are 24 inches long by 7 inches high, have plane face and are surfaced with the regular

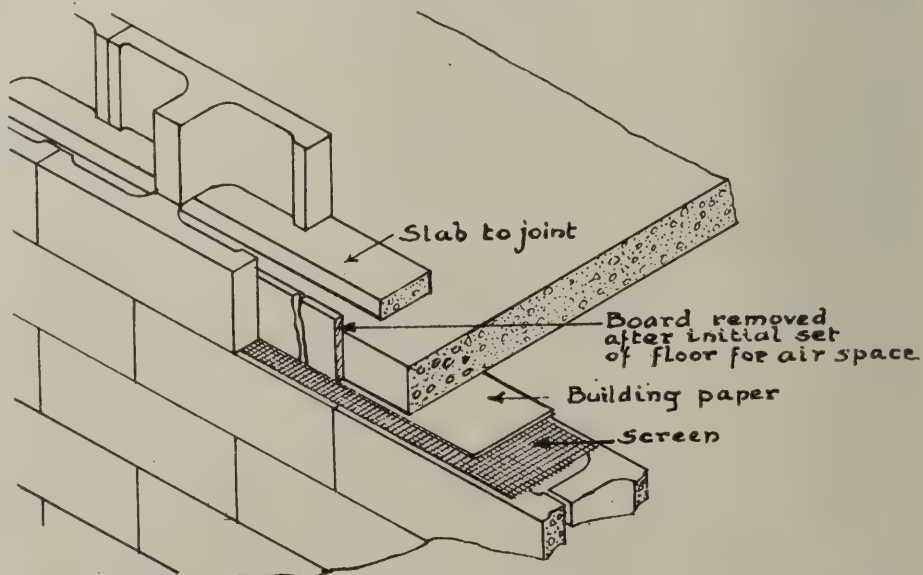


Figure 4. Illustration showing method of supporting concrete floors on the interior wall in double wall construction. Floors of the house shown in Figure 2 are supported by this method



Figure 5. Nine room dwelling house of concrete block veneer and frame construction. The wall material is a cast block. Foundations are of monolithic construction. The roof is covered with red cement shingles

mixture used in the body of the block. They are laid up with $\frac{3}{8}$ -inch flush joints. The surface effect is rustic, harmonizing well with the general scheme of the landscaping and quite in keeping with the modest pretensions of the project. The block were made by the pressure process, of gray portland cement, and local gravel and were steam cured.

The house shown in Figure 5 is typical of an interesting group built of wood frame construction surfaced with concrete veneer block. The foundation wall up to the water-table is of monolithic concrete. The veneer block are 24 inches long, 7 inches high and 3 inches thick. The proper returns are made at the corners by means of reinforced L shaped corner block having one leg 24 inches long and the other 12 inches long. These block were cast in wooden molds and subjected to natural curing. The block are laid in cement mortar, flush joints.

Figure 6 shows floor plans of the nine room house illustrated in Figure 5. It is typical of the larger houses of the group. The unusual bedroom capacity—there are six good sized bedrooms—suggests that it was planned to take care of a large family or to permit the ambitious housewife to add to the family income by the keeping

of several boarders or roomers. The interior arrangements of the Morgan Park houses are convenient and homelike above the average. A great many of the houses have comforts comparable with those in high-class suburban residences. Many of them have one or more attractive fireplaces and in all of them, kitchen, dining room and bathroom details have been well taken care of. Anticipating the preference of some of the occupants for stove heat, a certain number of the houses are equipped only for stoves, while in the others, hot air furnaces are provided.

Attractive effects are obtained in the combination of concrete block and stucco surface, as shown in Figure 7. Stucco panels may be arranged to occupy the wall space above the eaves of gable roofs, sides of dormers, bays and other projecting portions of the house where contrast of wall texture is desired. It is usually objectionable to treat the entire porch of a concrete block house with stucco, although stucco finish may be used in panels. Both of the houses shown in Figures 5 and 7 have roofs which are fire resistant from without, being constructed of shingle type concrete tile, laid on ship lap.

The architectural work in connection with the Morgan Park project was done

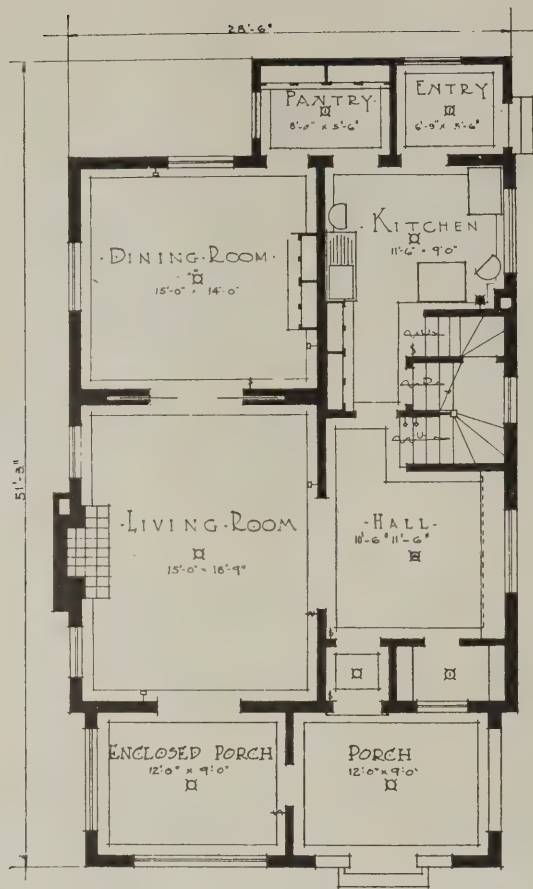
by Dean and Dean of Chicago, and the general management of the development by John M. Davidson, manager of the Morgan Park Company, a subsidiary of the Minnesota Steel Company.

Clear Shellac Varnish

When you require a clear shellac varnish, something lighter in color than ordinary white shellac, take one part of white or bleached gum shellac and pour over it six parts of strong grain alcohol; shake now and then until the gum has dissolved. This will be about 12 hours. Then add one part of powdered chalk, and heat the mass on a water bath; let it then stand until perfectly clear; pour off the clear part and strain the remainder through filter paper, adding a little alcohol to facilitate the operation. This for small quantities, of course.

Cleaning Up Oiled Floors

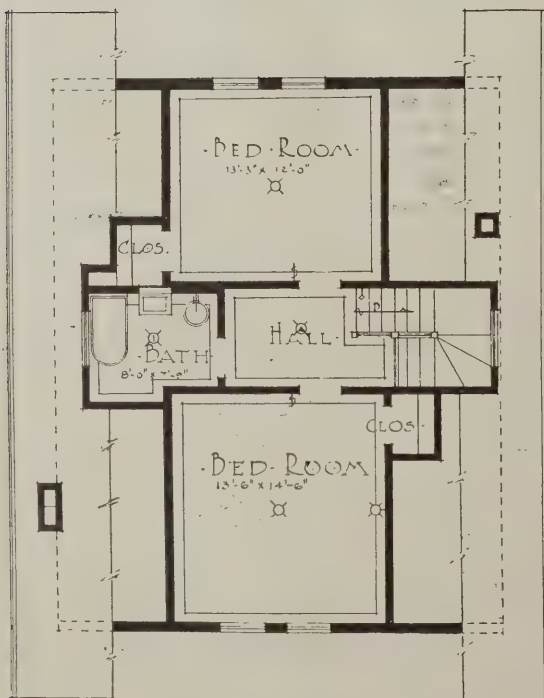
After a floor has been oiled for some time it will become dark and dirty looking. Remove all the old stuff with varnish remover, clean up with benzole or gasoline (beware of fire and have plenty of ventilation), then give it a strong solution of oxalic acid, four ounces to three pints of water. Apply hot.



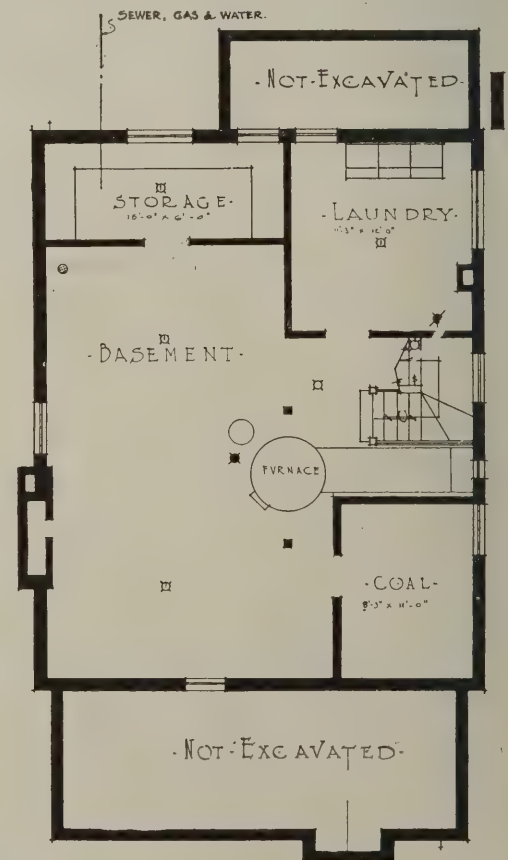
FIRST FLOOR.



SECOND FLOOR



THIRD FLOOR.



BASEMENT PLAN.

Figure 6. Plan of nine room house shown in Figure 5.



Figure 7. A type of wood frame house in the Morgan Park group, surfaced with concrete veneer block and portland cement stucco. The floor plan of this building is quite similar to that shown in Figure 6, with the exception that no rooms have been finished off on the third floor, since the roof is somewhat too low for good ceiling height



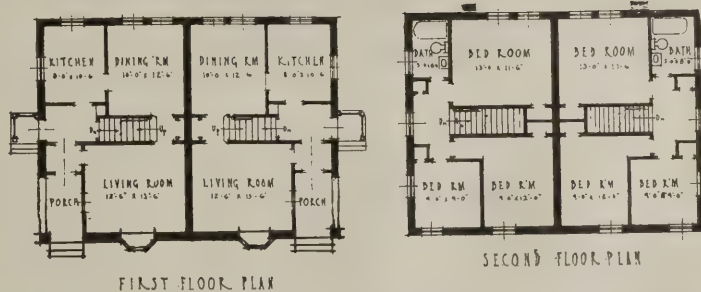
Figure 8. The boarding house at Morgan Park is known as the Nenovan Club. It is an attractive building of concrete block having 12 bedrooms on each floor, large reading, recreation and dining rooms, equipped in the most modern fashion throughout



Plate 3—A house at Lordship Manor

THE housing developments at Bridgeport, Connecticut, are distinguished from the fact that they form one of the earliest attempts to solve the problem of housing war workers.

Bridgeport had become an important munition center before the entrance of our government into the war, and the consequent influx of workers had brought the city to an early realization of the housing problem. In fact there were two problems; one was labor turnover, the other housing.



Plan of double house at Grasmere—Plate 4.



Plate 4—A double house at Grasmere

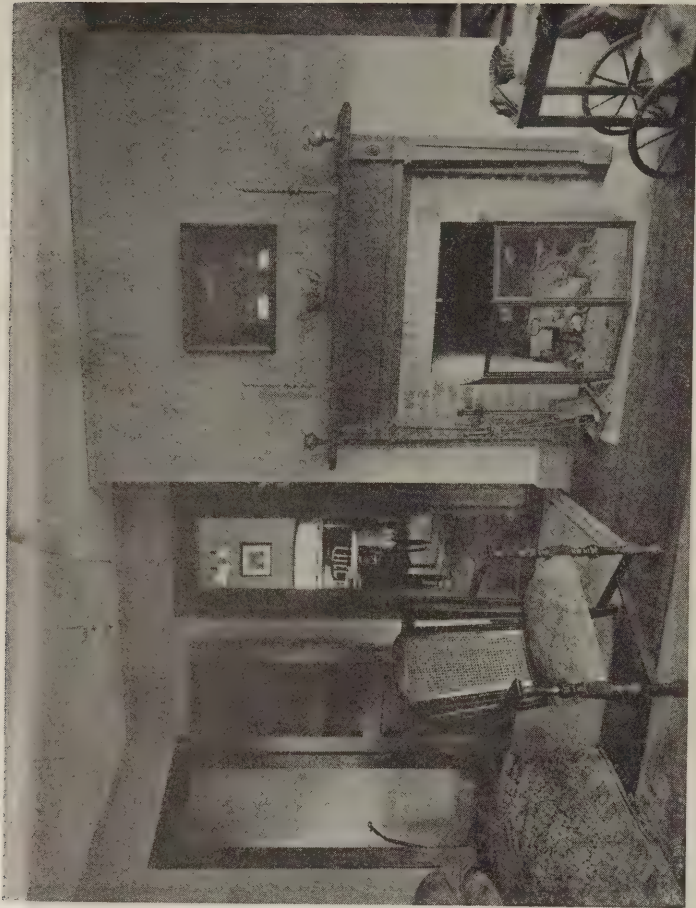


Plate 6—The living room of one of the houses at Bridgeport



Plate 8—Another glimpse of the Crane Tract



Plate 5—A two-flat house at Grasmere

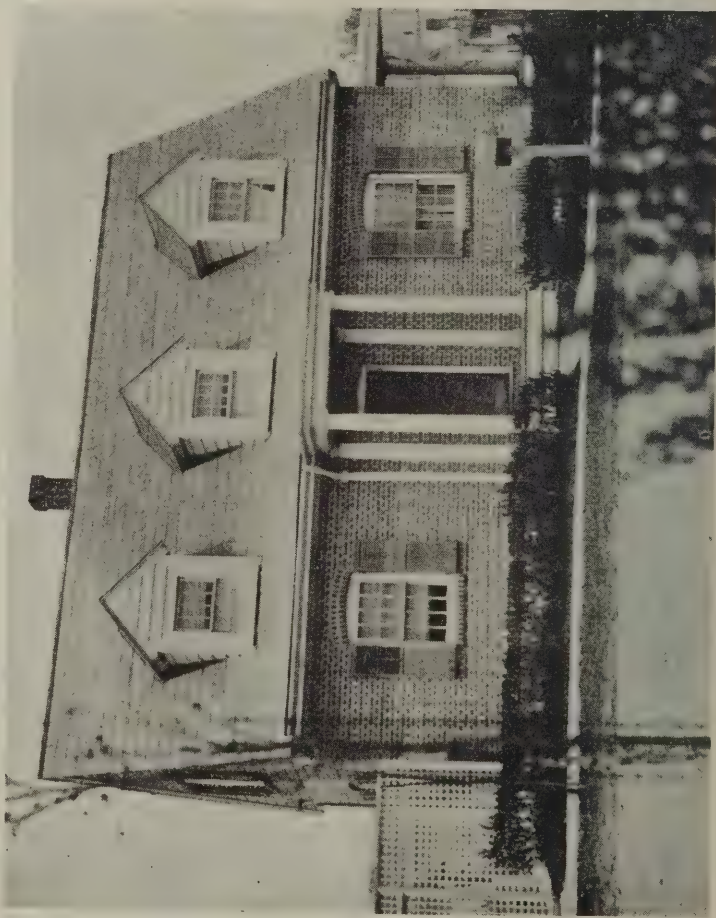


Plate 7—A house at Lordship Manor



Plate 9—Group of row houses at Black Rock

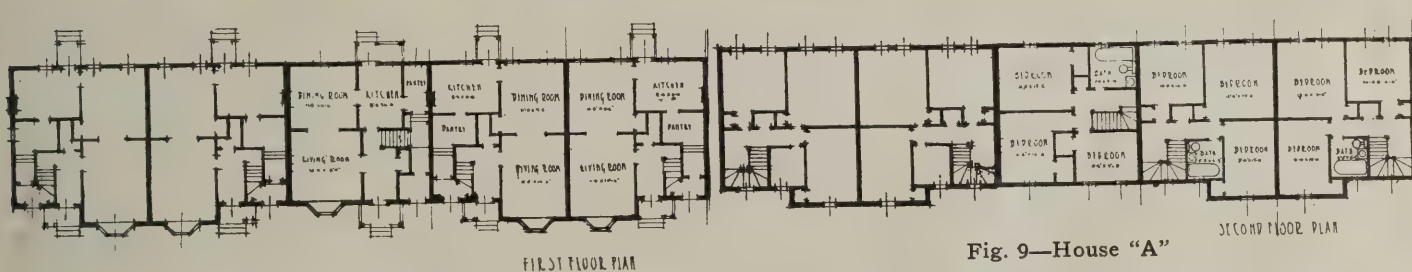


Fig. 9—House "A"

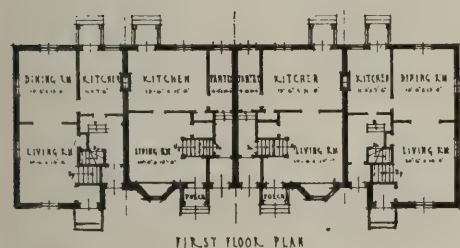


Fig. 9—Houses "B"

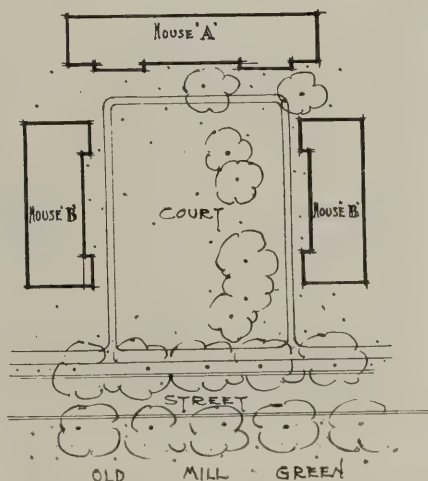


Fig. 9—Plot plan of houses "A" and "B"

At that time it was difficult to bring employers to realize that these two elements are really factors forming but *one* problem. Except in isolated cases employers throughout this country had long adhered to the policy that plant or office conditions formed the most important relationship between employer and employee. Welfare work, educational features, social and recreative organizations, improvements in sanitation, lighting, ventilation, safety standards and other improvements had been made, but these things important as they are, deal mainly with working surroundings. As for homes the worker was expected to shift for himself.

Thus the worker became the easy prey of grasping landlords, or if thrifty and ambitious, he often fell into the clutches of "jerry builders" who bled him of his savings in exchange for a more or less worthless "structure." If with thrift was combined a lack of self respect, he sometimes built a squatter's shack of tar paper

and waste materials; lived in squalor and became a health menace to the community. If a renter, two families often lived in a single house or rooms were rented to roomers, thus introducing a social relationship that lowered morals and frequently ended in disaster.

These conditions invariably give rise to discontent. The sufferer often does not realize just why he is disturbed, but he becomes morose, irritable and dissatisfied. His job is of uppermost importance in his thoughts, and if he is discontented he naturally lays it to the plant, its management or some fancied wrong that inspires him to quit and hunt work elsewhere. Thus is sketched the short line that connects the home with labor turnover.



Plate 10—A K-9 house grouped with two 4-5 houses. Crane Tract

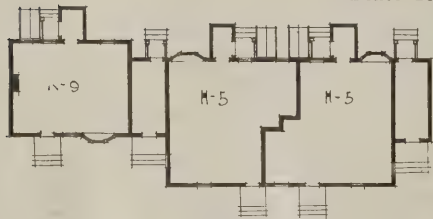


Fig. 10

The Chamber of Commerce of Bridgeport worked on this theory to such effect that employers were prevailed upon to divert some of the funds that were being used for plant extension work, to the building of homes for the workers. The chamber's work was of course complicated by the plainly evident fact that a dollar invested in plant extension work meant increased facilities for production, and apparently expanded profits, while the housing scheme which they advocated would bring a comparatively modest return in dollars and cents.

The labor turnover, however, was causing anxiety and it was becoming evident that plant extension work did not increase production if the machinery was not manned.

The Bridgeport Housing Company, as first formed late in 1916, was composed of about a dozen manufacturers and the public service companies. The capital was \$1,000,000.

Any charge of profiteering was eliminated by limiting the return from the investment to 6 per cent. The popularity of the scheme was enhanced by the fact that any concern, large or small, was afforded



Plate 11—A K-12 house joined with a group of K-10-8 and 12 houses. Crane Tract

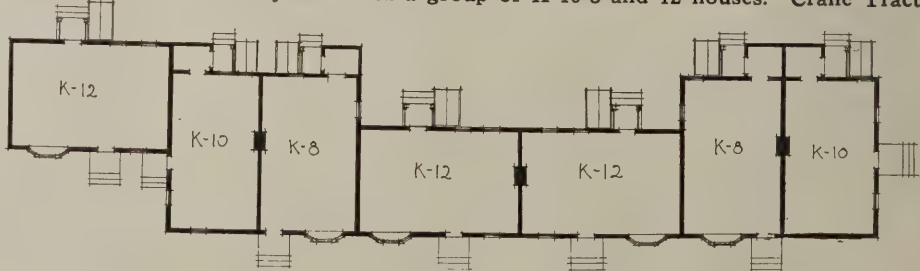


Fig. 11



Plate 12—A row of three K-8 houses. Crane Tract



Fig. 12

an opportunity to become a stockholder, and its real service was assured by the policy of making its services available to any workman, whatever his occupation and regardless of whether he is employed by a



Fig. 13

stockholder or an outsider. Thus the company cannot be charged with forming a landlord trust for exploiting labor.

One of the first actions of the company was to appoint an architect, a town planner, and a manager. Mr. R. Clipson Sturgis, of Boston, was the architect, and another Boston architect, Mr. A. H. Hepburn was associated with him on later work. The town planner was Mr. A. A. Shurtleff. Mr. W. H. Ham, a Boston engineer, is the general manager.

When the U. S. Housing Corporation



Plate 13—Rear view of two K-11 houses joined to a group of K-8-9 and 10 houses, Crane Tract

was formed after our entrance into the war, they found that the Bridgeport Housing Company had two housing projects under way, but that the demand for houses was greater than private investors could meet.

Under the direction of the housing corporation seven housing sites were selected. These sites were located with reference to the different centers of employment, such as large plants, so that in most cases the majority of the inhabitants were within walking distance of their work. Land

values and existing surroundings were of course also considered.

Under the joint operations of the Bridgeport Housing Company and of the U. S. Housing Corporation homes were built for almost a thousand families. The Black Rock and the Connecticut Avenue Tracts are apartment house developments, while the Crane, Grasmere, Mill Green, Fairfield and Lordship developments are composed of detached, semi detached, two-flat and row houses.

The Crane Tract is the largest of the developments and provides dwellings for 257 families. The houses forming this development were designed for the use of what is commonly described as a tenement population. That is, families whose income is less than that of highly skilled workers, and who, owing to their financial position, are usually left to herd into three-deckers and low grade tenements or to throw up miserable huts on vacant property.

The Crane Tract forms a brilliant contrast to such conditions. The development consists of single family homes grouped and combined in such a manner that com-

pactness and economy are well served without sacrificing the important elements of charm and domesticity.

In this development the architects and the landscape architect have succeeded in manipulating a perfectly flat building site in such a manner that the development has a charm and picturesqueness fairly comparable to that of the "garden city" work for which England is famed. Such a procedure is of course dangerous from a standpoint of both appearance and economy, but when the result is so conspicu-



Plate 14—A combination of K-9 and K-8 houses. Crane Tract

ously successful as it is here, there is no denying that an uninteresting site can be transformed without a suggestion of artificiality or unnaturalness. These same houses grouped on a gridiron plan would lose much of their picturesqueness.

The success of the irregularity of the plat layout is no doubt due to the fact

that a number of fine trees served to justify the setback of houses or the change in direction of streets. Also scale models were constructed and used in studying the entire development. In this manner the relation of the houses to each other and to the site could be visualized and regulated.

The basis of the design is irregularity,

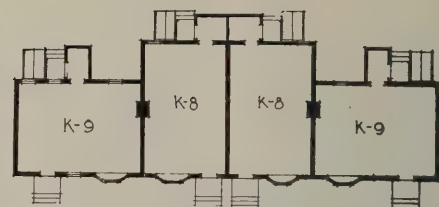


Fig. 14

not forced and artificial, but spontaneous and accidental alike. Houses are joined at angles, with two story and story and a half houses mingled in varying combinations.

An important feature of the layout is the



Fig. 15

absence of alleys. This is unusual in row houses, but in this development underground garbage receptacles are sunk in



Plate 15—At the left two K-12 houses joined to a K-8-9 and 10 group. Crane Tract



Plate 16—At the left a K-8-10 and 11 group. Center, two H-6 houses. Distance, a row of K-11 houses. Crane Tract



Fig. 16

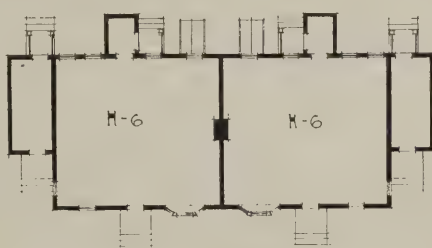


Fig. 16

are of common brick laid in English bond, adding attractiveness at small expense.

Let Fresh Mixed Paint Stand

Paint mixed for exterior use will be the better for standing a day or two before using, as this allows time for the ingredients to blend more perfectly.

front of each dwelling and ashes and other refuse is removed through the front door. This scheme results in a material decrease in the cost of the houses and causes only a more or less fanciful inconvenience.

A combined kitchen, dining and living room is used in these houses. This meets the approval of the majority of the families, but in some cases a bedroom is utilized as a living room.

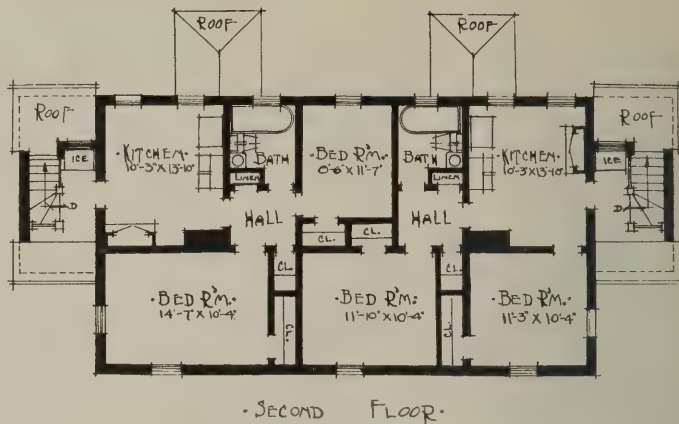
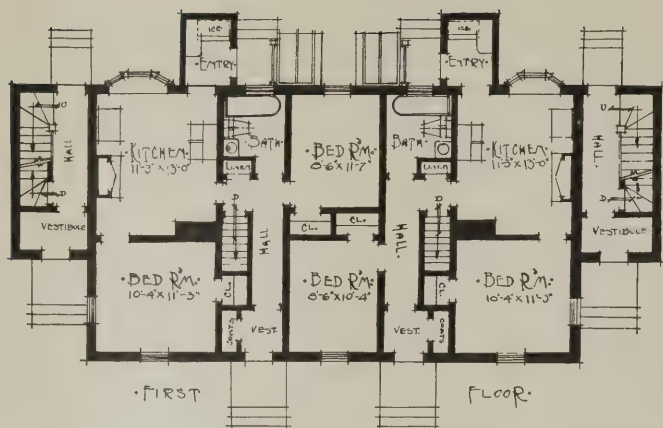
Furnaces have not been provided in general, as many of the families prefer to depend on heat from the kitchen, sometimes supplemented by a stove in another room. Where the occupants choose to pay the price, however, single pipe furnaces may be installed.

Only seven types of plans are used in the development. Variation is given by grouping and by differences in entrance doorways, windows and other details. Each dwelling has a basement, a yard and modern plumbing. The construction is above the average for houses of a higher class.

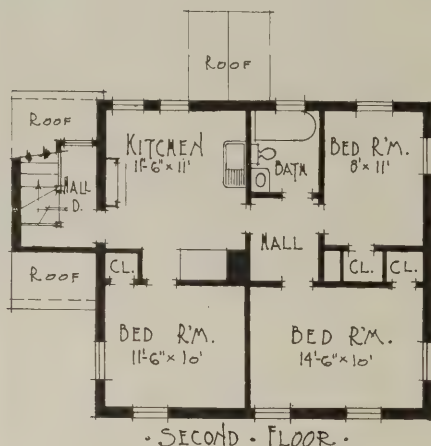
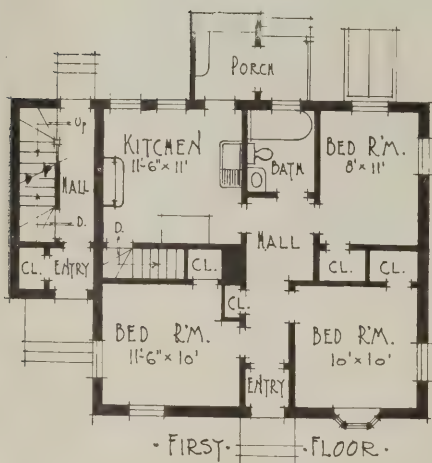
An interesting feature is that the walls



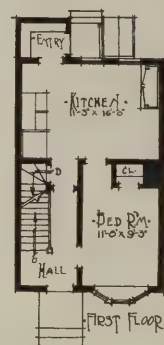
Unrestrained thrift often leads to "developments" like this



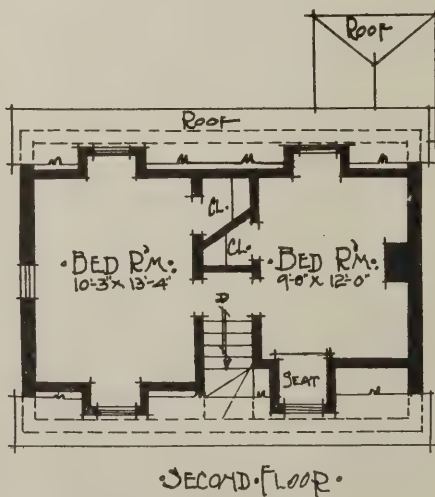
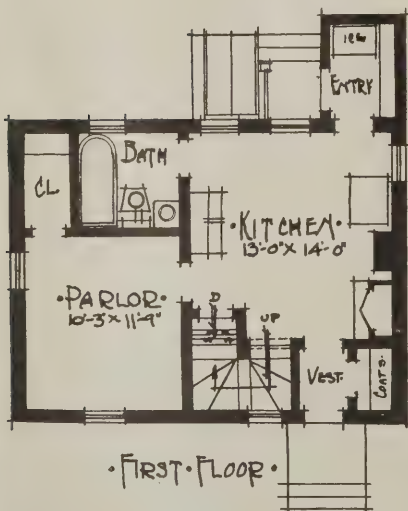
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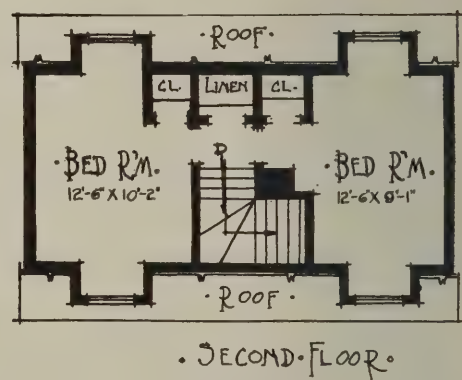
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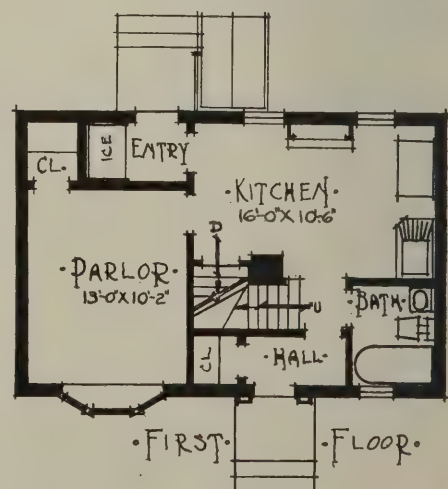
Type K-8



Type K-9



Type K-10



Type K-12

Typical plans of development at
Bridgeport, Conn.

Housing at Davenport

THE United States arsenal at Rock Island is practically surrounded by five communities, the chief of which are Davenport in Iowa, and Rock Island and Moline in Illinois. Several large industrial plants are located in these overlapping towns and cities, thus rendering it necessary to distribute housing developments in a manner to best serve the workers in each of the different plants. To meet this requirement four rather widely separated housing sites have been developed. The development at Rock Island was briefly described in the June issue of NATIONAL BUILDER, and the development at Davenport is the subject of this article.

The development at Davenport is known as the McManus tract and is the largest one of the group. It offers accommodations for 189 families, 20 of which are provided for in semi-detached houses. The architects were Temple & Burrows, and the development was under the direction of the U. S. Housing Corporation.

The plot plan shows a number of vacant lots which are to be built upon as the need may arise. The gridiron arrangement was forced by reason of the fact that many of the streets were already in existence. This handicap was partially overcome, however, by varying the setback and types of adjacent houses. The use of alleys for the removal of ashes, garbage and so forth was required by city ordinance, otherwise they could easily have been dispensed with. The playground adjoins a small school already built.

Only eight types of plans were used for the houses, but twenty-three different exteriors were based on them. This fact has given rise to some criticism on account of the lack of repose in the appearance of the development. But, to quote from the report of the Housing Corporation, "The custom of the vicinity seems to lean toward dissimilarity rather than uniformity in the design of rows of detached houses." The criticism of course does not mean that rows of houses precisely alike are to be preferred, but that the exterior should be more fully related with roof lines near the same levels and with each of the different styles segregated in groups.

Whatever merit the criticism may have applies only to the general grouping, as taken as individual houses the designs leave little to be desired, even though the mouldings are crude and far inferior to those drawn by the architects.

All of the houses are of frame construction. Some are finished with magnesite stucco, others with clapboards or shingles, and on some a combination of these materials are used. This method offers a means of obtaining variety in the appearance of

similar houses that is often singularly striking in its effectiveness.

The photographs which accompany this article were made while the development was in an incomplete stage, and they, of course, give but a faint idea of the attractive appearance of the houses since the grading and planting have been added.

All of the houses have complete plumbing equipment, including a laundry in the basement that provides for the power washing machines that are generally used in the locality. The basements are of concrete and contain the furnaces, fuel rooms and so forth. The roofs are of asphalt shingles.

All of the front entrances have French doors, and the windows have wood muntins forming small panes. The kitchens have built-in cabinets with sinks and drain boards. Space for the cooking ranges is carefully proportioned, as is the space for refrigerators in the rear entries. Covered rear porches are not provided, they could, however, be easily added if desired. The rear entries contain the stairs to the basements and most of them are of the grade-line type.

Figure 1 shows a four-room bungalow that is uncommonly attractive. The Palladian arch treatment of the porch is especially good. The entrance is directly into



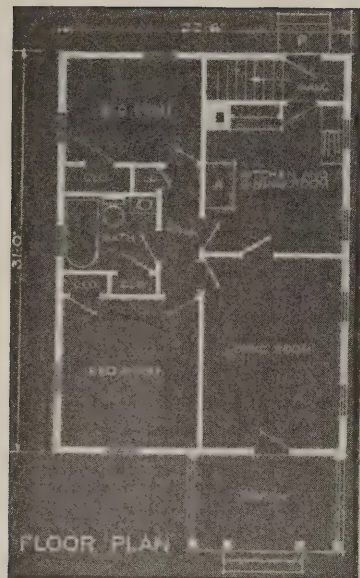


Fig. 1—Note the shingle treatment in the rake s of the gable cornices. The plan is reversed

the living room. The bath room is placed between the two bedrooms and contains a large closet for linen, towels, soap, and so forth. Each bedroom has cross ventilation and contains a large closet. The central hall opens into each of the four rooms and the bath. It contains a linen or coat closet. No dining room is provided, as it is intended to use the kitchen for such purposes. The arrangement is such, however, that one of the bedrooms or the living room could be used as a dining room.

Figure 2 shows a five-room bungalow. The porch here is also well designed with the entrance directly into the living room. A cased opening is placed between the living room and the dining room. Each of the two bedrooms has cross ventilation and ample closets. The central hall opens into all of the rooms excepting the kitchen, and contains two closets—one for linen and the other for coats, or for blankets and so forth. The kitchen contains a built-in cabinet and a sink and drainboard.

Figure 3 is a six-room house with a rather ingenious roof treatment. The cut-

in dormer over the porch has a metal deck connected to a down spout. This is an excellent device for preventing a large dormer from dominating a roof, and should be more often employed by designers. The entrance is directly into the living room which contains a coat closet at the foot of the main stair. Cased openings separate the living room from the main stair and the living room. The arrangement of the small hall between the kitchen and the living room is good, making the living room easily accessible from the kitchen and from the rear entry. With this arrangement it would be feasible to also use the living room for dining purposes, turning the dining room into a bedroom if desired. The second floor contains three bedrooms, all of which have cross ventilation and ample closets. The hall is compact and contains a linen closet.

Figure 4 is a five-room house of the Dutch Colonial type. The appearance of this house is excellent, with well related proportions and details. It will be noted that the plans and photograph are some-

what at variance due to a rearrangement of porches and entrances to add variety. The living room contains the main stair with a coat closet at the side, and a cased opening separates the living room and the dining room. The kitchen is very small, but as cross ventilation is provided it should be comfortable even in hot weather. The second story contains a hall that while very compact offers all the advantages of a much larger one. It contains a linen closet and is well lighted. Each bedroom has cross ventilation and large closets.

What Causes Streaks in Paint

If paint composed of white lead and lampblack for color shows streaks after brushing on it is because the paint has not been mixed perfectly. Break up the lampblack first, in turps and oil, then stir the mass until perfectly mixed, then add a little more oil and turps; use very little drier. This black pigment is very difficult of mixture with lead paint.



Fig. 2—Clapboards effectively used in the main gable and the porch pediment



Fig. 3—The clapboarded base helps to reduce the apparent height of this house

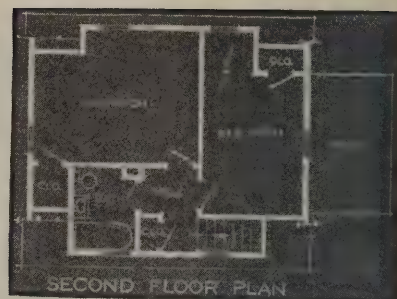
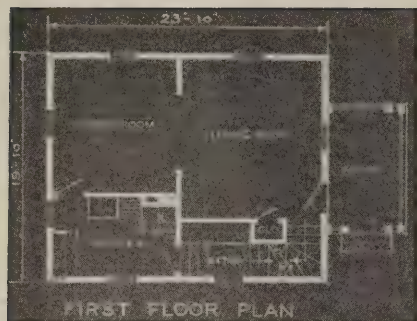


Fig. 4—The discrepancy between the plans and the photograph are due to rearrangement of the porch and entrance



Fig. 5—This house is based on the same floor plans as Fig. 3, but is reversed



Fig. 6—One of the most attractive bungalows in the development



Fig. 7—Many of the bungalows have large attics



Fig. 8—Narrow, moulded trim is typical of the openings of all of the houses



Fig. 9—One of the semi-detached houses

Houses at Hartford, Conn.

THE accompanying illustrations show two types of houses that are being built by Skinner Brothers of Hartford, Conn. The builders wisely entrusted the design of these houses to a capable firm of architects, thus creating confidence on the part of prospective buyers and insuring that the houses would be modern and attractive.

variety that may be obtained by such simple means is often remarkable. The photographs were made before the grading and planting were completed, with the consequence that the houses do not appear to the best advantage. Even with this severe handicap, however, it is readily apparent that the appearance of the houses is far ahead of that usually encoun-

row jambs; taken as a whole, however, they might be made a trifle smaller. Type B is a free handling of the Dutch colonial style, in which the upper pitches of the gambrel roof are made steeper than usual. The effect, however, is good. The entrance is graceful and well tied to the house. The wall surface enclosed by the entrance and the soffit are plastered.



Fig. 1—View of type A house with garage

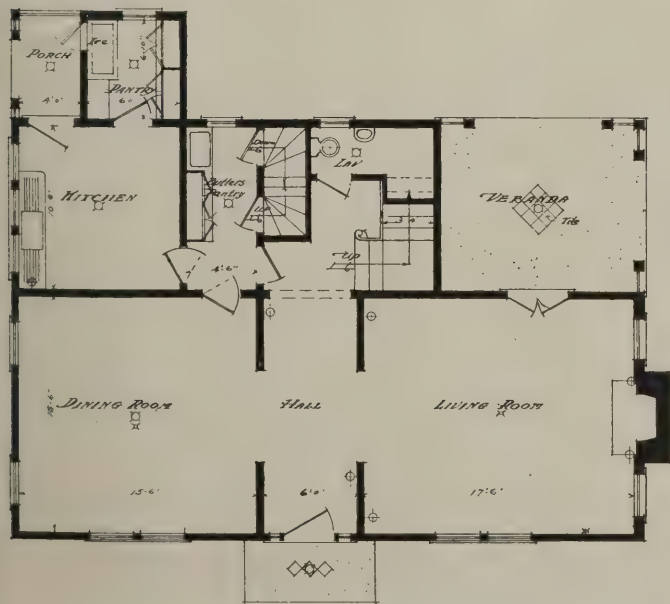


Fig. 2—A closer view of a type A house

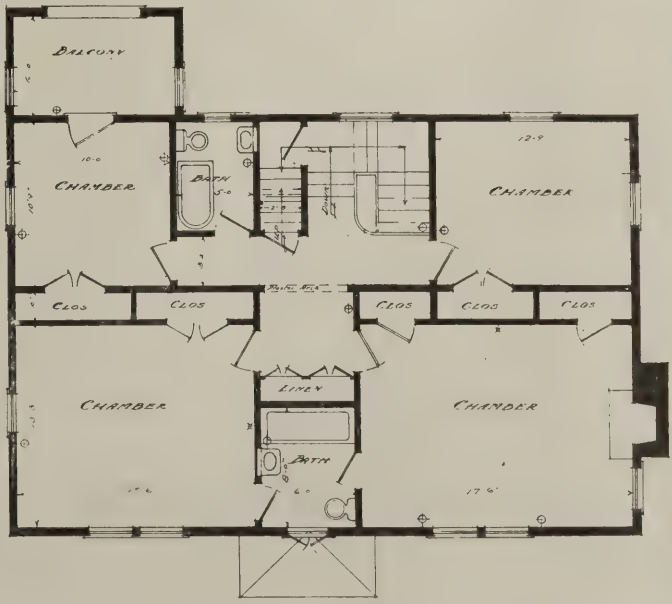
The architects were Smith & Bassette, and they developed two different types of plans, from each of which three houses have been built. The six houses are located on adjacent lots, but variety has been introduced by locating some houses broadside to the street, while others are turned with the end to the street. Also some of the houses are finished with clapboards, while others are shingled. The degree of

tered in houses that are built to sell. Both types are based on old colonial work; type A, however, has a faint suggestion of the English style. The hooded entrance is simple and dignified; the dentil course under the main cornice gives a nice touch to this detail, and the low roof at one side makes the house appear to hug the ground and avoids a barnlike appearance. The dormers are well designed with nar-

In both types the large chimneys are a decided asset, as is the use of trelliswork, although the photographs of type A were made before the trellises were placed. In the first floor plan of type A the front hall has wide openings into the living room and the dining room. The living room has a fireplace at one end and opens through French doors onto a porch. The porch has a plastered ceiling.



FIRST FLOOR PLAN



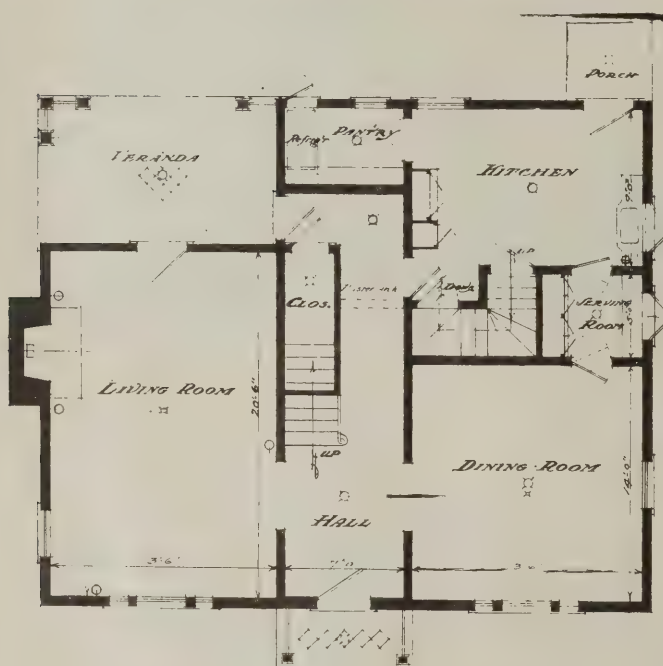
SECOND FLOOR PLAN



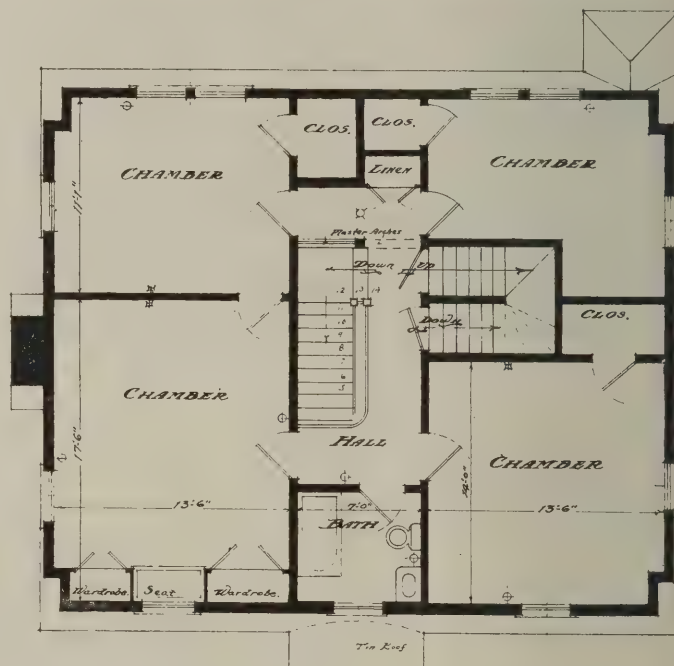
Fig. 3—A type B house with shingled walls



Fig. 4—A type B house with clapboard walls



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Wall space between two windows is provided for a sideboard in the dining room. This space is opposite the openings from the hall and balances the fireplace in the living room.

The kitchen has high windows over the sink and has a glazed door opening onto a kitchen porch. Two pantries are provided, one of which is intended for kitchen supplies, and the other for use as a serving pantry. The kitchen pantry contains a built-in cupboard and an outside icing refrigerator. The sewing pantry contains a built-in cupboard and a sink for washing silver and fine china. From the serving pantry stairs lead to the basement and also to the second floor. If the position of the kitchen and porch were reversed, an entrance from the porch to the serving pantry might be provided, thus making the basement stairs more easily accessible. A door

from the serving pantry opens into the rear portion of the main hall, which is separated from the front by a plaster arch. The main stair to the second floor leads from this portion of the hall and a lavatory compartment is placed in the space under the stair. A first floor lavatory is a practical feature that is too often overlooked by designers.

The second floor of type A contains four bedrooms, all of which are generously supplied with closets and have cross ventilation. The largest bedroom has two closets and contains a fireplace. The two front bedrooms open into a bath room, while another bath room is placed at the rear of the house. Two bath rooms on the second floor are becoming increasingly popular. One of the rear bedrooms contains a sleeping balcony. A large linen cabinet is placed at the end of the hall against the front

bath room. The stair is of the duplex type, branching at a landing from where one flight forms the main stair to the hall and the other the kitchen stair. A stair over the kitchen stair leads from the second floor to the attic.

The plan of type B shows a smaller house in which the arrangement is perhaps better than that of type A. Here wide openings lead from the hall into the living room and the dining room. The living room contains a fireplace and opens onto a porch. This porch is easily accessible from the kitchen and might serve as a breakfast porch if desired. The kitchen pantry contains an outside icing refrigerator, but the built-in cabinet is placed in the kitchen where the average housekeeper would prefer it. This cabinet contains a broom closet. A serving pantry with a built-in cabinet is placed between the

kitchen and dining room. The stairs to the basement and the back stair to the second floor open directly from the kitchen, an arrangement that is usually preferred to that of type A. The main stair to the second floor rises from the front portion of the hall and has a coat closet under it.

The second floor of type B also has four bedrooms, each of which has cross ventilation. The largest bedroom contains two

wardrobe closets and a built-in window seat. One of the rear bedrooms is quite small, but would serve as a child's room or for sewing. The bath room opens from the hall, and separate stairs lead to the attic and to the kitchen. The hall contains a small linen closet.

Both of these types of houses contain large attics that might be partitioned off to form a couple of additional bedrooms

if desired. Each has a full basement with heating plant and laundry. The bath rooms have tiled floors and wainscots, and the trim and floors throughout are of hard wood. An interesting feature is the use of tile inserts in the concrete slabs which form the floors of the living porches and around the entrances. It is such individual touches that go far toward raising a house above the commonplace.

The Small Livable House

By Eugene R. Schulz, Architect

HERE are some suggestions that the builder can use in presenting conditions to the prospective home builder, either in newspaper "readers" or in literature he may send out to a selected list. The "judicial" way of showing a prospective home owner his relation to the builder and the builder's relation to him has considerable merit. All the meritorious things that are mentioned as part of a builder's equipment are implied to be comprehended in the builder who sends out such literature. He puts himself into the confidence of his clients, and clears away many misconceptions, because the matter is both judicial and informing, and the practical examples sustain the argument which follows:

Today with labor and material prices "sky-high" the cost of building is a perplexing problem. But if expense were not an important factor in the building of a home, we would probably have but few small houses. The average home-builder with a limited amount to spend for the constructing and equipping of his house, cannot expect a spacious home; but if he is considerate and careful he can build a comfortable one. The success of any house depends largely upon the common sense of the Builder and the Owner.

The Owner usually has a certain amount of money to spend for the house complete and a fairly concise idea of what he wants regarding the size and number of rooms. After he has expressed his own desires regarding his house, it remains for the Builder to tell him how much he can have for his money. The Owner, being unacquainted with building costs, is very apt to demand more for his money than he will eventually get. Often times he becomes unreasonable in his demands and is apt to become discouraged. But if he keeps in mind a house designed to fit his actual requirements rather than please his whims, the problem is greatly simplified.

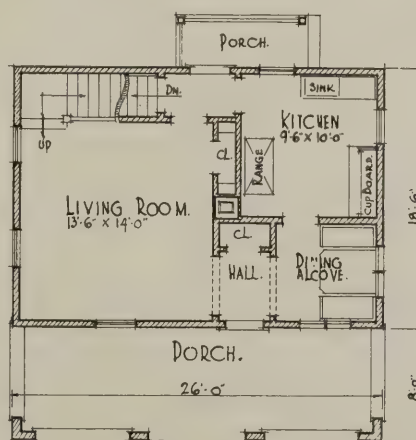
Our houses should suggest our own individuality. We should have our personal ideas regarding the houses in which we are going to live, but let them be intelligent ideas, and if we are told frankly and candidly by one who is in a position to under-

stand these matters better than ourselves, that we are wrong, let us try to understand, for if we don't we are apt to regret it in the end.

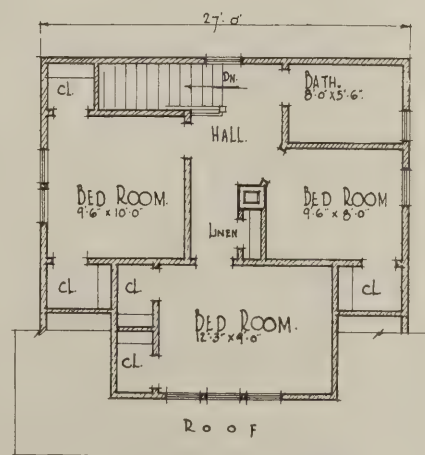
should keep in mind the total cost limit, and yet strive to give his client as much as possible for his investment. This rough sketch then becomes a basis for argument.



Fig. 1



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

After the Owner has stated the amount which he is able to afford, the Builder should prepare a rough pencil plan showing the number, size and the arrangement of the rooms. In drawing this plan he

Alterations and changes are suggested. Because of the stipulated total cost which is to be afforded, the builder may find that in many cases he has been forced to eliminate some of the suggestions made by the

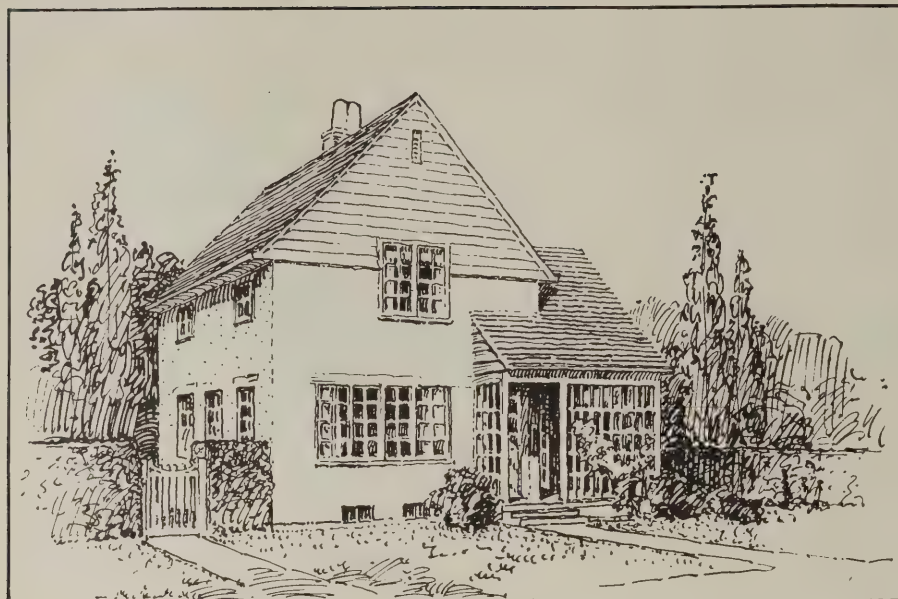


Fig. 2

home-builder. As a rule this is not done because the Builder is indifferent to the Owner's wishes but because he is honestly working to keep the house within the cost

limit. On this point Owners oftentimes become unreasonable in their demands, and become discouraged. The Owner is protected by the Builder's estimate. Before

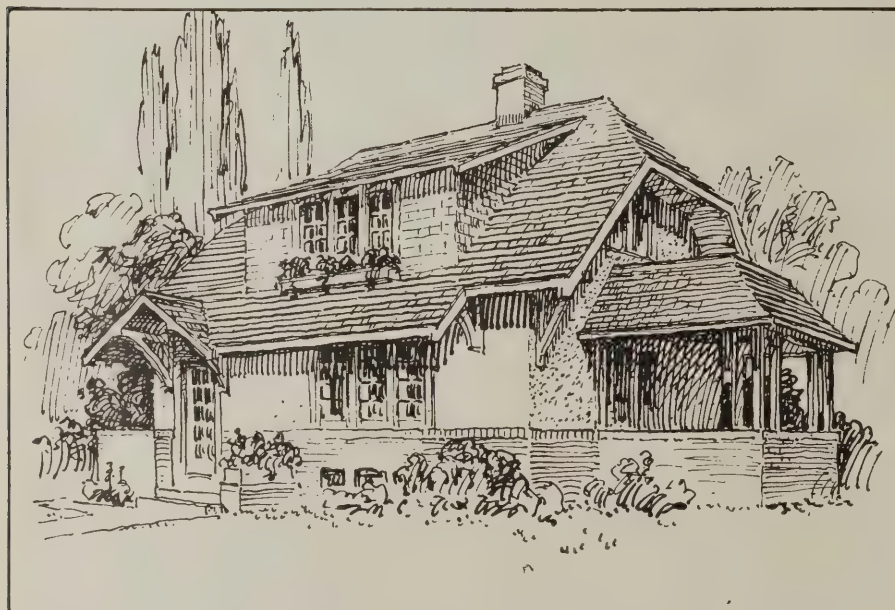
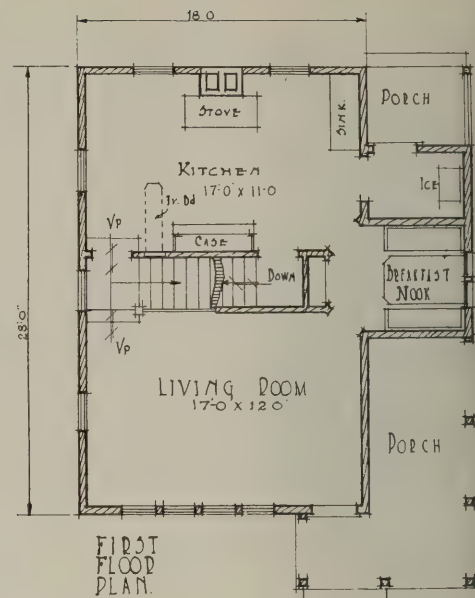
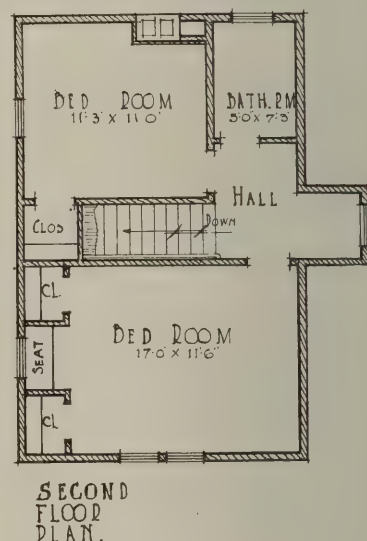
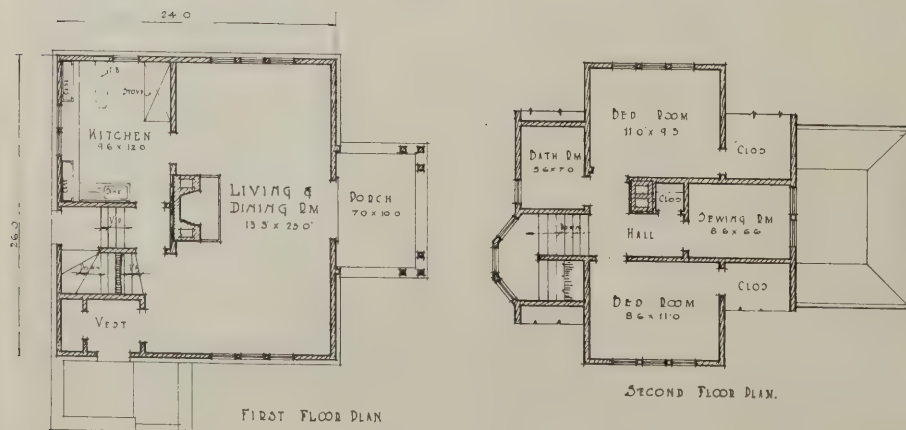


Fig. 3



he becomes responsible for the payments on his house an estimate has been submitted to him for his approval. If the estimate is too high and more than can be afforded, the plans must be altered and reductions made so that the house may be built within his amount.

Unfortunately the design of the exterior of the house does not interest the home-builder as much as its interior arrangement. The Builder should try to think of the exterior as directly related to the interior. There should be some common harmony between the two. Above all, let us beware of an eccentric design. Many houses are made grotesque in an effort to create something different from those others have built. We do not build for a day or a week but in most cases for a lifetime.

The illustrations accompanying this article are examples of simple, yet dignified design and practical planning. The houses can be built at a very reasonable cost because of the simplicity of their design.

Unit Type Apartment Houses

WHEN Bridgeport, Connecticut, began work on the solution of her housing problem it was found that one of the most needful types of buildings was the apartment house. It was wisely held that an important phase of housing is that which concerns newly married couples who have not had sufficient time to establish a permanent home.

It was learned that the "floating" worker was recruited not only from the single men, but that the young married class also is a large contributor to the ranks of workers who are constantly moving from job to job.

In view of the deplorable housing conditions that surround these young people in every congested community,—conditions that are fostered by the housekeeping rooms and the "three decker" tenements that are common to almost all such communities,—it was arranged to make an experiment. It was decided to build groups of slightly, convenient and inexpensive apartment houses that would offer young couples a temporary home until they could accumulate enough funds to move into their own houses.

It has long been understood that this first period of married life is of vast importance in determining the formation of family habits. It is also understood that homelife gives a reasonably accurate index as to contentment, in other words the worker who lives in a slipshod house will reflect his environment; his work will suffer and he is always on the go, hunting a better job. Granting that his job isn't all that is to be desired, if his home is an exceptionally pleasing one he will think several times before sacrificing it on account of a more or less petty dissatisfaction with his job. In this he will often be influenced by his wife.

These apartments at Bridgeport are very successful in influencing young people to stay on the job. They permit their tenants to retain their self respect while saving for a real home, and because of their clean, wholesome and attractive atmosphere they offer a stimulus toward the formation of valuable family habits. In other words the apartments bridge the gap between the more or less dependent circumstances of the young worker during the first few years of married life and the later years when his growing family and his natural desires lead him to think of a real home of his own.

In building these apartments only three types of plans are utilized. These consist of three, four and five room units that offer considerable flexibility of arrangement to provide for variety in the appearance of the buildings and also permit various sizes and shapes of ground to be prop-

erly utilized. The architect was R. Clipston Sturgis, of Boston.

The walls are of common brick with rowlock arches over the windows. The second story windows of the 5-room apartments have a more ornamental character produced with stucco panels and a wooden balcony treatment. The bay windows in some of the second room apartments also add interest. The entrances are of wood and are well designed.

It will be noted that in all cases the apartments are but two rooms deep, thus avoiding the use of air shafts and other

disagreeable features of ordinary tenement houses. Each apartment has a private porch and the inevitable clothes line has been provided, but this feature is supplied by one of the compact swinging bracket types which do not disfigure the rear of the buildings as do the long dangling clothes lines stretched in the rears of most tenements.

The areas in the rear of the apartments is made slightly by shrubbery, trees and grass, and offer a play space for children that is a decided contrast to the dangerous and unhealthful conditions existing around

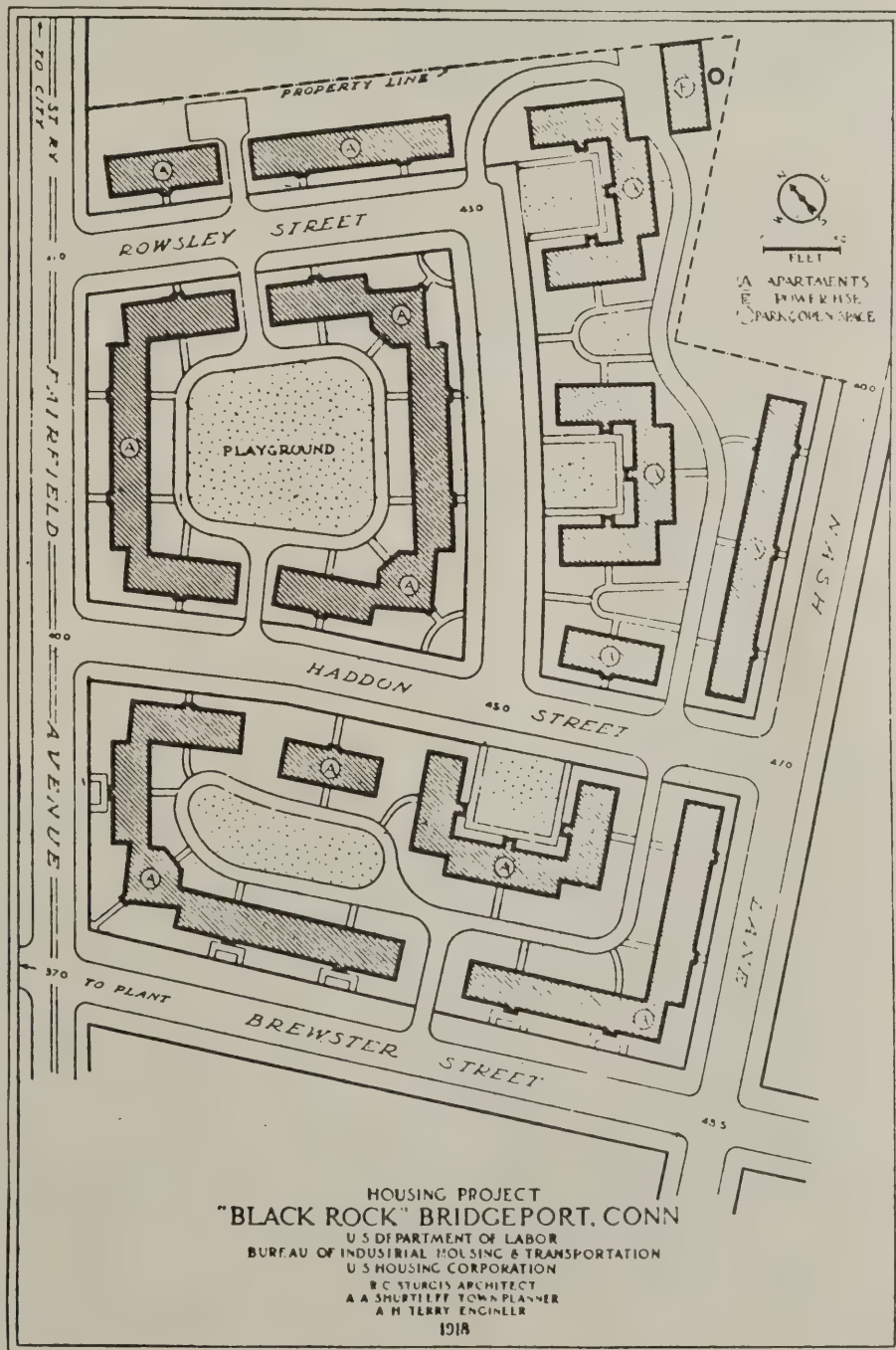




Fig. 1—(a) One corner of the "Black Rock" Apartment House development

most tenements, and many high grade apartments for that matter. In one case a large playground has been provided for the larger children of the neighborhood. The familiar saying, "A Queen Anne front and a Mary Ann back" certainly doesn't apply to these buildings.

That this plan of giving each room a

pleasant outlook onto generous air and light spaces is entirely practicable for almost any building of this type is shown by the fact that the U-shaped units facing the streets and containing 18 apartments are adaptable for use on lots only 100 feet in depth; the units in rows parallel to the street may be used on lots only 50 feet deep.

The buildings as used in this development give a density of almost 40 families per acre gross, which from an economic standpoint, compares favorably with the density of population of ordinary "three-decker" districts.

The heating plant is contained in a separate building. This makes an excellent



Fig. 1—(b) A typical U-shape arrangement of units. R. Clipston Sturgis, architect



Figs. 2 and 3—A study in contrasts. A row of "three-deckers" and a view of the "Black Rock" development



Figs. 4 and 5—Another study in contrasts. The rear of a group of tenements and a typical back yard in the "Black Rock" development

arrangement where the apartments are disposed in several buildings as in this case. It should be noted, however, that the possibility of future individual ownership of the houses has been provided for, and that in such an event it will be entirely feasible to install separate heating plants for each building.

All who are interested in apartment buildings designed to serve people who cannot afford unduly high rentals should study these at Bridgeport. The buildings are economical, sightly and are livable. They illustrate the value of simplicity in lending dignity and picturesque charm to buildings of moderate cost. From a standpoint of mere "looks" these buildings are far superior to many others that cost ten times more. Here will be found no "tin cornices," exaggerated ideas of detailing nor "stunts;" the buildings are four square, built for service—and render it,—and are exceptionally pleasing in appearance. No more can be asked of any building.

To give a harder finish to asphaltum varnish add a gill of shellac to the gallon of asphaltum.



Fig. 6—Fine old trees contribute to the effect of the "Black Rock" development

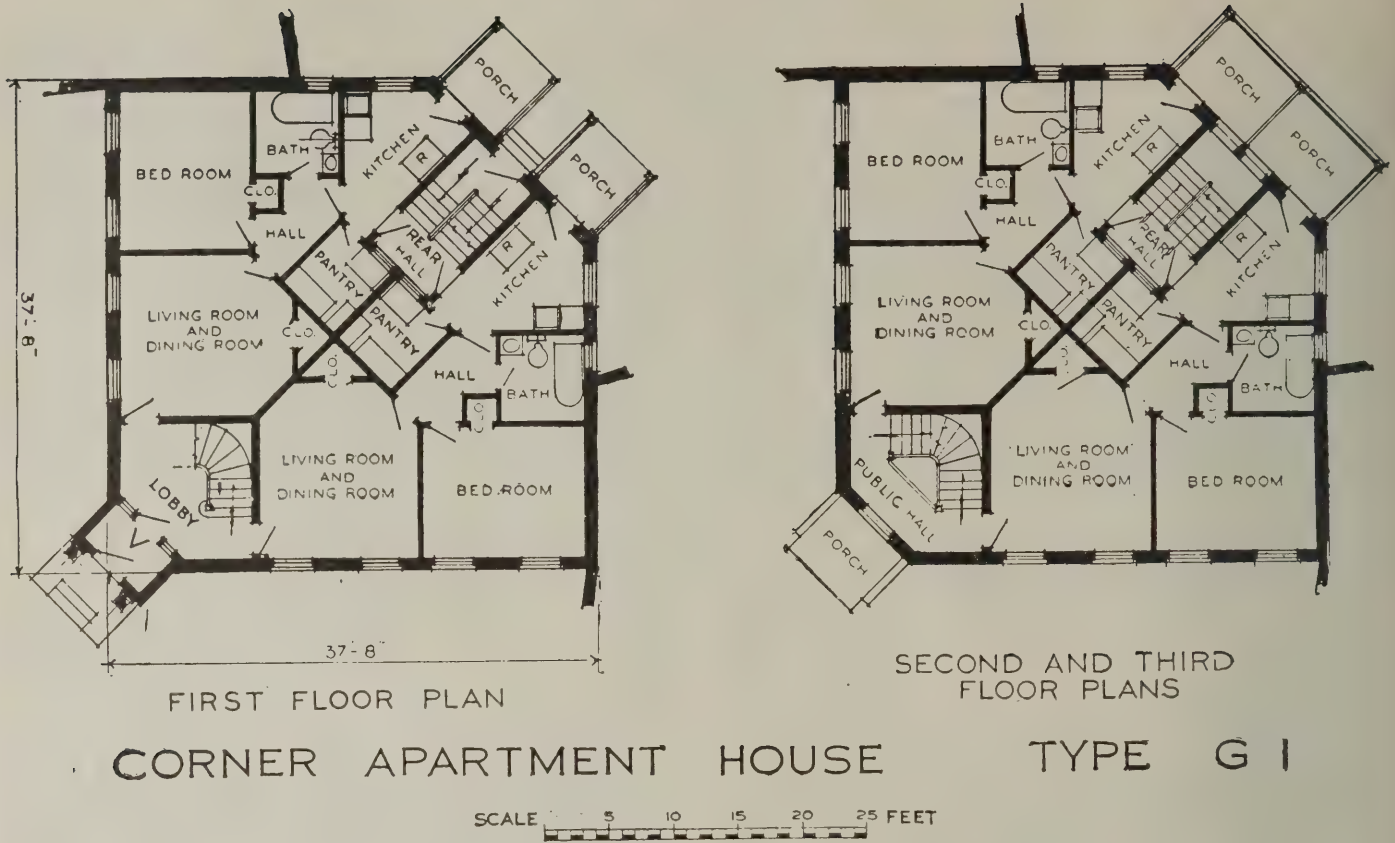


Fig. 7—Three-room corner apartments. R. Clipston Sturgis, Architect

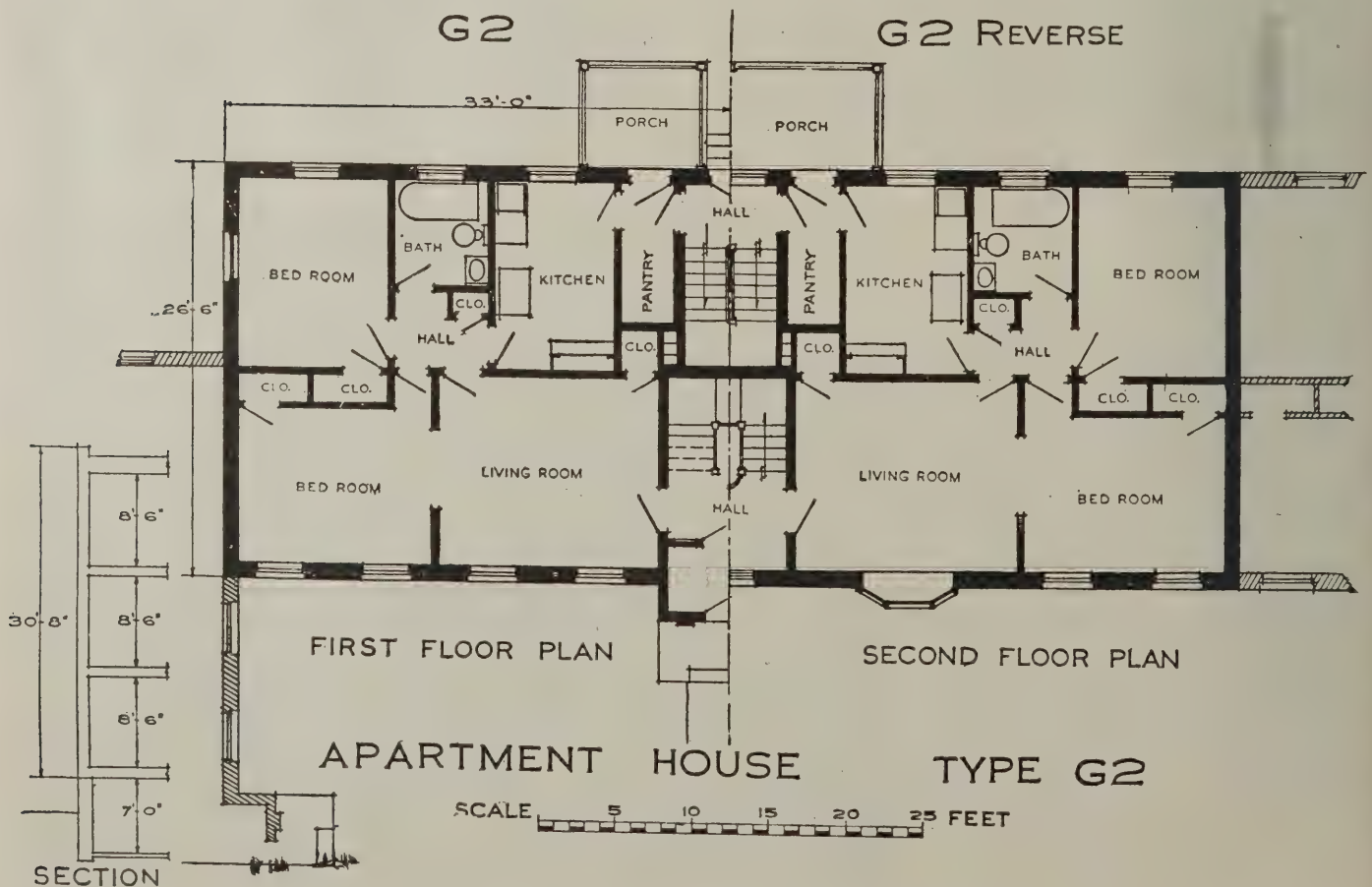


Fig. 8—Four-room unit apartments. R. Clipston Sturgis, Architect

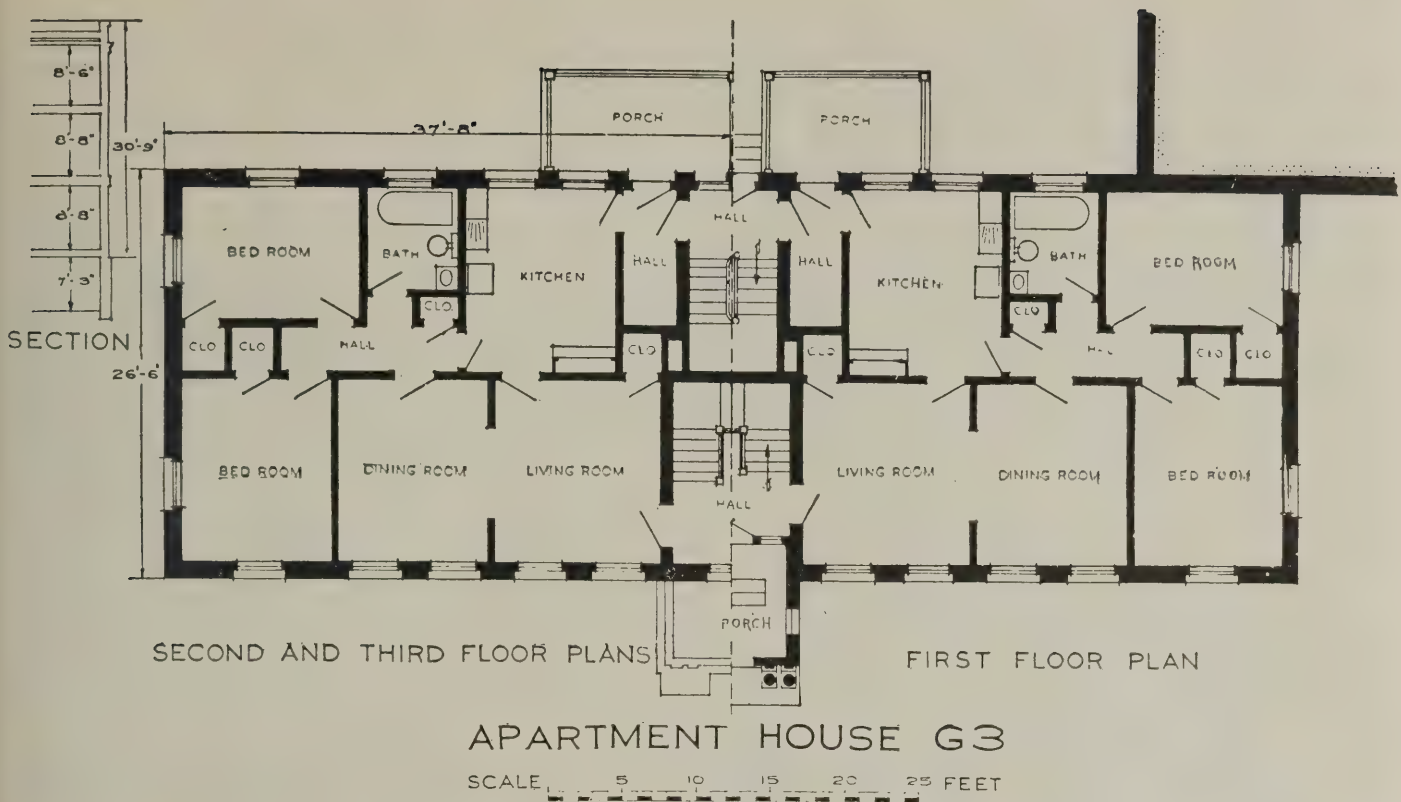


Fig. 9—Five-room unit apartment. R. Clipston Sturgis, Architect

Details of Space Saving Partition

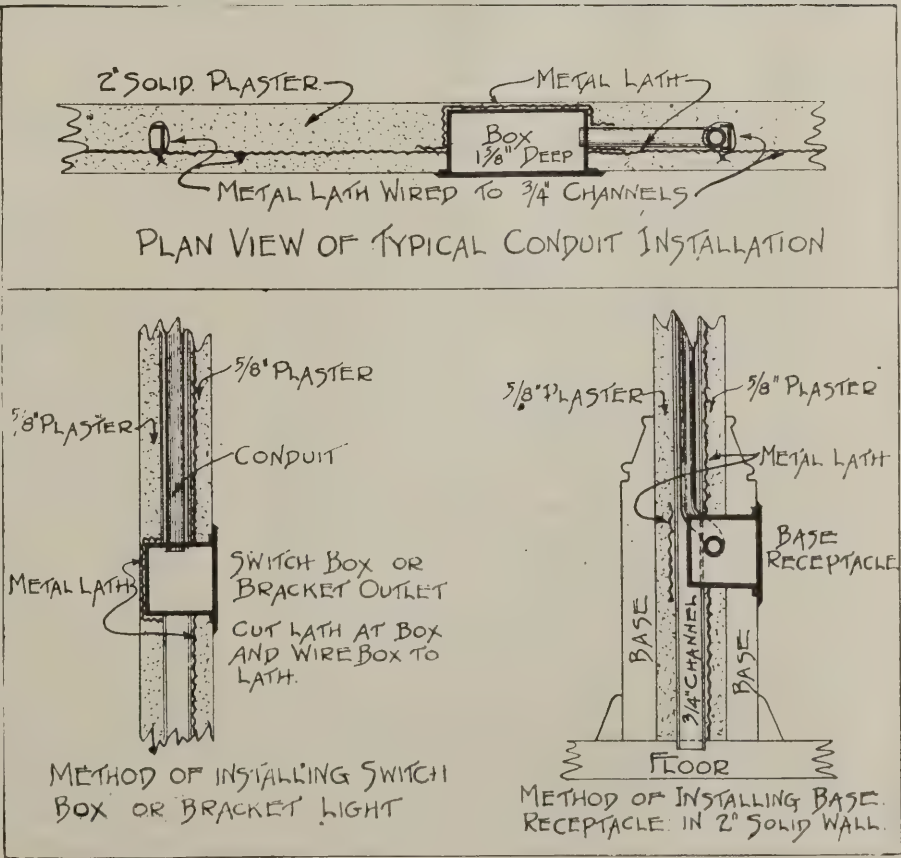
FOR over thirty years the two-inch solid partition has been used wherever space saving is essential. At the present high cost of building every inch counts. In a typical hotel of 500 rooms there is a saving of 3,500 square feet through the use of two-inch partitions instead of three-inch, says the *Metal Lath News*.

When it is considered that this means ten additional rooms with a rental value of about \$50 a day, the economy of the two-inch partition can be realized. This additional revenue is equivalent to over \$18,000 per year, or six per cent on \$300,000, and is practically all profit.

So widely is the two-inch partition used that outlet boxes and other electrical fixtures to fit the thin solid wall are standard and carried in stock by all electrical supply dealers.

In specifying and installing the outlet box, one condition should always be taken care of. Despite the shallowness of the box used, the thickness of plaster back of the box is quite small and the surface should be reinforced by a flat metal lath.

The lath is carried around the box and prevents the thin plastic coating from cracking. By following the sketch shown, and good practice in placing the lath, plaster and fixtures, unsurpassed results from the ideal thin partition are attained.



Three Types of Houses

ONE of the most important of the elements which constitute a designer is a sense of values. By *values* in this sense is

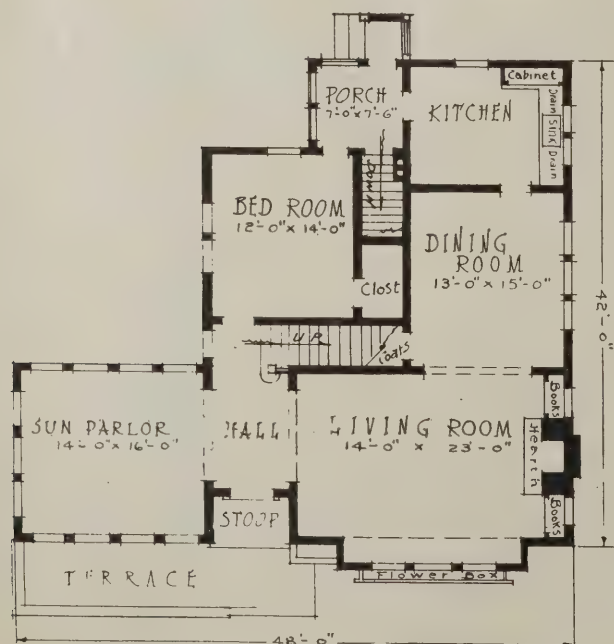
Too many designers are inclined to excuse a poor plan on the grounds that such an arrangement is necessary on account of

but a reasonable compromise is usually possible and should always be employed.

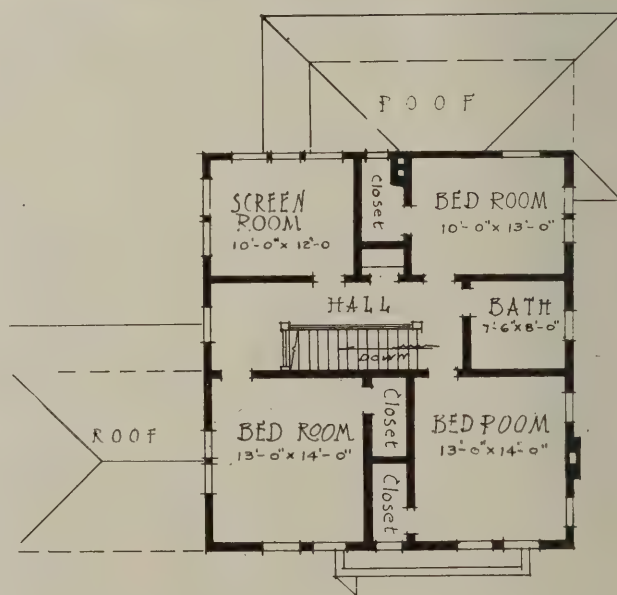
Then there is the matter of detailing.



Fig. 1—A two story house suitable for town or farm



FIRST FLOOR PLAN



SECOND FLOOR PLAN

meant proportion and harmony as applied to "looks" and practical arrangement, as well as cost.

appearance, or vice versa. Of course it is true that conditions sometimes arise to influence one requirement in favor of another,

Some designers are never content until every available feature has been forced upon the attention and every wall space



Fig. 2—A double bungalow that is economical

decorated. Then for good measure details and ornament are thrown onto the house so long as there is a vacant spot to aim at. As designers they should confine their efforts to wedding cakes.

The accompanying houses were designed by Ye Planry of Dallas, Texas. They are

well designed, both inside and out, and should prove useful as suggestions.

Figure 1 is a two-story house of the type known as "Western" or "prairie" style. The exterior is very simple and has a solid appearance that is seldom seen in a frame house.

A cement terrace extends partly across the front and the entrance is placed in a deep recess in the wall. At one side of the hall is a large living porch and at the other side is the living room. By reason of the wide openings which separate them, the living porch, hall, living room and dining

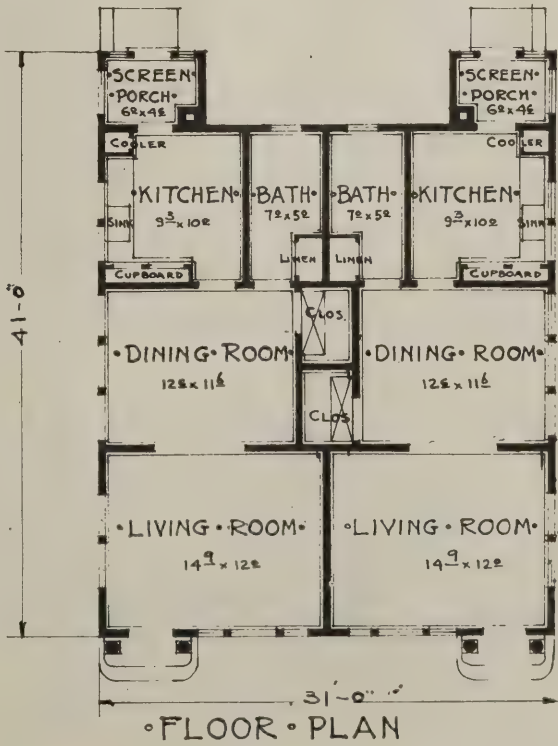
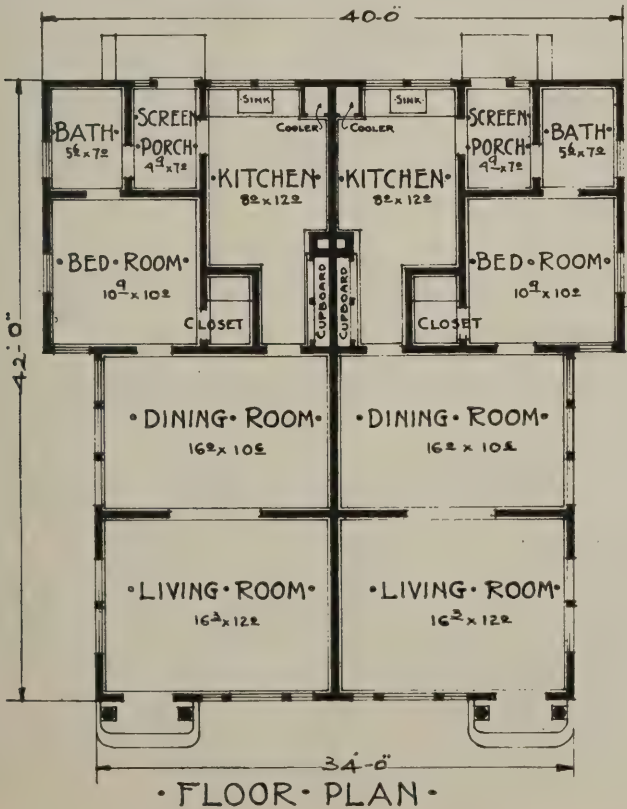
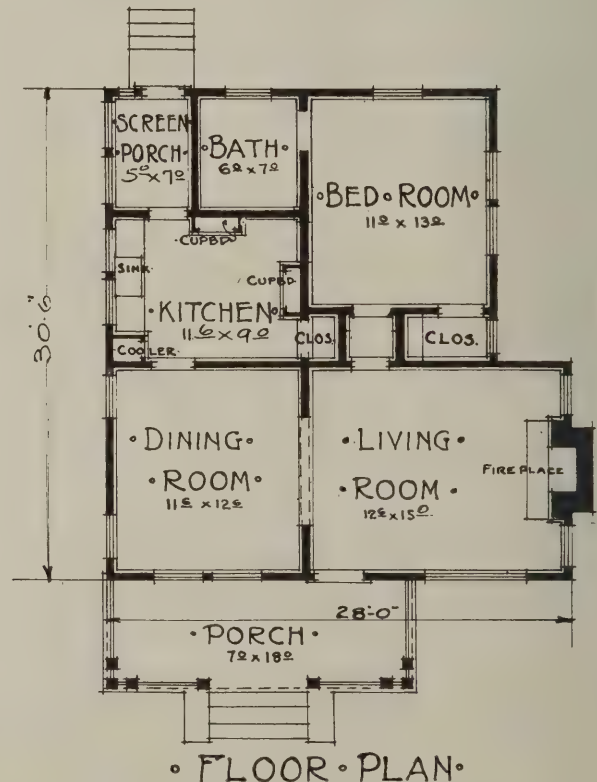
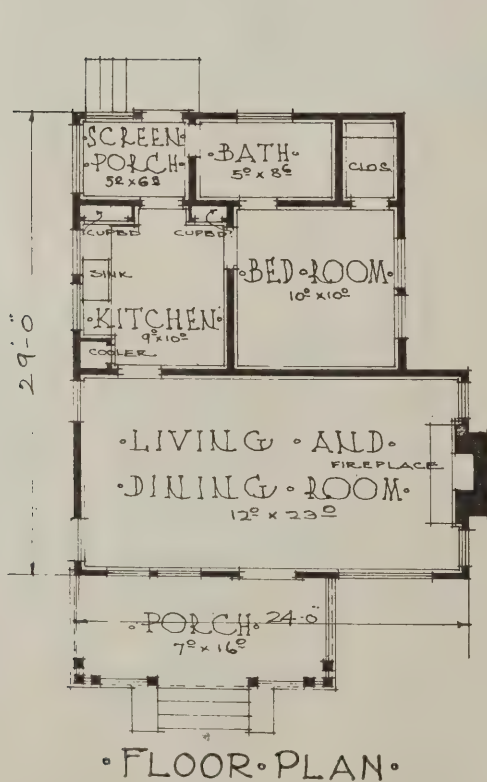




Fig. 3—A small bungalow for "Newlyweds"



room, form what is practically one large room that would be highly useful for a family that entertains a great deal. The living room contains a large bay window and a fireplace flanked by bookcases. A coat closet opens from the dining room into the space under the main stairs. The

house has no pantry, but some storage space is provided by a built-in cabinet and the drawers under the work boards at the sink. The kitchen has cross lighting and ventilation.

The basement stairs lead from the rear porch, a good arrangement that does away

with a bulkhead stair and also keeps a lot of dirt from being tracked into the kitchen.

The first floor bedroom is novel, but very useful in case of illness, or if the house were built on a farm this room would be very desirable for the use of a hired man.

The second floor contains three bedrooms, all of which have cross ventilation and ample closets. The sleeping porch could be made into an additional bedroom if desired. A linen closet and a bath room are provided on this floor.

Figure 2 is a double bungalow for which two different floor plans are shown. This type of house has achieved popularity from the fact that a double house can be built at less expense than can two single ones. There are several conditions under which this type is practicable. Adjacent owners of narrow lots can build this type on the lot line, thus gaining ground space around their houses, or one owner may own the entire property and build one-half for his

use and rent the other half of it, or the houses may be built for rental purposes alone.

The elevation of this house is simple and attractive, the entrances being very unusual and pleasing.

The large floor plan contains four rooms and a bath for each half, and the arrangement is convenient and compact.

The smaller plan contains but three rooms and a bath for each half, but the use of wall beds in the dining room gives the units four room efficiency. The use of wall beds is becoming more general for conditions similar to this.

Figure 3 shows a small bungalow for

which two plans are also shown. The elevation of this bungalow is typical of the style, but is an improvement over many in that the porch is carried only part way across the front and is therefore made a subordinate element rather than one dominating the house.

The large plan shows four large rooms and a bath room. A wall bed for the living room could be placed in the space now occupied by the bedroom closet, thus increasing the capacity of the house.

The smaller plan shows but three rooms and a bath. The living and dining rooms are combined to form one large room, a very practical arrangement for a small house.

The Relative Cost of Bungalows and Two Story Houses

GENERALLY speaking houses are grouped into two kinds; the house with two floors and the bungalow. Until quite recently the bungalow has been handicapped by the general impression that such a type is relatively more expensive than a two story house offering the same accommodations. It was held that the in-

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost

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Fig. 1

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost



Fig. 3

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost

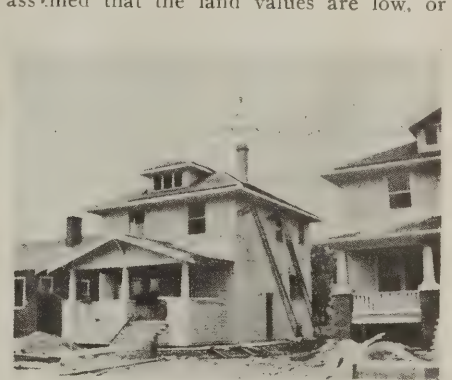


Fig. 5

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost



Fig. 2

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost



Fig. 4

creased area of foundations, roofs and so forth made the bungalow unduly expensive. Later, however, comparisons of cost



Fig. 6

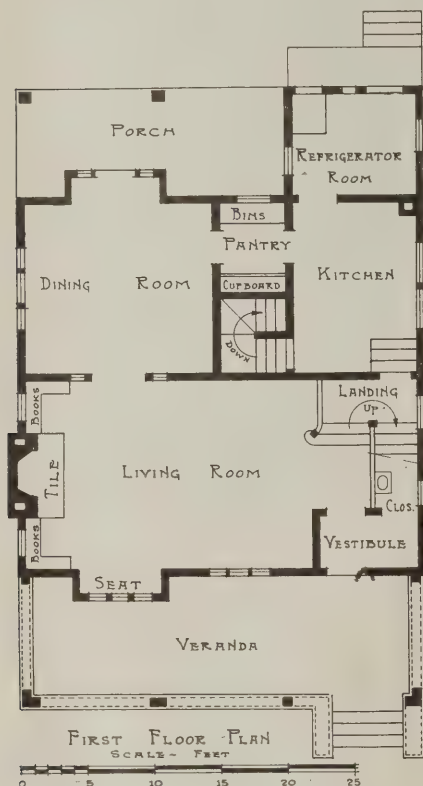
Two New York Houses

TWO HOUSES at Syracuse, N. Y., designed by Harry D. Phoenix, architect, are here shown.

Floor plans of Fig. 1 are not available, but the exterior indicates that a central hall opens into the living room on one side and the dining room on the other. Each

of these rooms has a bay window, and an enclosed porch opens from one and an open porch from the other. The second floor apparently has four large rooms with

flower boxes between the columns of the open porch relieve the severity. The enclosed porch is glazed with wooden panels under the windows.



Floor plan for house Fig. 2



Fig. 1—A modern house based on the Italian style

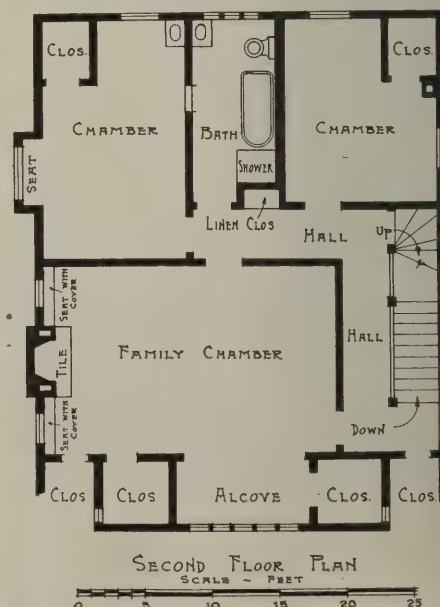
a bath at the front of the hall. The attic is well lighted and ventilated and may contain extra rooms.

The exterior is simple and straightforward. The entrance hood and the roofs of the bays are continuous, binding these details together. The trelliswork and the

Figure 2 is a house of stucco on wood frame. A large open porch extends across the front of the house and is roofed by an extension of the main roof. The porch opens into a vestibule which contains a coat closet and lavatory. The living room extends entirely across the front of the house and at one end contains a fireplace flanked by built-in bookcases, and at the



Fig. 2—A modern house of the Queen Anne type



Floor plan for house Fig. 2

bay window with a built-in seat extends onto the porch.

French doors with sidelights open into the dining room from the living room and also from the dining room onto a porch at the rear. This porch may be used as a dining porch when desired. A small pantry is placed between the dining room and the kitchen. Stairs to the basement and a short flight connecting with the main stairs, lead from the kitchen, at the rear of the kitchen is a cool room containing an outside icing refrigerator.

The second floor contains three bedrooms, all of which have cross ventilation. The front bedroom is large enough for use as an upstairs sitting room, a practical convenience that is growing in popularity. This room contains a fireplace, with built-in seats, and a large alcove overlooking the front yard. There are three closets in this room; two large ones for clothing and a low one under the roof for blankets and so forth. There are two doors in this room; one opening near the bath room and one near the stairs.

The other two bedrooms and the bath room are lighted at the rear by a lift dormer. Closets are built in the corners under the roof. One of these bedrooms contains a bay window with a built-in seat and a lavatory.

The bath room contains a shower bath in addition to the customary three fixtures, a linen closet opens near the bath room and an attic stairs rises from the turn in the hall. At the front of the hall is a utility closet built under the roof. other end is located the main stair. A

Concrete, Stucco and Tile

THE accompanying illustrations show an attractive bungalow recently erected in Indianapolis for William Gage Hoag, by the Peters Eastman Company, contractors of that city.

Living room, kitchen, dining and breakfast rooms, sun parlor, two bed chambers and bath are conveniently arranged on the first floor, while a high finished basement

provides space for billiard room, laundry, maid's room, shower bath and garage, in addition to furnace and fuel rooms. The attic is unfinished. A portion of the large front porch is uncovered, giving a pleasing balcony effect. To offset shadows under the broad eaves, surplus window space is provided, inviting plenty of sunshine into almost every room.

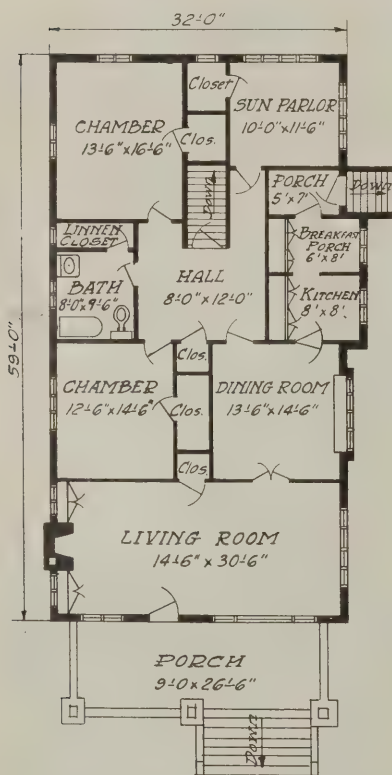
Methods of construction were unusual only in the wall material used. Walls from the footings up are of triple air space type concrete structural tile, each unit having a wall face twenty inches long and six inches high, with width varying from seven to ten inches. These tiles are made especially to receive stucco and possess most of the characteristics of a good base,



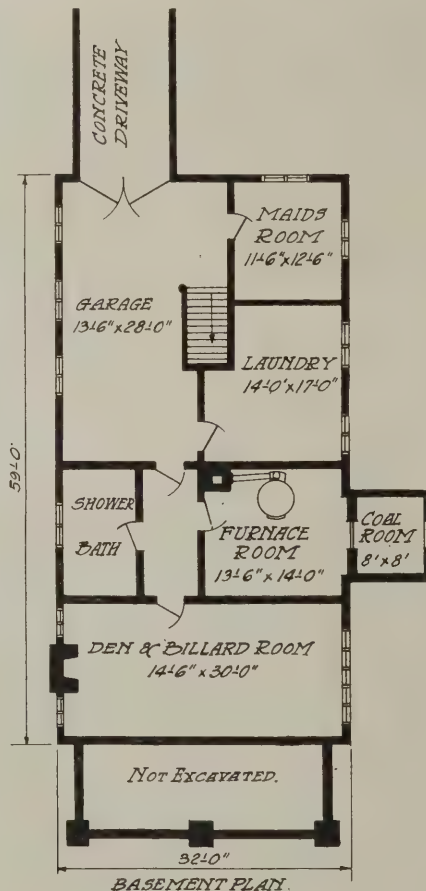
Bungalow of concrete and stucco and tile and stucco



Concrete and tile walls ready to receive stucco coats



FIRST FLOOR PLAN



BASEMENT PLAN

being uniformly rough in surface texture, equal in absorption and perfect in shape, so that they lay up easily in a true plane. Portland cement stucco was applied to the exterior, two coats being used in place of the customary three coats, with proportionate saving in material and labor.

Interior fireplaces are of same construction as the walls, covered with a smooth floated stucco and finished with fumed trim. Exterior steps, porch floor and base-

ment floor are of concrete. The roof is of asphaltic shingles on wooden framing. Due to the triple air space feature of the tile, and contrary to recommended practice for single air space block and tile, the plaster was applied directly to the inner surface of the masonry, with entire satisfaction.

The house is comfortable and attractive and a considerable number of additional structures of the same type are under construction in the vicinity.

High Prices of Lumber Check Housebuilding

Abnormally high lumber prices were in part responsible for the arrest of the housebuilding movement within the last few months, according to a report submitted to the Senate by the Forest Service of the United States Department of Agriculture and made public July 25.

During the latter half of 1919 and the early months of 1920, says the report, lumber prices in the United States increased more sharply and to far higher points than were ever known before. In March, 1920, average mill prices had increased 300 per cent and more over 1914. While the costs of production and distribution of lumber likewise increased, the rise in lumber prices was wholly disproportionate. "Present prices, though somewhat lower, are still excessive and yield profits unjustified by costs," says the report.

"A shortage in housing accommodations that is almost world-wide has brought home vividly the close relation of building to the comfort, health, and general welfare of the public. When for any reason construction falls below normal, overcrowding, high rents, lowered standards of living, and other evils follow."

Lumber prices, however, do not tell the whole story. Difficulty and delay in securing material and the impossibility of getting many of the grades desired tend to make the construction of a home at the present time a highly uncertain and speculative venture and take it out of the reach of large numbers of people.

According to figures of the United States Housing Corporation, the report states, normally 30 per cent of the number of buildings constructed are dwellings. In 1919, however, dwellings were only 15 per cent. Even before the war one million families in the United States desired houses. In 1919 only 70,000 houses were built, when 500,000 were required to meet the demand. In 1918 house construction was still less than in 1919.

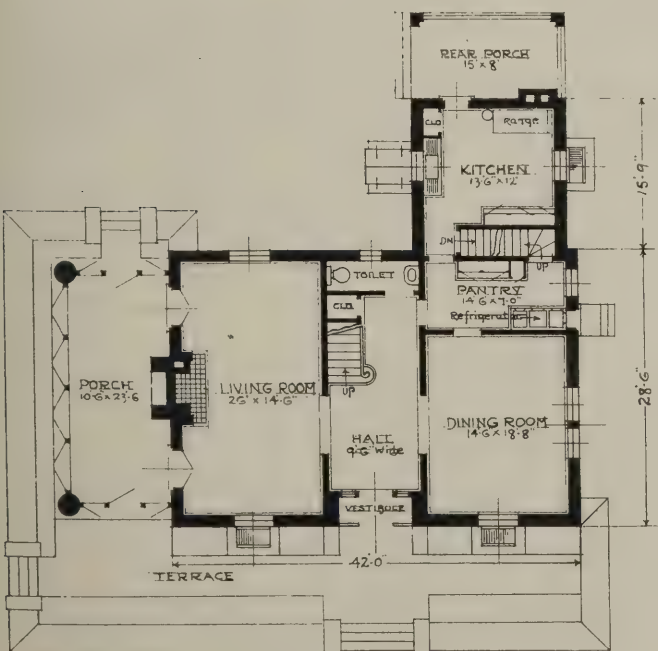
As examples of the increase in the cost of lumber, it is stated that the Pittsburgh home builder of 1913 paid \$27 per thousand board feet for No. 1 common dimension framing. In 1920 he paid \$72. Sheathing lumber No. 2 common yellow pine cost \$26 in 1913 and \$80 in 1920. Yellow pine finishing lumber increased from \$42 to \$140. If plain oak finish were used instead of Southern pine it cost \$85 in 1913 and \$260 in 1920. Yellow pine siding rose from \$36 to \$120; B and better flat grain flooring from \$38 to \$142; plain oak flooring cost, in 1913, \$70 per thousand feet, and in 1920 \$290; and quartered oak rose in the same period from \$102 to \$352.

Compact Houses

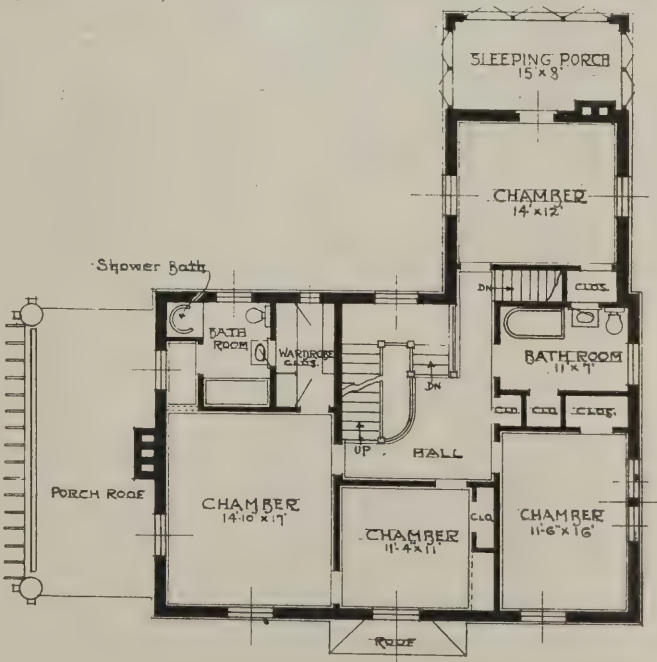
OWING to the cost of building, the scarcity of servants and other present day influences, there is a tendency toward building small houses. While this tendency is no doubt sound in all essential respects, it should not be overdone. A five-room house will not satisfactorily serve a family whose normal requirements are, or will be, six, seven or more rooms.



House for F. A. Shick. C. A. Schermerhorn, Architect



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Ingenious planning will of course go a long way toward making rooms do double duty, thus economizing space, but it should be remembered that the most of us are inclined to be extremists. We often carry such things too far. The compactness and logic of the five room house that has the efficiency of seven rooms appeals to the average man—for a while! Then he begins to chafe under its restrictions and finally winds up by feeling that he has been misled.

A seven room house is a particularly satisfactory one for the average American family. This gives four bedrooms; one for the parents, one for the children of each sex, and one guest's room. A family with servants of course requires additional space, but such rooms are often placed in the attic which is a satisfactory location, provided that they receive good light and ventilation and have plenty of head room.

Each of the houses that illustrate this article contain seven or more rooms. The first four of the houses were designed by C. A. Schermerhorn, architect, of Phila-

delphia. Mr. Schermerhorn was associated with W. K. Phillips, architect, in the design of the remainder.

The house for Mr. Schick is a pleasing design in stucco with a tile roof. The garage conforms to the house and forms an important feature of the composition. The placing of the house on a terrace adds a certain distinction. The entrance is a simple recess with a hood and the windows are well placed. The dormers, however, are a trifle too prominent.

The living room has a large living porch extension at one side. Both the living room and porch have fireplaces, a welcome feature on spring and autumn evenings. The first floor toilet and the coat closet under the main stair are practical features. The large pantry contains an outside icing refrigerator and a built-in cabinet with a broom closet. A basement stair leads from the pantry, and the back stair to the second floor rises from the kitchen.

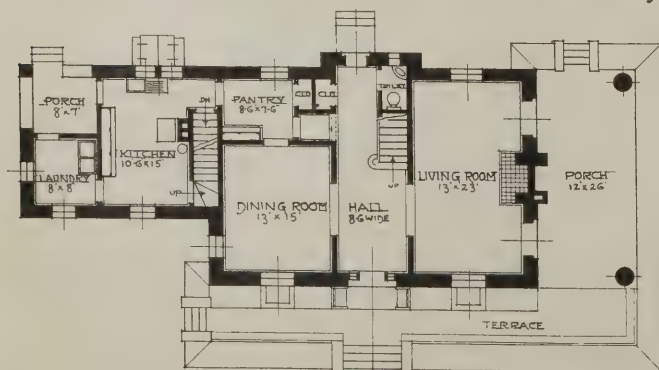
The second floor contains four bedrooms, two baths, and a sleeping porch. The principal bedroom has a private bath, in-

cluding a shower. This room also has a dressing closet with built-in wardrobe. All of the bedrooms have large closets, a linen closet opens from the hall, and the general bath room has a closet for towels, soap and so forth. With the exception of the smallest bedroom, all have cross ventilation. A stair leads from the hall to the attic.

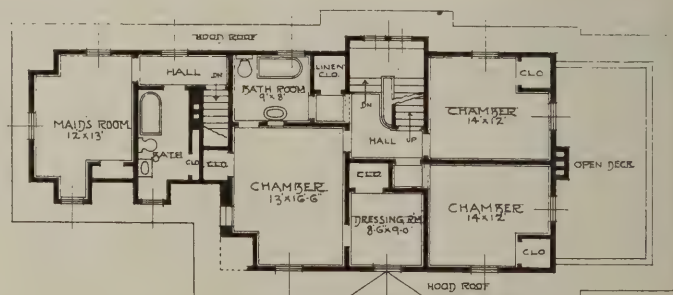
The house for Mr. Stauffer is of pronounced colonial type, although free from any rigid formality. The plan arrangement is quite similar to that of the house just described. A first floor lavatory, however, is omitted and the pantry is placed at the end of the house adjoining the rear porch. The bay window in the dining room makes an attractive feature, and by combining it with the main entrance under a Germantown hood, its exterior appearance is uncommonly pleasing. The second floor contains four bedrooms; a bath room, and a sleeping porch. Each bedroom has ample closet space and cross ventilation. The stair is of the duplex type, one flight of which forms the back stair. There is



House for E. Y. McCurdy. C. A. Schermerhorn, Architect



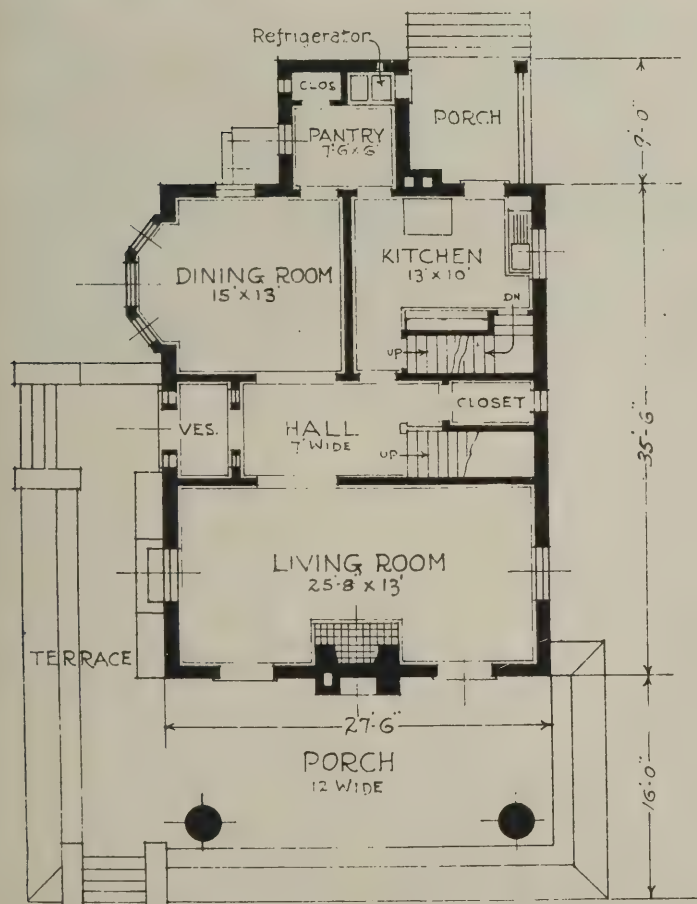
•FIRST FLOOR PLAN•



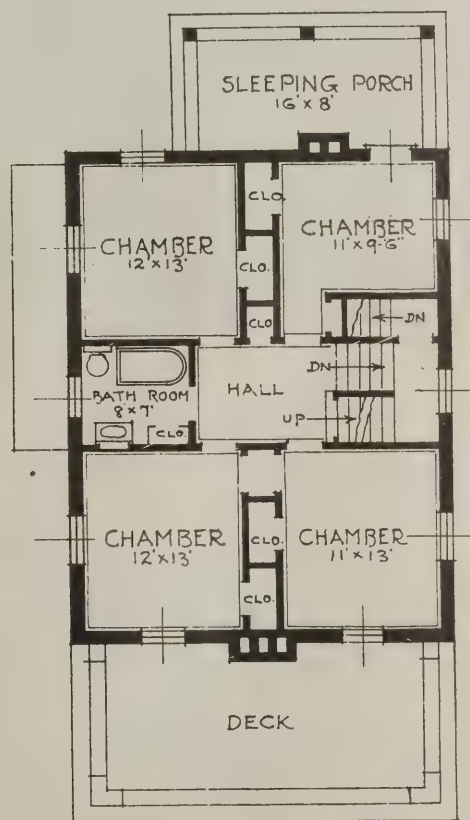
•SECOND FLOOR PLAN•



House for Chas. M. Stauffer. C. A. Schermerhorn, Architect



FIRST FLOOR



SECOND FLOOR

a stair from the second story hall to the attic.

The house for Mr. McCurdy is of the Dutch colonial type, with the first story walls of Pennsylvania split stone. The design is exceptionally good. The hood over

the long dormer is unusual and pleasing.

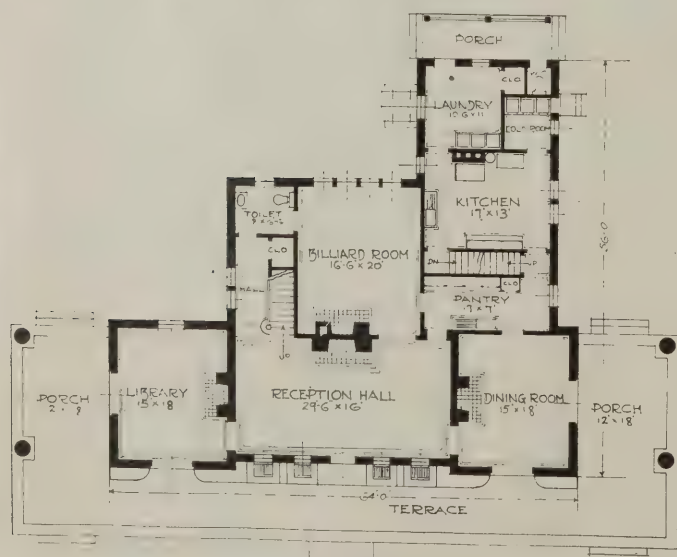
The main hall has an auto entrance from the rear and there is a lavatory under the main stair. Both the living room and porch have fireplaces. The kitchen is placed in an extension at one end of the house

and opens into a laundry. First floor laundries are becoming increasingly popular.

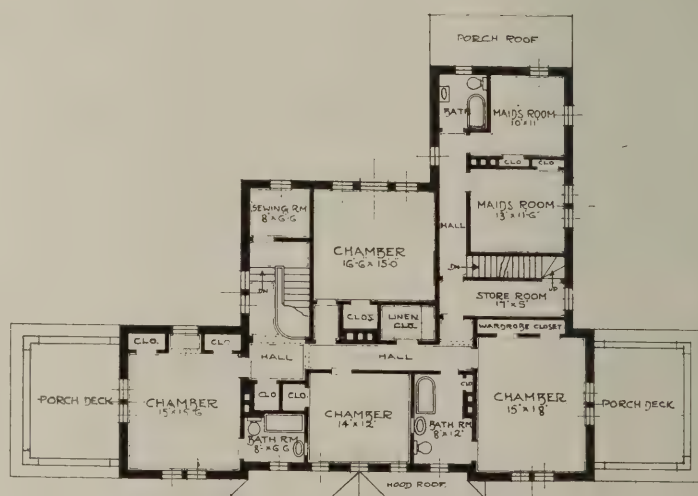
Over the kitchen wing is the maid's room with bath. This portion is cut off from the remainder of the second story and is reached by a stair from the kitchen. There



House for Clarence Illingworth. C. A. Schermerhorn, Architect



FIRST FLOOR PLAN



SECOND FLOOR PLAN

are three bedrooms over the main portion of the house, each of which has closets and cross ventilation. The largest bedroom has a large dressing room. The two

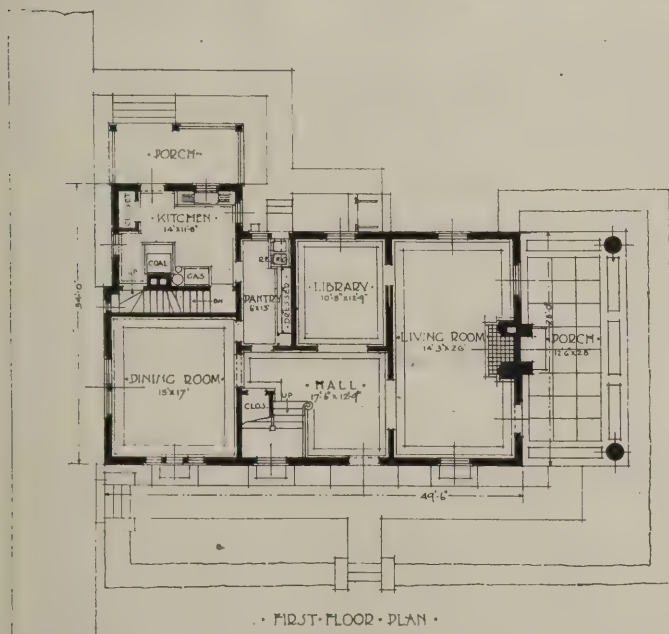
entrances to the bath room would be objected to by many people.

The house for Mr. Illingworth is the largest one considered in this article. The

exterior is of stucco with a slate roof. The Germantown hood across the central portion and around the porches is typical of early Pennsylvanian work.

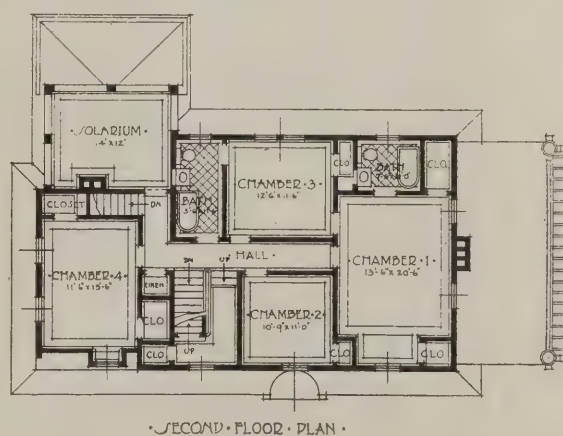


House for C. K. Lukens. C. A. Schermerhorn and W. K. Phillips, Architects



The entrance is into a large reception hall or living room. There is also a library and billiard room on this floor. These

rooms and the dining room all have fireplaces. There are two large porches; one at the library end, the other at the dining

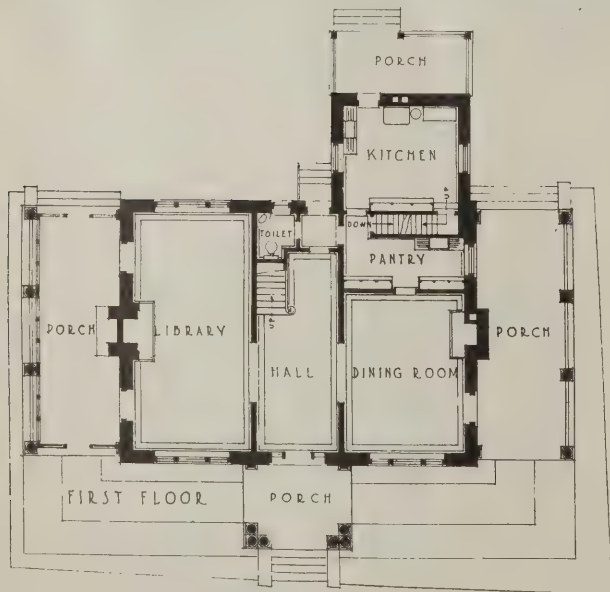


room. The location of the stair hall is unusual, but very practical in this case. A first floor lavatory and a coat closet are provided. The service wing contains the kitchen, pantry, laundry and a cold room for the outside icing refrigerator. A toilet opens from the rear porch.

Two maids' rooms with bath are located on the second floor of the service wing.



House for W. G. Eells. C. A. Schermerhorn and W. K. Phillips, Architects

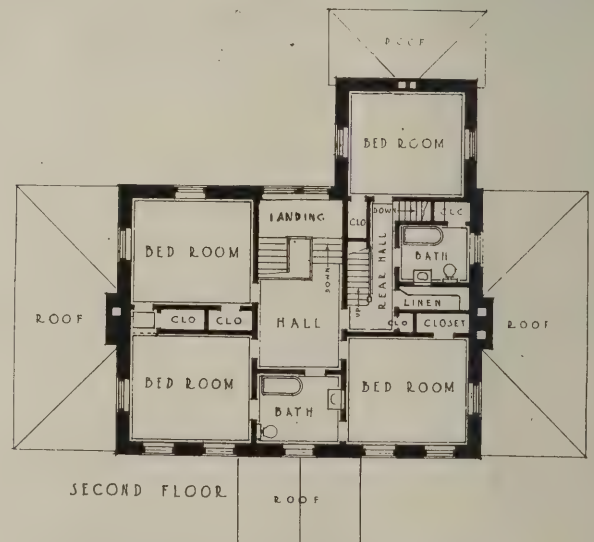


Stairs lead from the rear hall to the kitchen and to the attic.

There are four principal bed rooms and two baths in the main portion of the house. One bedroom has a private bath room and two closets. There is a roomy linen closet opening from the hall and a sewing

room is placed at the level of the landing of the main stair.

The house for Mr. Lukens is also of the Dutch colonial style. The entrance to this house is especially appropriate. The entrance is into a large front hall opposite which is the library. Both the living room

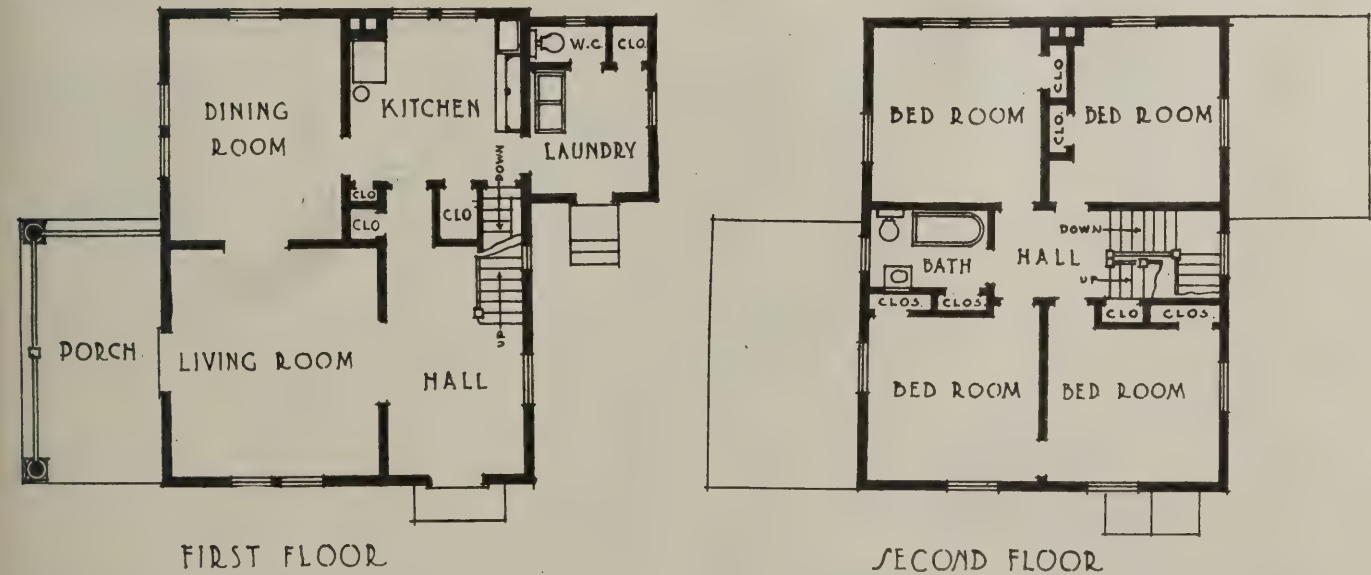


and porch contain fireplaces. There is a coat closet under the main stair and the pantry has an outside icing refrigerator. The kitchen contains a large closet and opens onto a rear porch. Provision is made for both coal and gas ranges. Stairs lead from the kitchen to the basement and to the second floor.

The second floor contains four bed-



House at Ambler Highlands, Pa. C. A. Schermerhorn and W. K. Phillips, Architects



rooms, two baths and a solarium, or sleeping porch. The largest bedroom contains two closets and a private bath. A linen closet opens from the hall and a broom closet is located on the landing of the attic stair.

The house for Mr. Eells is of split stone. The first floor arrangement is almost identical with that of Mr. Shick's house which is described in the first part of this

article. Noticeable differences are that this house contains an auto entrance at the rear of the main hall, and that the back stair rises from the kitchen instead of the pantry.

The second floor contains four bedrooms and two baths. All bedrooms have cross ventilation. The rear hall contains a large linen closet and a broom closet. Second story broom closets save many steps.

The house at Ambler Highlands is the smallest one of the group. The simple hooded entrance at the corner is quaint and attractive. The arrangement of the first floor is compact and convenient. A toilet is placed in the laundry.

The second story contains four bedrooms and a bath. The arrangement is economical of space and generally excellent. Each bedroom has cross ventilation.

Modernized Adobe

TAKING a tip from the early structures of the Southwest an enterprising firm of California builders have developed a type of construction which they have named "modernized adobe."

that modernized adobe, in which the walls are properly sealed against the direct action of dampness and the weather, has a wider geographic application than might be suggested at first thought.

article were made in one of the company's tracts at Walnut Park, adjoining Los Angeles.

We take this opportunity to advise our readers that we have been informed that



Modernized Adobe—Fig. 1



Fig. 2

Fig. 1—Adobe bricks are moulded on the ground and left in the sun to dry. Fig. 2—Dried bricks stacked and ready for use

The method is essentially that which was used in the construction of many of the buildings erected by the early Spanish settlers, but it has been brought up to date by utilizing modern materials and types of construction. Many of the old adobe missions and so forth are yet standing, thus testifying to the durability of the material when the climatic conditions are favorable. Their durability also has largely depended on the care that has been expended in their upkeep, such as the prompt repair of surfaces where the exterior plaster has broken off, exposing the adobe walls to the weather.

The originators of "modernized adobe," however, claim that they have perfected a type of adobe construction that is highly durable and practically free from upkeep costs. By utilizing cement stucco the exterior walls are rendered highly resistant to the action of time and the elements.

From a standpoint of economy such material as adobe is almost ideal, as, where the conditions are favorable, the earth taken from the excavations may be utilized in building the walls. In times such as the present when prices have reached an alarming level that is holding down the building of homes that are sorely needed throughout the country, there is a magnificent interest in any material or method that will serve to cut down building costs. Of course, the success of adobe when used under severe climatic conditions is problematical, it may be found, however,

The Cudahy Walnut Land Company of Los Angeles inform us that they are the originators of modernized adobe construction and that the new type of building has created quite a sensation in their locality. The illustrations that accompany this

the house shown on page 81 of the May issue of NATIONAL BUILDER was built by the Cudahy Land Co. and is located in Walnut Park and not in Huntington Park, as was stated in that article.

The house shown in that article is a



Fig 6—The modernized adobe houses have a setting of walnut trees, and other greenery



Fig. 3—The adobe wall completed and receiving the rough coat of cement stucco

“model house” that is used to stimulate the interest of prospective buyers. By enlisting the co-operation of a prominent firm of in-

taken from the building excavation. Even the grass and straw stripped from the property may often be utilized in their

property where the house is to be built; truly a remarkable example of simplicity and economy.

The modernized adobe houses are built with concrete foundation walls; the interior walls and the roof and floor construction are of wood frame. Brickwork, Spanish tile and wood are used in details here and there to add interest to the exteriors. The lintels, arches and so forth are of concrete. The development of a suitable method of applying cement stucco to the adobe walls required considerable experimentation and the exercise of much ingenuity, as finally developed the method consists in first driving nails at close intervals into the hard adobe walls so that the nail heads project slightly to form a key for the stucco. Then the entire wall



Fig. 4—The completed building of modernized adobe

terior decorators, the model house has been completely furnished with Spanish type furniture, rugs, draperies and so forth, thus contributing to its pleasing effect on the visitor. Needless to say the decorators derive much valuable publicity from the arrangement and are also in a position to help the builder by advising customers to visit the model house. This co-operative idea is applicable to any similar development and should be taken advantage of by other builders and decorators. In some cases it might be practicable to distribute the publicity among material men as well as several firms of decorators. For instance a room might be allotted to each decorator; the bath room could display tiling as well as plumbing fixtures; parquet flooring specialists could display their wares in the important rooms and so on.

The nature of adobe blocks is such that walls built of the material may be made comparatively thick. This is held to be an advantage that results in coolness in summer and warmth in winter. The blocks are made right on the building site from earth

manufacture, and the blocks may be sun-dried on vacant portions of the property. Thus the source of the raw materials and a manufacturing site are combined on the

surface is sprayed with a coat of rough-cast before the plasterer applies the rough coat. The remaining stucco work is carried out in the usual manner.



Fig. 5—Modernized adobe is adaptable to almost every style of building

Dormer Windows--By A. Benton Greene

THE principles set forth in the July issue of NATIONAL BUILDER in connection with bay windows, apply with still greater force to dormer windows. A bay window pierces a vertical wall and its construction is comparatively simple. A dormer window pierces a sloping roof and has a vertical framework, thus complicating its construction. A bay window is not difficult to design for, since it breaks through a wall, the lines of the wall may be continued around the projecting bay, and the surrounding decorative details duplicated. But it is entirely different in the case of a dormer window. There is nothing in the treatment of the dormer that could suggest the remotest relationship to the main roof, except perhaps the treatment of the roof of the dormer. And it is just because this relationship is so precarious that extremely delicate handling is necessary.

A dormer piercing a roof helps to break up the monotony of a plain roof surface. It is an oasis, figuratively speaking, in a desert of shingles, slate or asbestos roofing. The conspicuous position that a dormer occupies makes it imperative upon the designer to treat it with care and refinement. A dormer may make or mar the design of a building. A large dormer in a small roof gives one a feeling of overpowering depression. A dormer that is disproportionately small gives a building an effeminate look. Too many dormers tend to create a feeling of weakness, etc.

But of far greater consequence than these aesthetic considerations is its utilitarian purpose. It makes possible the use of more attic space. It increases the number of livable rooms in the attic with comparatively little additional cost.

In French "dormir" means to sleep; and it is probably because all bedrooms, in early times, were placed in the attic, that the name "dormer window" was applied to those windows that lighted and ventilated these sleeping rooms.

There are so many different styles of dormers that it would be quite impossible to describe all of them in this brief discussion. All we can hope to do is to touch upon the salient characteristics of the most common types.

Generally speaking there are two classes of dormers: one which sets back of the face of the main wall, and the other which juts flush with it. The latter is shown in Fig. B; all the other illustrations exemplify the former type.

The opening in a roof for any kind of dormer window has double rafters at each end, a header at the top and a header at the bottom. These headers vary in size, depending upon the width of the opening, and the area of roof or size of dormer

they have to support. The dormers themselves are usually framed with 4x4-inch corner posts, 2x4-inch studding, 4x4-inch plate and 2x6-inch rafters.

Fig. 1 shows a front elevation and a sectional side elevation of a dormer finished with a triangular pediment. Sometimes the pediment is made in the form of a segment, as represented in Fig. C. The construction in either case is the same. Coming back, therefore, to Fig. 1 we find that the pediment, together with the two well proportioned pilasters, forms a most graceful and pleasing mass. The roof of the dormer is constructed the same as any ordinary roof, with ridge board, rafters and ceiling beams. The trimmer rafters at both sides of the opening and the headers at the top and bottom, are easily discernible in the section. Note particularly the manner of laying these headers and carefully read the explanatory notes relating thereto.

The question of flashing is of vital importance. Since the dormer penetrates the roof, there is the ever present danger of a leak occurring in the line of intersection between the two surfaces. These intersections, therefore, must be made absolutely water tight by concealed lap flashings of tin, copper, or other suitable metal. The flashing is put on top of the sheathing and is then covered with shingles. All tinwork used for flashing should be painted on both sides before being laid and an additional coat of paint applied after it is laid.

The sill is also a vulnerable point. This member should be constructed and thoroughly flashed as described in the notes on the accompanying plate.

Fig. A shows a dormer with a double pitch roof and a hip end. This is the most common style of dormer window. Its popularity is explained by its pleasing outline and its simplicity of design. Instead of the show rafters, a simple entablature, similar in profile to the one shown in Fig. 1 may be substituted. The sill, also, may be modified. But these are mere details. What we are interested in are not details but types; not specific examples, but general considerations of design and construction. So that, when we discuss any given drawing on a plate, the description we make and the conclusions we reach are intended to apply to all possible variations of the detail or details under examination. Now reverting to Fig. A we know that though the cornice may be changed and the walls abutting the window may be made wider or narrower than shown, the construction of the head, jambs, and sill will remain practically the same.

The style of dormer shown at B has decided advantages over those situated wholly on the roof. In the first place, a

larger window is possible. And in the second place, as a natural corollary, a higher ceiling may be obtained. From an artistic viewpoint also, this style of dormer excels its rival in that the monotony of a long, uninterrupted eave line is broken and the eye is attracted to a detail that is pleasing and harmonious. From a construction standpoint, perhaps, this interruption may be criticized; but if the roof over the dormer is provided with a gutter, this objection is removed.

Fig. C represents a pedimented dormer in a brick building. The construction is virtually the same as that of Fig. 1. If the reader is so inclined he can fill in the rectangles, which have purposely been left blank, with the corresponding sections shown in Fig. 1.

To Cut Plate Glass

To cut plate glass with a steel wheel cutter, cut on both sides and gently tap along the cut with a light hammer.—*Am. Paint and Oil Journal*.

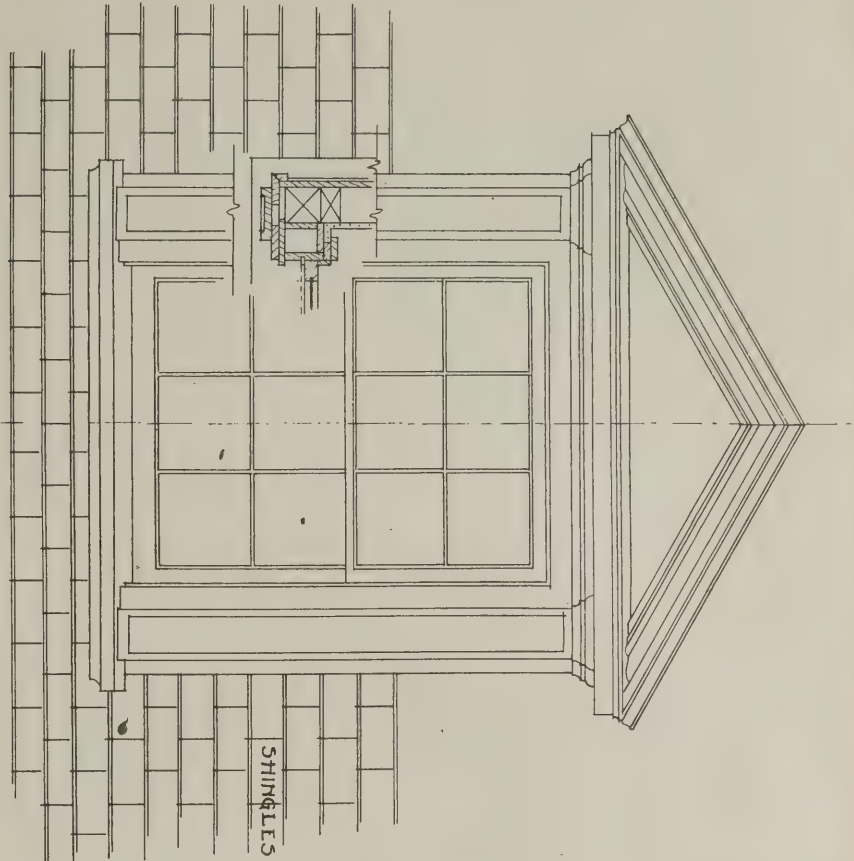
Getting an Even Stain on Soft Woods

Soft woods, like pine, spruce and bass, take oil and turps stain very satisfactorily. Such woods usually have soft and hard places, and water or all turps stains sink in too much and give a too dark effect. Oil stain, containing a little turps, will not do this; it should, of course, have some driers, too. The oil stain also makes a better foundation for the varnish finish.

Sometimes there will be two or three kinds of soft wood in the finish of a room, and to make a uniform finish is not easy, unless you first apply a size made up of oil and turps, equal parts—some driers, too. When this is dry the oil stain, containing some turps, may be applied.

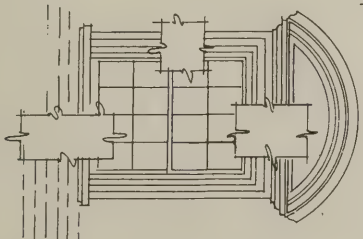
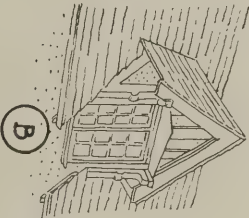
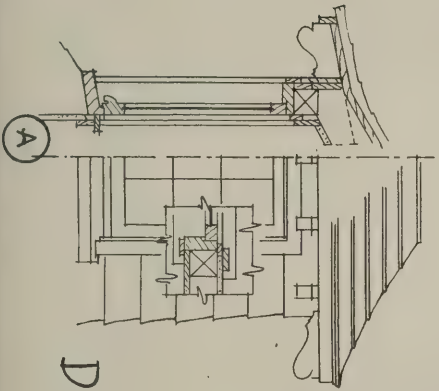
Painting Over Fireproofed Wood

Painting over fire proofed wood is difficult. The wood is filled with certain chemical salts, which when damp attack the paint and injure it. When dry these salts are harmless enough. The salts also attack the tannin in some woods, and alter the color of the wood. These chemicals are either one or more of the following: chloride of lime, magnesia, zinc, tin and ammonia. The only thing that seems to be proof against the chemicals is a good hard gum varnish. Over this the paint may be applied, if paint is wanted for a finish.

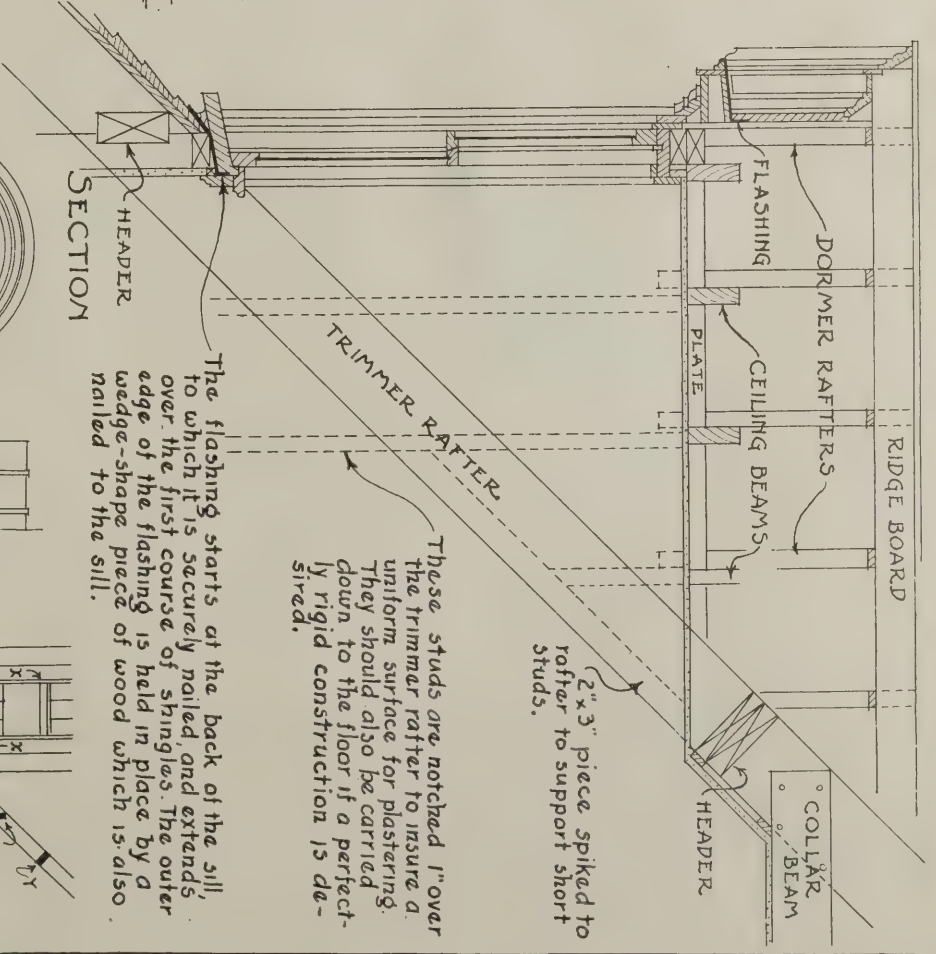


ELEVATION

Scale
0 6" 1' 2'



SECTION



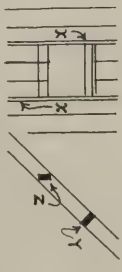
2" x 3" piece spiked to rafter to support short studs.

These studs are notched 1" over the trimmer rafter to insure a uniform surface for plastering. They should also be carried down to the floor if a perfectly rigid construction is desired.

The flashing starts at the back of the sill, to which it is securely nailed, and extends over the first course of shingles. The outer edge of the flashing is held in place by a wedge-shaped piece of wood which is also nailed to the sill.

GENERAL NOTES.

The opening in the roof to receive the dormer window is framed in the following manner: The rafters at the sides, X, called "trimmer rafters," are doubled. Two short pieces of timber, Y and Z, called "headers" are framed in between the trimmer rafters, at the top & bottom. The bottom header, Z, is always set on edge in an upright position, while the top header is always set at right angles to the plane of the roof.



DORMER WINDOWS

(R)

How to Estimate Interior Mill Work

By I. P. Hicks

IT is the custom with many contractors to send their plans to the mill to get figures on the mill work required. In one way this may be all right because many of the mills have expert estimators to go over the plans and take off the quantities.

To the inexperienced contractor this may be the safest plan, but who pays for this estimating? In all cases the mill man adds enough to the price to pay for the estimating and much more. The man who estimates for the mill has to play safe and make money for the mill; if he did not he could not hold his job as an estimator of mill work. They always add quite a margin above the actual figured cost. Of course we know that it is necessary for them to do this, for they must be sure that they have figured enough of everything and must figure some for contingencies.

However, the contractor who can take a set of plans and accurately take off the quantities of mill work required will be able to save a considerable amount of money on every job. The contractor can just as well figure to save the mill man's safety margin as not. They figure a margin for safety, why not you and get it yourself. Surely if you know how to figure you can just as well do this as not. If you have any doubt that they don't add a good big margin for figuring, let one mill man figure from the plans and another from a carefully prepared list and note the difference. The figures are likely to vary from \$25 to \$100 or more according to the size of the job figured on.

Many contractors think that taking off the quantities of mill work is such a tedious job that they do not care to undertake it, and then they are afraid that they will overlook some things and be the loser in the end. If you have a system in doing this work and follow it, you can make the work easy and do it with the full knowledge that your figures are right.

We will try to put you on the right track to make the work of estimating mill work easy and so plain that you can safely do it yourself.

Mainly there are only three kinds of trim in general use. These are as follows: Missions style with just a heavy plain head casing. Cap mold trim with head casing, cap and cap mold and a fillet. Back band trim with casings and back band. Each one of the requires a little different figuring. Where the back band is used no plinth blocks are used and the side casings have to be figured longer, if mitered at the top allowance for this also has to be made. With cap trim you have to add enough of cap and mold to make the returns.

To show just how each should be figured so that the right amounts for each, the proper lengths, the amounts that have to be added and that absolutely nothing shall be missed we will take a window and door openings of given sizes and figure the quantities for each of the different styles of trim.

We will take a window 24x28 two lights, size of opening will be 2 feet, 4 inches by 5 feet, 2 inches.

Mission Style

	Amt. Added Inches
2 side casings, 5 feet, 4 inches long.....	2
1 head casing, 3 feet, 6 inches long.....	14
1 stool, 3 feet, 6 inches.....	14
1 apron, 3 feet, 4 inches.....	12
1 head stop, 2 feet, 6 inches.....	2
2 side stops, 5 feet, 4 inches.....	2

Cap Trim

2 side casings, 5 feet, 4 inches.....	2
1 head casing, 3 feet, 4 inches.....	12
1 cap mold, 3 feet, 10 inches.....	18
1 head mold, 3 feet, 8 inches.....	16
1 fillet, 3 feet, 6 inches.....	14
1 stool, 3 feet, 6 inches.....	14
1 apron, 3 feet, 4 inches.....	12
1 apron mold, 3 feet, 8 inches.....	16
1 head stop, 2 feet, 6 inches.....	2
2 side stops, 5 feet, 4 inches.....	2

NOTE: In some styles of cap trim the head mold and apron mold is not used. We put in all the items so that nothing shall be missed.

Back Band Trim

	Amt. Added Inches
2 side casings, 5 feet, 10 inches.....	8
1 head casing, 3 feet, 4 inches.....	12
1 stool, 3 feet, 6 inches.....	14
1 apron, 3 feet, 4 inches.....	12
1 head back band, 3 feet, 6 inches.....	14
2 side pieces back band, 5 feet, 10 inches.....	8
1 head stop, 2 feet, 6 inches.....	2
2 side stops, 5 feet, 4 inches.....	2

We will now figure for a door opening by the same method. Take a door 2-8x6-8 the opening will be 2 feet, 8 inches by 6 feet, 8 inches.

Mission Style

	Amt. Added Inches
Trim for one side.	
2 plinth blocks (supposed to be 10 inches long)	
2 side casings, 6 feet, 0 inches.....	00
1 head casing, 3 feet, 10 inches.....	14
1 head stop, 2 feet, 10 inches.....	2
2 side stops, 6 feet, 10 inches.....	2

Cap Trim

2 plinth blocks, 10 inches long.....	
--------------------------------------	--

2 side casings, 6 feet, 0 inches.....	00
1 head casing, 3 feet, 8 inches long.....	12
1 cap mold, 4 feet, 2 inches.....	18
1 head mold, 4 feet, 0 inches.....	16
1 fillet, 3 feet, 10 inches.....	14
1 head stop, 2 feet, 10 inches.....	2
2 side stops, 6 feet, 10 inches.....	2

Back Band Trim

2 side casings, 7 feet, 4 inches long.....	8
1 head casing, 3 feet, 8 inches.....	12
1 head piece back band, 3 feet, 10 inches	14
2 side pieces back band, 7 feet, 6 inches	10
1 head stop, 2 feet, 10 inches.....	2
2 side stops, 6 feet, 10 inches.....	2

Bear in mind the following facts: That a window opening is nearly always 4 inches wider than the width of glass and 6 inches longer and the amounts we have added gives a plenty to cut on. Also remember that if you have twin windows or triple windows, you must add an additional 6 inches for each mullion as well as the width of the windows to all of the head and stool and apron trim. Don't forget that all doors except outside doors have to be cased up on both sides, so it takes double the amount for inside doors except for the stops.

Pay particular attention to the items listed in this article and the amounts we have added to work on. Be sure you figure the size of your openings right and be sure that you count up the number of openings of each size correctly, the ones that are cased on one side and those that are to be cased both sides. It will pay you to take particular pains in carrying out this system.

It is well worth your attention, for in just a little figuring in this manner you can rely upon the exactness of your figures even better than if figured by the mill man and furthermore you will save yourself a good many dollars on the average job.

Lettering or Painting on Oil Cloth

To letter on oil cloth and prevent crawling first rub the surface of the cloth with either vinegar, gasoline, benzine, turpentine or soapy water. For quick work use gasoline.

In Using an Extension Ladder

When using an extension ladder the rope gets under your feet, and to prevent, tie the free end to the bottom rung of the top section so that when the ladder is extended it will take up the slack rope from under foot.

Weather Tiling--By John Y. Dunlop

IN most of the towns in England building authorities insist on all external walls being of stone, brick, or other hard and incombustible material. Wood fabric is only used in the suburban districts and for country work. The wood walls are usually constructed of timber filled in with plaster, or with timber covered with weather tiling.

Weather tiles are made of a rectangular

laid. For weather tiling the gauge is usually 3, $3\frac{1}{2}$ or 4 inches. Or to speak in roofers' parlance, tiles of $10\frac{1}{2}$ inches long are laid with a lap of $4\frac{1}{2}$, $3\frac{1}{2}$ or $2\frac{1}{2}$ inches. The lap being the distance which any course of tiles is overlapped by the second course above it.

Some makers manufacture tiles with a slight curve from bottom to top, the exposed face being convex and the other side

course,—that is $10\frac{1}{2}$ inch tiles. The entire surface is covered with full length tiles until the top is reached, when the finishing course is again a short course.

In weather tiling where the vertical surface is tiled on a corner as shown in the sketch at "H," the corner is formed by special tiles. These corner tiles are made both for internal and external angles, and are $6\frac{1}{2}$ inches broad on the one face and



SKETCH OF WEATHER TILED GABLE

shape, or they may have the lower edge shaped in various ways in order to add to the decorative effects as shown in the line drawings.

The usual size is $10\frac{1}{2}$ by $6\frac{1}{2}$ inches, but other sizes can be obtained for special work. In the head of each tile two holes are bored through which the wood pegs or nails are driven to secure the tile to the walls.

Sometimes, as is shown in the section of the wall with fixing blocks, there are two projecting lugs on the back upper edge for hanging the tile to the projecting blocks. The tiles are laid shingle fashion, each course being overlapped by that above.

The length of the tile exposed to view is known as gauge to which the tiles are

concave. This is done in order that the tail of the tile may lie more closely against the tile below.

The covered portion of each course of tile should be covered with good mortar to form a bed for the next course. This prevents rattling and helps to keep the walls warmer and drier.

Timber framed walls to receive weather tiling as are commonly constructed as shown in the details of the gable front. To the ordinary stud framing, horizontal battens about $1\frac{1}{2}$ by 1 inch in size are nailed to receive the tiles which are secured by pegs or nails.

The lower course of the tiling is a double course, starting with short tiles $6\frac{1}{2}$ inches long. On the top of this is laid a full length

$3\frac{3}{4}$ inches on the return face. In this way no lead or zinc flashing is required at the corners.

After the timber walls have been tiled the frame work is usually finished inside with lath and plaster. This construction is doubtless as warm and dry as a roof of similar construction, but on first-class work the spaces between the studs are often filled with silicate of cotton, slag wool or with brickwork as in brick nagged partitions.

This of course gives the walls a more solid character and makes them cleaner and more fire resisting.

Walls built entirely of brick, however, furnish a far more satisfactory backing for the tiles. The brick walls may be hol-

low or solid as shown in the sections given. The tiles may be secured directly to such walls by means of zinc or galvanized iron nails driven into the joints of the brickwork. The gauge of the tiling will of course be regulated by the thickness of the courses of the brickwork, and as this is as a rule only 3 or $3\frac{1}{4}$ inches, giving a greater lap than is necessary, the bricks are sometimes laid on edge and the gauge then becomes $4\frac{1}{2}$ inches. This arrangement is shown in one of the drawings but cannot be recommended for very exposed situations, as it gives a lap of only $1\frac{1}{2}$ inches or less.

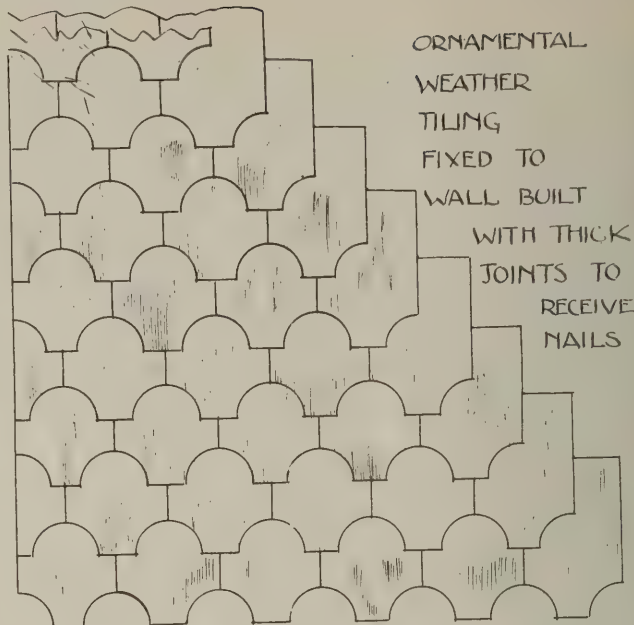
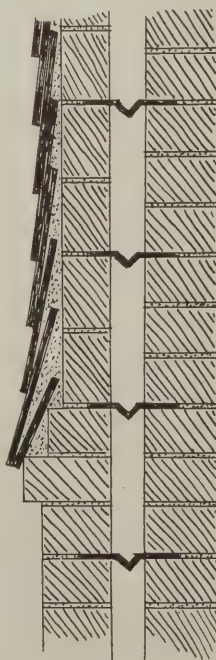
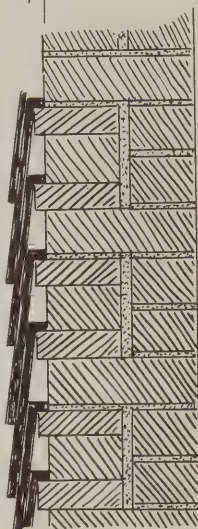
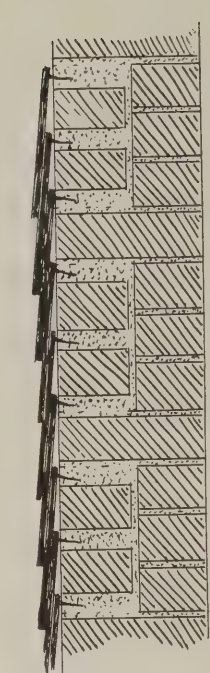
A better method consists of laying the bricks flat as usual and forming mortar joints about 1 inch thick so that the gauge of the tiling will be about 4 inches. The mortar used for the thick joints is made of ashes and selenitic lime with a small quantity of Portland cement. The bonding of the brickwork in this kind of wall is clearly shown in the drawings.

Unless the mortar is of such a nature as to afford a good hold for the nails there is a danger of the tiles being stripped by the wind in exposed situations. To prevent such stripping, wood fillets are sometimes built into the brickwork every six or eight courses, and to these are nailed vertical battens which in turn receive the horizontal battens for the tiles. By this means the tiles are securely held, but the battens are apt to decay sooner or later.

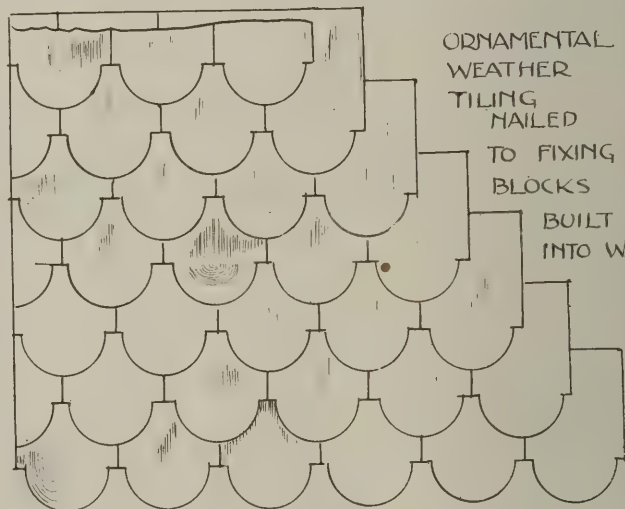
A better method which is sometimes adopted consists in nailing the tiles directly to fixing blocks which are specially made of a kind of concrete which will receive nails. The concrete fixing blocks usually measure 9 inches by $5\frac{1}{8}$ inches by $1\frac{1}{2}$ inches and are laid in continuous courses alternately with the courses of brickwork as shown in the drawing. The projection of the block is for supporting the nib of the tile if the tiles are nibbed, but in any case the tiles should be nailed to the blocks.

A very important point in all classes of weather tiling is the function of the tiling with window and other openings. With tile or brick walls the arrangement, apart from the careful cutting of the tiles around the openings,—is much simplified, as all of the tiles are bedded in cement.

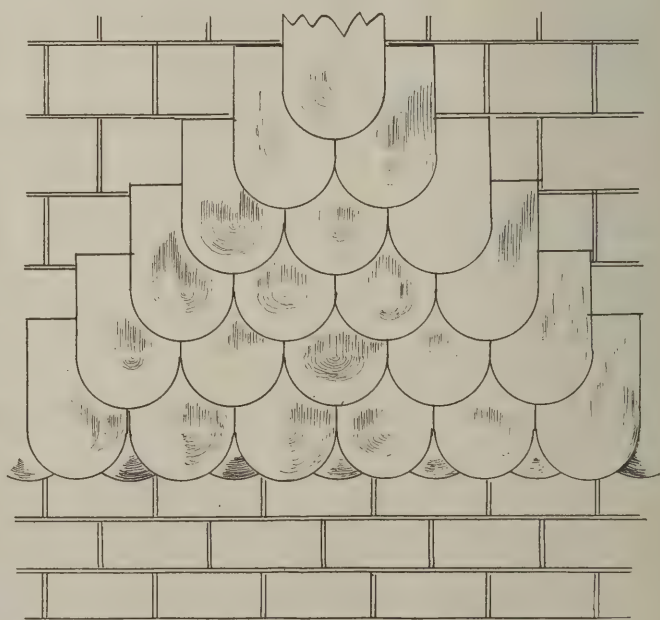
With timber framed walls, however, the construction is somewhat more difficult. The ends of the battens at the side of the openings butt against the window frame as shown in the sections at "D" and "G." On the outside facing of the window is fixed a finishing strip $1\frac{1}{2}$ inches broad and $1\frac{1}{2}$ inches thick which has been grooved to receive the lead or zinc flashing strip which is required to make the vertical joint watertight. Across the head of the window a splayed piece is fixed to receive the first course of tiles crossing the window head. Sketch "D" shows the battens in position at the side of the window, while another sketch shows the strip of lead or zinc in position ready for the tiles.



ORNAMENTAL
WEATHER
TILING
FIXED TO
WALL BUILT
WITH THICK
JOINTS TO
RECEIVE
NAILS



ORNAMENTAL
WEATHER
TILING
NAILED
TO FIXING
BLOCKS
BUILT
INTO WALL



HOLLOW BRICK
WALL COVERED WITH
WEATHER TILING ON CEMENT

ORNAMENTAL
WEATHER
TILING

The tiler always tries to arrange to have the tail of the last full size course under the sides of the window as shown in the sketch "F." Then the moulding which is shown attached to the underside of the sill forms the lap over the top course but one.

The courses of tiles are then added to the sides of the window as shown at "G." To form the first course over the window a short course is set in position, after which the regular line of the tiles from each side is carried across as shown at "E." This means that a double course is formed above the window and to carry this out, the line of the face of the tiles above the window project somewhat past the line of the tiles on the side. This is the reason for showing a straight joint through two courses of tiles at "D" in the sketch of the gable, and it is also the reason for the lead or zinc strip being carried up above the window head. By the time three courses of tiles have been laid across the window head the surface of the tiles is straight through and the perpendicular joints take their usual places.

Deodorizing Glue

When boiling glue for glue size and it gives forth an unsavory odor, add a pinch of saltpeter to it. This will deodorize the glue and also cause it to dry quicker.

Sagging Paint

Painters who have trouble with paint sagging on the weather boarding may be sure that it is fatty, and if it is ready mixed paint it likely contains some rosin oil, which will cause sagging or running; good fresh paint won't do these things.

Ultramarine Blue

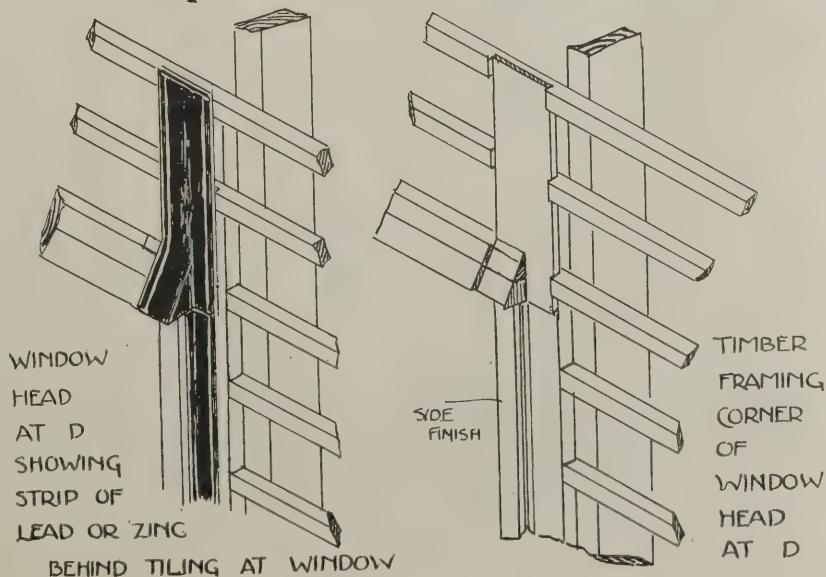
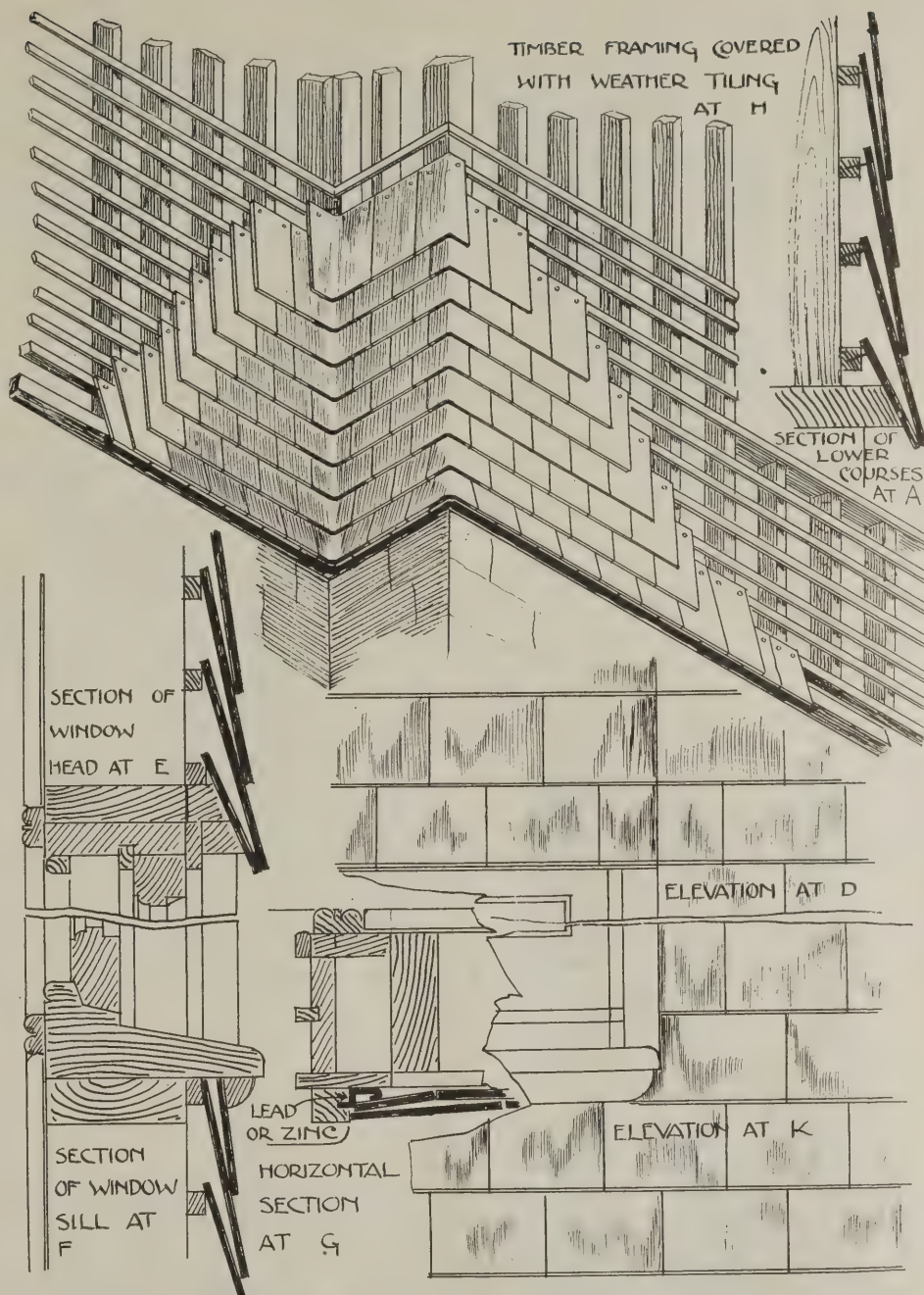
If you have ever mixed ultramarine blue with white lead you have noticed how dark the lead became. Better use Prussian blue instead.

Brick Houses for Refugees

The homes which the Friends' Unit of the American Red Cross has erected in Varennes to house returning refugees are made of substantial brick of a standardized pattern, which recalls the Georgian type of home in some of our Southern cities.

Each house has a garden, and—what constitutes an innovation in French customs—the grounds are separated by wooden fences. These are now covered with vines, and front gardens are planted with rose bushes. At frequent intervals, under picturesque tiled pagodas, are pumps which supply water to these rows of residences.

Of course their uniformity lacks the quaint charm and mellowness of the historic houses that have been destroyed, but the new community has a drainage and lighting system which the pre-war dwellers never aspired to.



Questions and Answers

Architects and Builders are Invited to Contribute to this Department Either by Asking Questions or Answering Them. National Builder Will Pay for Answers to Questions Asked and for Better Answers from Wider Experience

The Qualities of Nails

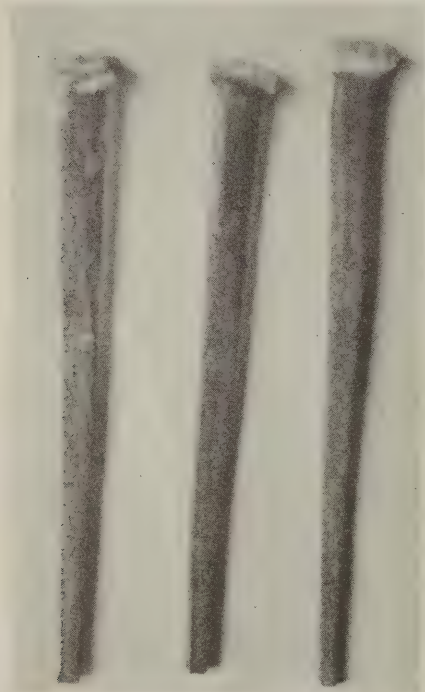
Evidences of his contention that cut iron nails have more lasting qualities and holding power than wire nails is submitted by S. F. Black, builder and contractor, of New London, Ohio, who sends a box of the specimens here reproduced with the legend that was wrapped around each set. We reproduce Mr. Black's letter.

Note that he says he will close unless someone takes another "round" out of him, and if there is to a "come-back" we suggest that the writers send something that

"Cut steel nails are no better than wire nails so far as rusting is concerned; I agree with Mr. Wells on that point.

"I met a Cincinnati contractor a few

days ago and we talked nails. He said he took an old shingle roof off and found the



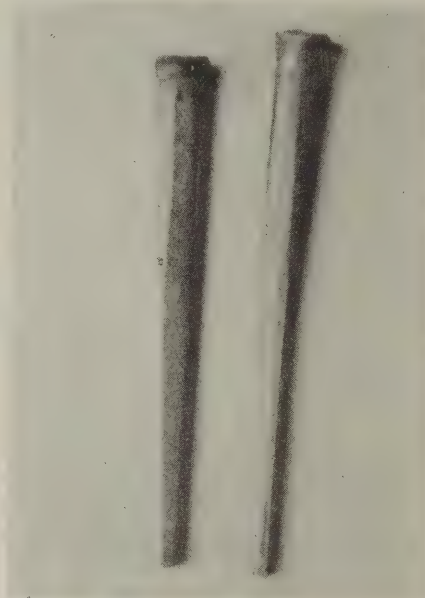
Cut iron nails driven in outside window 64 years ago. Slight rust only

can be photographed, as Mr. Black has done. What do you know about nails?

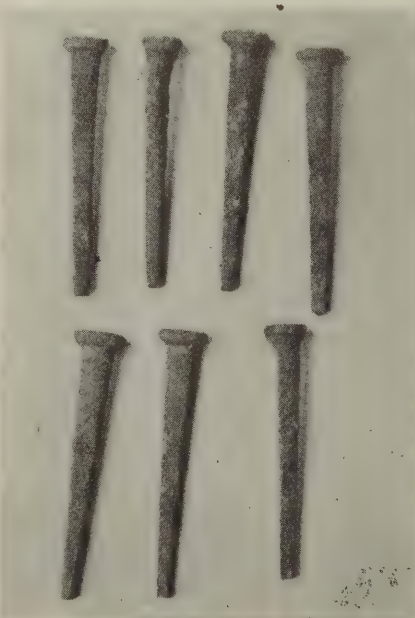
This is what Mr. Black says:

"I am sending you some samples of nails that will prove my argument is right, I think.

"Tell the Missouri man to take two pieces of 2x10 about 12 inches long and lay them flat together and drive two cut nails through both blocks about 1/2 inch from the edge, and then put two wire nails in the other edge and lay the block out in the hot sun and see which pulls first, and then let him tell what happens.



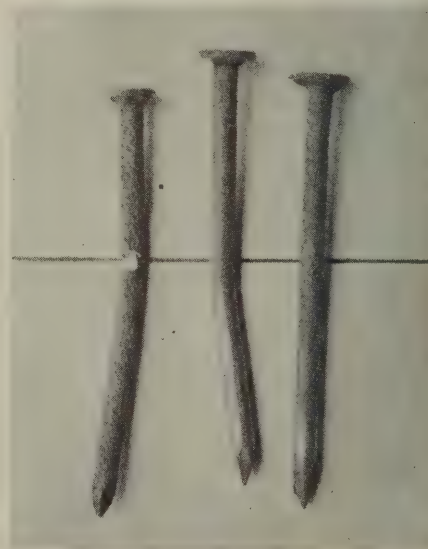
Cut iron nails driven in inside window 64 years ago. No rust—metallic luster intact



Cut iron shingle nails driven 20 years ago. Condition unimpaired



Wire nails driven in a porch nine years ago. Who has the best of the argument?



Wire nails taken from siding. File marks (at line) show how far they stuck out. I pulled them out with my fingers

old iron cut nails ready to use again, and he re-shingled the roof and used wire nails, and in fifteen years the shingles were off

and nothing left of the nails but rusty holes.

"He also said that if he was going to do any building for himself he would hunt the country over for cut nails.

"I have calls to re-nail two houses where the warp of the siding has pulled the nails.

"I think the argument is in my favor and will close unless some one takes another 'round' out of me."

Mitering a Raking Mould

I notice in the July issue, Mr. J. B. of South Dakota, wants to know how to miter a raking mould with a horizontal. My way of doing this is explainable in a somewhat simpler manner than in the explanation given in the July issue, which, while correct, is hard for the most of us to understand.

I sometimes use two miter boxes for this work, one to join the mould together at the top of the gable, the other to join the raking mould with the horizontal, as it requires a different cut for each different pitch of roof.

I knock together a cheap box with a piece of 2x4 for the bottom, and two narrow boards of equal width for sides. This done, I mark the box for the top of the gable. As J. B. asks for third pitch we will use those figures. Lay the square across the top of the box with the figure 8 on the tongue and the figure 12 on the blade. Have these figures on the edge of the box toward you. Mark on the 8 or tongue side. Make two cuts. Mark sides of box square down.

To make a cut in the box to join the raking and horizontal moulds, lay the square on top of the box as for a regular miter; that is, take an equal number, as 12 in. & 12 in. or 16 in. & 16 in., on both tongue and blade. Mark both. For the side or down cuts take 8 in. on the tongue and 12 in. on the blade. Mark the 8, or tongue, side. Saw out to marks, and it is ready for use.

For any other pitch of roof the broad rule is simply this: use the figures on the square for the rise and run of your particular roof, and cut on the rise. Horizontal moulding should be cut on a regular miter.—W. E. Bennett, Kaylor, So. Dakota.

To Paint Over Coal Tar

To paint over coal tar on pipes remove the tar with coal oil or other remover, then clean off with benzole. Then give a coat of shellac, after which any desired paint or bronze may be applied.

White Paint to Stand Heat

A white paint that will stand heat without yellowing may be made from dry zinc white mixed with silicate of soda or so-called water glass. It is useful for painting radiators, stoves, etc., where a white finish is desired on heated surfaces.

Practical Suggestions for Building Machinery Bases of Concrete

VIBRATION is the great enemy of things mechanical. Machinery firmly secured to a substantial base, heavy enough to absorb the vibration, will give better satisfaction during its life-time

and will outlast machinery that is allowed to move around or vibrate.

The base must have sufficient spread to give it ample bearing, with a wide margin for safety. The following tabulation shows

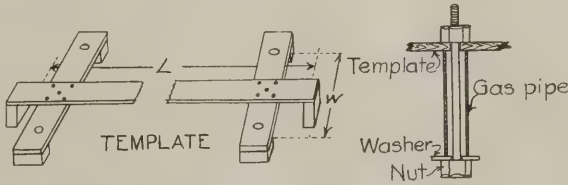
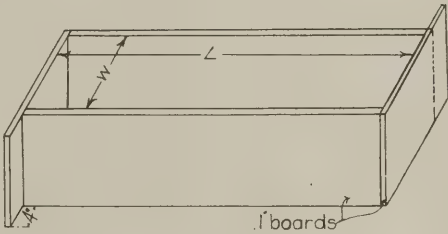
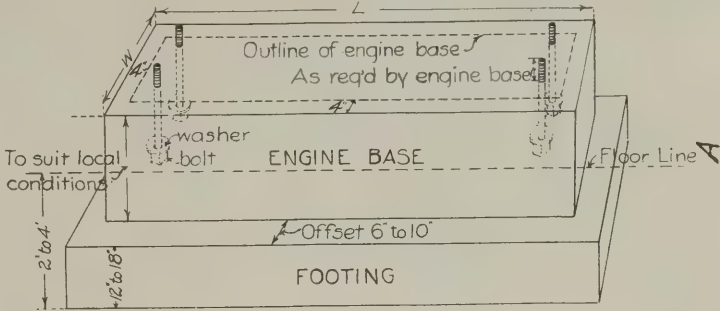


Fig. 1—Design of typical engine base with suggestions for making forms and templates



Fig. 2—Completed forms for simple machinery base with template and engine bolts in place, ready for the concrete

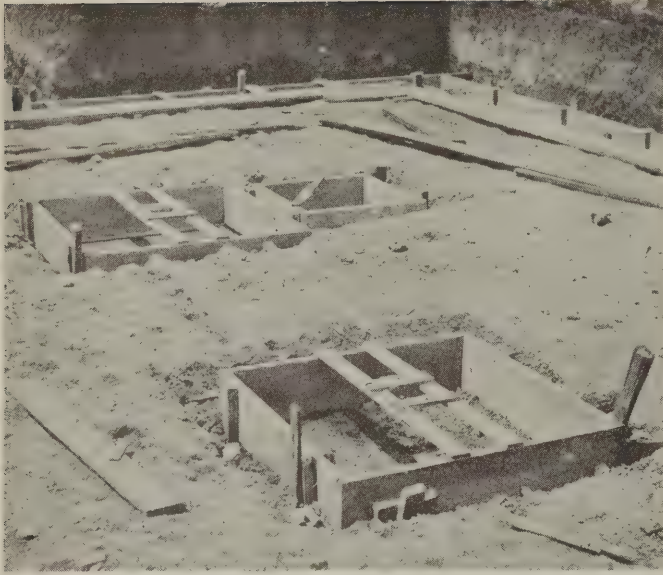


Fig. 3

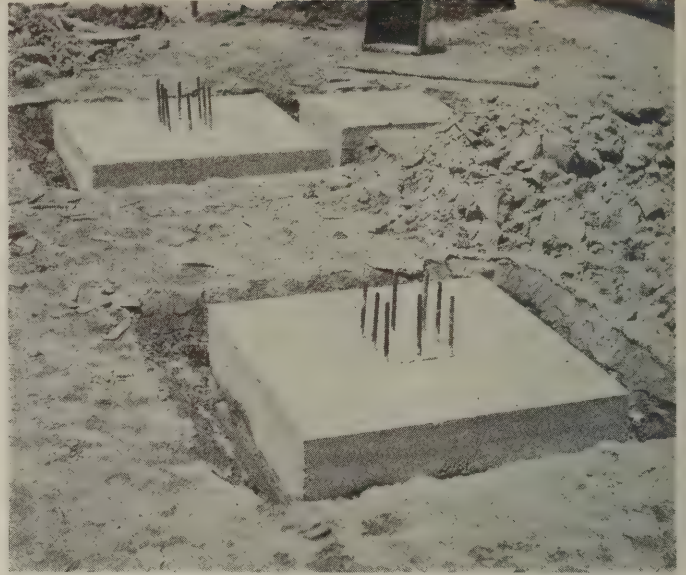


Fig. 4

Fig. 3—Forms for shallow foundations for the support of non-vibrating machinery, columns and other still loads. Fig. 4—View of completed foundations made by depositing concrete in the forms shown in Fig. 3

the approximate safe loading on engine foundations for various kinds of soil:

Soft Clay—1 to 2 tons per square foot of bearing area.

Ordinary Clay—2 to 3 tons.

Dry Sand and Clay—3 to 4 tons.

Hard Firm Clay—4 to 6 tons.

Firm Course Sand—6 to 8 tons.

Firm Course Gravel—6 to 8 tons.

Bed Rock—15 tons and up.

A properly placed base will keep the machinery absolutely plumb and in alignment if secure anchorage is provided; strains and unnecessary wear are thus materially reduced or entirely prevented, and a persistent source of machinery troubles eliminated. The upper illustration in Figure 1 shows the anchor bolts by which the machinery is secured, and the two lower illustrations a form of template by which these bolts are held in the proper position until the concrete is placed in the forms. Figure 2 illustrates a box form for a somewhat heavier foundation, showing template and engine bolts in place.

The shape of the foundation is determined largely by the type of machinery it will be called upon to support. The relatively light, high speed reciprocating engine or the light trip hammer may not require great speed of foundations to sustain their weight, but rather a bulky cubical mass of concrete to absorb their vibration. The heavy but freely rotating electrical machine, which is comparatively free from vibration, may rest on a relatively thin slab with sufficient spread to sustain the required weight.

For pumps, gasoline engines and similar small machinery, the base may be built with proportions approximately as shown in the illustration in Figure 1. The floor line as shown in the illustration may be moved as desired, with the one provision that any surrounding concrete floor should

be laid so it will be entirely independent of the foundation. Concrete in the proportion of one part portland cement to two and one-half parts torpedo sand to five parts pebbles or broken stone will give satisfactory results if mixed with just enough water to give the mass a quaky consistency. The top surface and bevel side of the base should be finished with 1:2 cement and sand mortar and the top carefully leveled.

Painting the Inside of Silos

If you have a silo to paint inside wait until it is dry; then apply a coat of benzol or gasoline to stop the action of the acid that has been deposited there from the silage. See that there is ample ventilation when using these liquids. Some apply a coat of shellac, well thinned down with denatured alcohol, followed by a coat of paint.

Floor Putty

Here is a good floor putty for use when the cracks are rather large: Stir into cheap varnish enough plaster of paris to form a stiff putty; for smaller cracks do not make it so stiff.

Red Lead

Red lead is a heavy pigment, causing trouble by settling in the pot. To avoid this add whiting, enough to hold up the pigment.

To Paint on Leather

To paint on leather or drum head without causing a halo use colors ground in Japan, thin with turps, with a little varnish for a binder. This paint will not discolor outside the lettering, causing a halo.

Weathered Oak Finish

To make weathered oak finish, make the stain with equal parts of water and iron sulphate (green copperas). Iron acetate is equally efficient, and may be made from iron fillings or old nails soaked in vinegar or sulphuric acid, weakened with water.

To Prevent Paint Crawling on Outside Work

There are ways of preventing paint crawling on outside work, but about the best way is to first rub over the surface with benzine, gasoline or vinegar. Some put a little vinegar in the pot of paint, and that seems to work very well, too.

Investigation of Contraction and Expansion of Cement Mortar

The Technical News Bulletin No. 39, issued July 13 by the Bureau of Standards, Department of Commerce, Washington, D. C., states that an attempt has been made to effect a combination of cement mortar by using a local mix that would not show unfavorable volumetric changes when cast in a dry absorptive form. Such a combination seems to have been obtained by using one part of this local mix with 6 parts of gravel screenings. The difference between this and other combinations is that the present one results in a harsh mix rather than a salvy or sticky one since 1:1 or 1:2 mortars, which are salvy or sticky, are inclined to show unfavorable volumetric changes. Results suggest that a harsh, initially inadhesive mix is more likely to be susceptible to influences for reducing volumetric change than any other type of mixture.

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The Situation

WHILE the general situation is favorable to lower prices generally, manufacturing conditions in building materials, transportation difficulties, and the uncertain quality of labor production balanced against the enormous demand for construction of all kinds, gives little hope for a permanent reduction of building costs.

The tendency to a weakened market for basic materials and lower prices due to price cuts made by holders under compulsion or in an effort to stimulate building activity, is regarded as temporary only.

A gradual readjustment of prices toward a lower basis is expected to come when manufacturers of basic materials can be assured of transportation, builders assured of deliveries, and the labor situation equalized.

Experts in finance, transportation, housing, and representatives of the Interstate Commerce Commission appeared before the Senate Committee on Reconstruction on August 16. A house famine of enormous proportions was cited by housing authorities. Walter Stabler, comptroller of the Metropolitan Life Insurance Company, which lends large sums for building purposes, told how rents have shot up from 75% to 300% and how the mortgage market is demoralized since mortgage incomes are taxed and some other investments are exempt. Daniel Willard, president of the Baltimore and Ohio, and chairman of the Advisory Board of Railway Executives told about the transportation situation which he declared to be improving and gave definite promises of railway assistance to the building industries. The completion of repair on apartments, houses, roads and streets and similar work should be classed as emergency work and treated as such so far as the railways are concerned.

Willard Plan to Aid Builders

The practical workings of a plan proposed by President Willard is as follows: Committees representing the construction industry have been appointed in various districts. In cases brought to their attention, where building material is being delayed, the construction committee will pass upon the necessity for the building, and upon the construction committee's recommendation, a committee of railroad officials will see that the material arrives. W. H. Truesdale, President of the Delaware, Lackawanna and Western Railroad, will be in charge of all the railroad committees.

The construction interests will be represented in the following cities by:

NEW YORK: Dr. J. T. Duryea, Pierce, Butler & Pierce Mfg. Corp., N. Y., Heating Appliances; C. A. Crane, Constructors' Association, 57 Chambers St., New York; F. L. Cranford, 149 Remsen St., Brooklyn, Contractor; C. J. Curtis, Farnun-Cheshier Lime Co., 39 Cortland St., New York; J. S. Davis, Cross Austin & Ireland Lumber Co., Brooklyn; James C. Ewing, Goodwin-Gallagher Sand & Gravel Co., New York; Otto Eidlitz, Marc Eidlitz & Son, Inc., 30 E. 42nd St., New York; T. N. Gilmore, Dwight P. Robinson & Co., 125 E. 46th St., New York, Power Plant Contractors; Calvin Tomkins, Tomkins Cove Coal Co., 30 Church St., New York, Limestone.

PHILADELPHIA AND BALTIMORE: H. B. Allen, General Crush Stone Co., North American Building, Philadelphia, Pa.; J. L. Durnell, Knickerbocker Lime Co., 804 Finance Building, Philadelphia, Pa.; Geo. J. Frye, Duquesne Slag Co., Philadelphia, Pa.; Robert C. Lea, Limestone Quarriers' Assn., Philadelphia, Pa.; W. D. Lober, Vulcanite Portland Cement Co., Land Title Bldg., Philadelphia, Pa.; Chas. Warner, Charles Warner Co., Wilmington, Del.

PITTSBURGH: Capt. Charles W. Brown, Pittsburgh Plate Glass Co., Pittsburgh, Pa.; F. R. Babcock Lumber Co., Pittsburgh, Pa.; Sam A. Porter, Dwight P. Robinson & Co., Pittsburgh, Pa.

BOSTON: Joseph B. Willcutt, L. D. Willcutt & Sons Co., 146 Summer St., Boston, Mass.; Edwin P. Bliss, H. P. Converse & Co., 88 Broad St., Boston, Mass. Linton Hart, Rollin Construction Co., 80 Boylston St., Boston, Mass.; James W. Rollins, Holbrook, Cabot & Rollins Corp., 6 Beacon St., Boston, Mass.; Parker F. Soule, L. P. Soule & Co., 80 Boylston St., Boston, Mass.; James T. Scully, 39 Cushing St., Cambridge, Mass.; Morton C. Tuttle, Aberthaw Construction Co., 27 School St., Boston, Mass.; Arthur C. Tozzer, Turner Construction Co., 178 Tremont St., Boston, Mass.; Fred A. Wilson, Master Builders' Assn., Summer St., Boston, Mass.

CLEVELAND: C. F. Lang, Lakewood Engineering Co., Cleveland, O.; John A. Kling, Kelley Island Lime & Transport Co., Cleveland, O.; S. B. Newberry, Sandusky Cement Co., Engineers' Bldg., Cleveland, O. A. P. Sandless, Ohio Stone Assn., Columbus, O.; Ralph P. Stoddard, Common Brick Mfrs. Assn., Schofield Bldg., Cleveland, O.

CHICAGO: G. F. Perkins, Chairman,

Secretary-Treasurer, Illinois Brick Co., 111 West Washington St., Chicago, Ill.; L. L. Barth (Lumber) vice-president, Edward Hines Lumber Co., Chicago, Ill.; G. P. Longwell (Sand) Consumers Co., 111 West Washington St., Chicago, Ill.; W. L. Hodgkins (Stone) Brownell Improvement Co., 133 West Washington St., Chicago, Ill.; F. T. Bentley (Cement) Traffic Manager, Universal Portland Cement Co., 210 South La Salle St., Chicago, Ill.; W. A. Rogers (Contractor), Chicago, Ill.

Some Things That Impede Building in Fort Wayne

Guy Mahurin, a Fort Wayne architect, says there are several things that are checking building operations in Fort Wayne, in addition to the high cost of material and labor. In the first place the strike of the building laborers kept things at a standstill for two months. Now the men are going back to work.

"The trouble with the building proposition in private work is the cost of labor and material; while in public work the authorities are unable to sell the bonds, which bear five per cent interest and must be sold at par. I estimate that at least \$10,000,000 worth of work has been laid aside in this county (Allen) just for that one reason, the inability to sell bonds.

"In house building, not more than 25 per cent of normal building is going on; and that 25 per cent consists in large part of very cheap houses that are being built to sell, but that are expected to bring \$8,000 to \$10,000 each.

House Building Plans of Fort Wayne

To meet the housing situation of Fort Wayne, Indiana, the Chamber of Commerce of that city organized "The Greater Fort Wayne Development Corporation," of which Albert Schaaf is secretary. Outlining the plans of the new corporation to a representative of NATIONAL BUILDER, Mr. Schaaf said:

"The corporation has been organized since the first of June of this year. It is a million dollar corporation. It is still so young that we have not yet gotten our plans worked up. It is distinctively the product of a civic movement, but the citizens have backed the movement with such enthusiasm that nearly all of the stock has been already subscribed. In fact, at this date (July 22), the

actual amount subscribed is \$940,000. The shares are each for \$1,000, and the subscribers are paying in five per cent a month.

"The International Harvester Company is preparing to build a branch in this city, and it announced that it would not come here till it was assured that we could house its employes. So we have taken this action to comply with its demands.

"We will not build more than 400 houses in any one year, beginning in 1921. Even then we may not build as many as 400 houses. The company may notify us that its plans do not require that more than 200 houses be built the first year, in which case we would build only 200 houses. In any case we can't build more than 400 houses a year, for we have not enough money for more.

"But there are other things that this corporation is designed to do which will have an effect on the future house building situation in this city. A belt line railroad is to be built around the city to connect the Pennsylvania R. R., the Nickel Plate, the Wabash and the New York Lines, to facilitate the shipping of freight. It is very important for the future business life of Fort Wayne that the land along that belt line be in hands friendly to future factories that might be built here if the lands were not held at a prohibitive price. We already know of other plants that want to locate here. So our association is buying the land along that belt line, for which we had previously secured options.

"We realize the fact that the building of houses for the International Harvester Company will not relieve the housing shortage in Fort Wayne, as enough people will be brought in to fill the houses we build. But we hope, by our action, to stimulate the building of houses in the city outside of our project.

"We are not afraid that the people that own lots here will put up the price on them, so far as our particular project is concerned; for we have secured options on 1,000 lots. That may be 500 lots more than is required for the Harvester purposes.

"I figure that Fort Wayne is short 1,500 houses.

"With this shortage, rents have not gone up correspondingly. You can rent a 6-room or 7-room house for from \$30 to \$50 a month, depending on locality. This fact has kept investors from building; for it is hard to figure out a profit on a building project."

Housing Conditions in Toledo

Toledo now claims a population of 243,000, a gain of about 41,000 since the previous census. All acknowledge that the housing situation is acute, but there are widely varying opinions as to what the shortage of houses is. Mr. T. I. Wilson, of T. I. Wilson & Co., a company engaged in house brokerage, tells the NATIONAL BUILDER that the shortage is between 5,000 and 8,000 houses.

Frank Saxton, secretary of the Toledo Chamber of Commerce, said, "We have made a survey and I would say that we could use from 1,500 to 3,000 new houses. Just how many houses we are short it is impossible for any person to say; for instance, we do not know how many families there are outside of Toledo that would live in Toledo if they could get a house to live in, and that is only one of the unknown factors.

"Since making the survey and discussing the matter with manufacturers, contractors and architects, we have done nothing. One large contractor in whose opinion we put much faith, says that prices are not likely to remain at their present heights and that we had better wait for lower prices.

"We also found that some of the manufacturers here had much interest in the house building problem but that the uncertainty in the house building conditions, as relates to cost, is so great that they did not consider it wise for us to jump in and build a lot of houses."

L. C. Price, of the Toledo Real Estate Board, declared the shortage in houses to be acute. "We are building so few houses that we are not keeping up with the current requirements, to say nothing about catching up with the deficiency created during the past few years. In the past three months there have been only 165 permits issued for the building of residences, and that is not much house building.

"Money is tight and has been tight for six months. We simply can't get loans with which to finance the building of houses. Also the men that have money to loan will not make more than one-year loans. We used to be able to get it for from three to five years. That creates a serious situation. And there is no relief that I can see.

"We are in good shape, so far as labor is concerned.

"There is some commercial building going on, but in residence work it is chiefly remodeling. They are making over a good many old houses into duplex. Three of our big builders started to build some very low priced houses, but they have mostly quit. People used to figure the workingman's houses as a little house. But the working man now largely rejects the four-room house idea. He demands a six-room house with all modern conveniences, and that kind of a house cannot now be built for less than \$4,000, not including the lot. There is a demand for that kind of a house right now, and there are many workmen that can buy them on deferred payments, with an initial payment of 15 per cent by the workingman.

"But such houses cannot now be financed. We can get a mortgage loan for only 55 per cent of the value of that property. The 15 per cent of the workingman brings up the total to only 70 per cent. Then there remains 30 per cent unprovided for, and that is the unsurmountable obstacle.

"There is also a market for a higher-priced house, one costing from \$7,000 up to

\$15,000, but that house also cannot be financed, for the reasons I have given.

"Some house building is going on, but it is largely of houses that were begun last spring and are now being completed. A building boom started early in the spring, and it looked as if houses were going to be built without regard to prices of labor and material, but the boom soon collapsed."

To Build a House Cheaply in High Priced Times

A writer for the NATIONAL BUILDER, in a visit to the offices of the Co-operative Ready-Cut House Company, in Toledo, was discussing with Mr. H. E. Pelton, of that company, some of the problems of house building. Among other things, Mr. Pelton said:

"We sell our houses on long time, how long depending on the circumstances of the man that wants to build a house. We do not find it advisable to build very expensive houses. Not often do we build a house that costs as much as \$5,000, in addition to the lot. We do not build at all on the speculative basis.

"We build on what we call the unit plan, which really means that we build a house by piece-meal, a part one year and another part another year, according as the owner is able to pay for it. We make it a point to see that he is not overburdened by the size of his payments. We think it better for him to get along without a porch or some other part of the house for awhile rather than have to pay interest on it when he does not really have to have it.

"We find out what a man is earning a week, and we try to make that the monthly payment. This will figure out a little less than 25 per cent of his salary. When the proportion goes above 25 per cent, we feel that the man is assuming more than he is likely to be able to carry, and that trouble is ahead not only for him but for us. And we stick to that point. We know from experience that if a man is permitted to assume too great an obligation, the minute he falls down he is gone; while if the amount of the monthly payment is smaller and he falls down for any reason, he will again pick up his load and go on.

"When a man comes in here with a building plan that will require 50 per cent of his monthly salary to keep up the payments on, we simply talk him out of it.

"One of the very important parts of our plan is to have the owner do as much as possible of the work on the house. We have him paint the outside. We do no interior decorating of any kind but throw that task on the owner; but he works under our inspection, to make sure that he is doing the right kind of a job. Under proper instruction, it is surprising how much a man can do in the construction of his own house. We never have any interference from the unions on this point; for it is recognized generally that a man does not

run counter to union principles when he works on his own house.

I have examined a good many of these plans being put forth in the interest of the homeless man that needs to build a home. According to my opinion, 90 per cent of them are too expensive, though they are all right for the man that can finance a fine appearing house. But we have to recognize the fact that there are many laboring men that cannot finance a fine appearing house that can finance a simple structure; and it is far better for him to own a simple style of house rather than to continue to pay out money for rent with nothing to show for it in the end.

"We are not pushing the ready-cut house, and our business is only local. So far as our experience goes, the ready-cut house is as expensive as the house built in the common way, under the methods that I have outlined."

Housing Employees at Rossford, Ohio

Rossford may be described as a manufacturing suburb of Toledo, as it is practically a part of Toledo but lies just beyond the city limits. The life of the place has been, till now, the Ford Plate Glass Works, but two other immense factories are being built.

The only housing enterprise being carried on in the vicinity of Toledo is that of the Ford Plate Glass Works, which is erecting enough dwellings to house its employes or such of them as are not already settled. It is just now completing the last of 50 houses and has already let contracts for the construction of 54 additional houses.

Of the first fifty houses, 25 are frame cottages scattered about the residential portion of Rossford. The other 25 are of brick in what is known as terrace construction. These 25 constitute practically one long building, divided into 25 living apartments.

Each apartment is two stories high and has a full basement under it. Above the basement it comprises five rooms and a bath. The basement is full sized, and will contain a hot air furnace for each apartment.

C. A. Watts, of Watts & Suhrbier, the contractors, said, "The contract for the 50 houses was \$181,000; and this brick terrace cost \$109,000. The plumbing for these 25 houses will run \$7,500, and the heating equipment will cost \$175 per house. There are about 2,200 employes in the Ford Plate Glass Works, mostly men, and they will need about 150 houses more.

A little figuring will show that the entire cost, including the plumbing and heating, will be about \$123,875, making the average cost for each of the 25 houses in the brick terrace \$4,955, which, of course, is only approximate. The contractors' work in this case does not include the grading, and that alone will bring the average cost per house up to \$5,000 or above.

It probably is not feasible to wholly elimi-

note monotony in such construction; but something has been done to offset it. The terrace is set well back from the street, which makes possible a big lawn.

That this plan of house building is satisfactory to the company financing the enterprise is evident from the fact that the 54 additional houses now contracted for are, Mr. Watts says, to be constructed on the terrace plan.

That some landscape ornamentation is to be done is evident from the fact that several other buildings of this company fronting on the same street have beautiful lawns in front of them and the walls of the building are festooned with climbing vines.

Building Conditions in Erie, Pennsylvania

The city of Erie has now a population of about 100,000, and has a strongly growing demand for houses, as is shown by the high rents asked for the higher priced houses. But there is not the shortage in houses for laboring people that exists in most other cities of the same class. The reason for this is the large number of houses built here by the United States Housing Corporation during the war.

There is a great need for high class residences, but almost no construction of that kind is going on. It is asserted by local men interested in building that there is not 25 per cent of the house building going on that there was two years ago. The causes assigned are principally the high prices of cement and brick, as many of the houses in Erie are of brick construction. Labor is declared to be high-priced and inefficient. Erie is quite generally a union town, and the builders there are not hopeful of lower labor prices to stimulate building.

The Government-Financed Homes in Erie, Pennsylvania

The United States Government is now selling 318 houses that it built in Erie during the war. These cost to build approximately 60 per cent of what they would cost today, and the government is selling at cost price. The terms are 10 per cent down and one per cent a month. The four-room houses are selling around \$2650, the five-room houses at about \$2900, and the six-room houses at about \$5,000. The monthly payment is one per cent of the balance after the first 10 per cent has been paid.

All of these houses are of brick construction and modern in equipment. Working men are being given the first chance to buy. As these houses rent at \$5.00 per room per month, and the monthly payment on a \$2900 house is only \$26.10, the acquisition of one of these houses is as easy as paying rent, as there is no problem of having to raise money on a second mortgage, generally impossible at this time.

The House Situation in Cleveland

The housing situation in Cleveland is very acute, and very little is being done to relieve it. Architects and others connected with the building trades declare that less is being done this summer than last, though there was a building spurt in the spring.

A survey was made last year as to the house deficiency, but the results were inconclusive, the general conclusion being that there were many thousands of houses short. Some guessed 5,000 and one architect guessed 15,000 or 20,000. Rents have been going up for the past two years, in response to a steadily increasing population.

A frequently heard explanation by men in the building trades is that the lack of house construction by private parties is due to the disturbed condition of the minds of people that could build and would build if they were not expecting a great decline in prices in the near future.

Drift Towards the Open Shop in Cleveland

The building trades of Cleveland require the work of about 1200 plumbers, when the building industry is in a normal condition. According to an investigation carried on by the Cleveland Chamber of Commerce, there are now only 720 journeymen plumbers in the city, this scarcity having been brought about by the union restrictions. As a result of this artificial and forced scarcity, the journeymen plumbers, who were getting \$8 per day, have been placed in a position to demand \$12 per day and went on strike June first for that sum. A little later the steamfitters struck out of sympathy with the journeymen plumbers.

The effect of this tying up of what work there has been to create a tremendous sentiment in favor of the open shop, even among some of the labor unions, who also are forced to suffer from the strikes. The Committee on Labor Relations and the board of directors of the Chamber of Commerce are out openly for the open shop, and the members of that committee include some of the big manufacturers of the country.

So strong is the open shop sentiment among the people, that it has been found possible to bring in quite a number of plumbers from outside the city, contrary to the rules of the union plumbers; and the imported men are working without serious molestation, in spite of the fact that the plumbing inspector of the city is the president of a plumbers' union local.

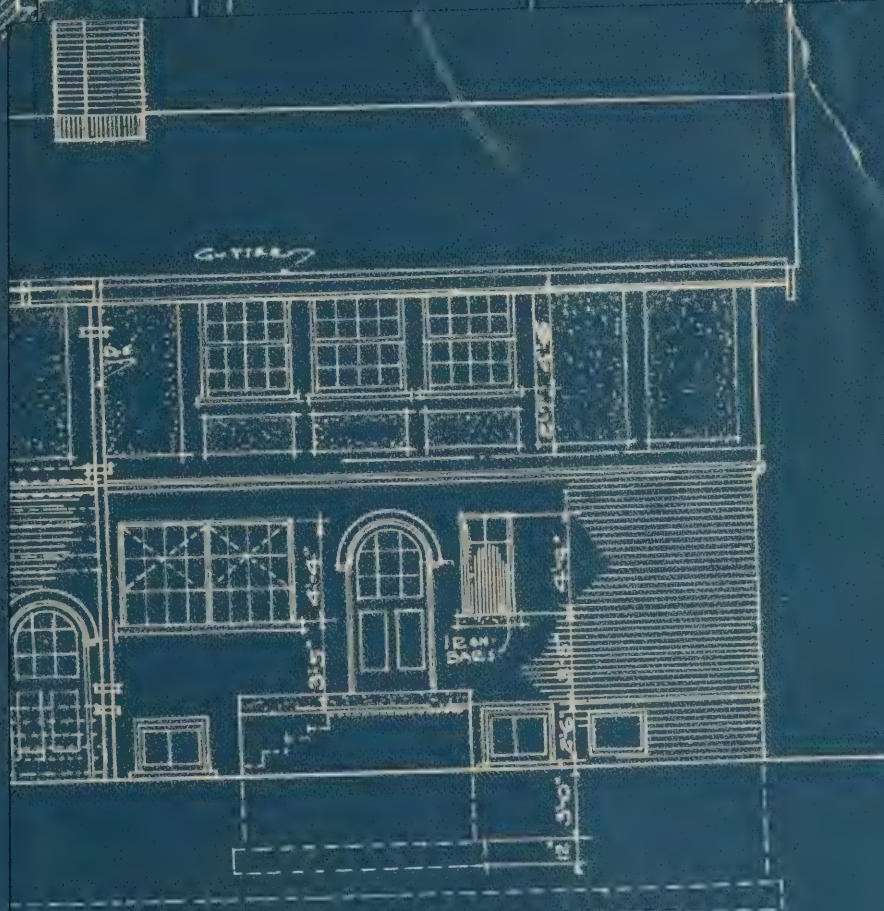
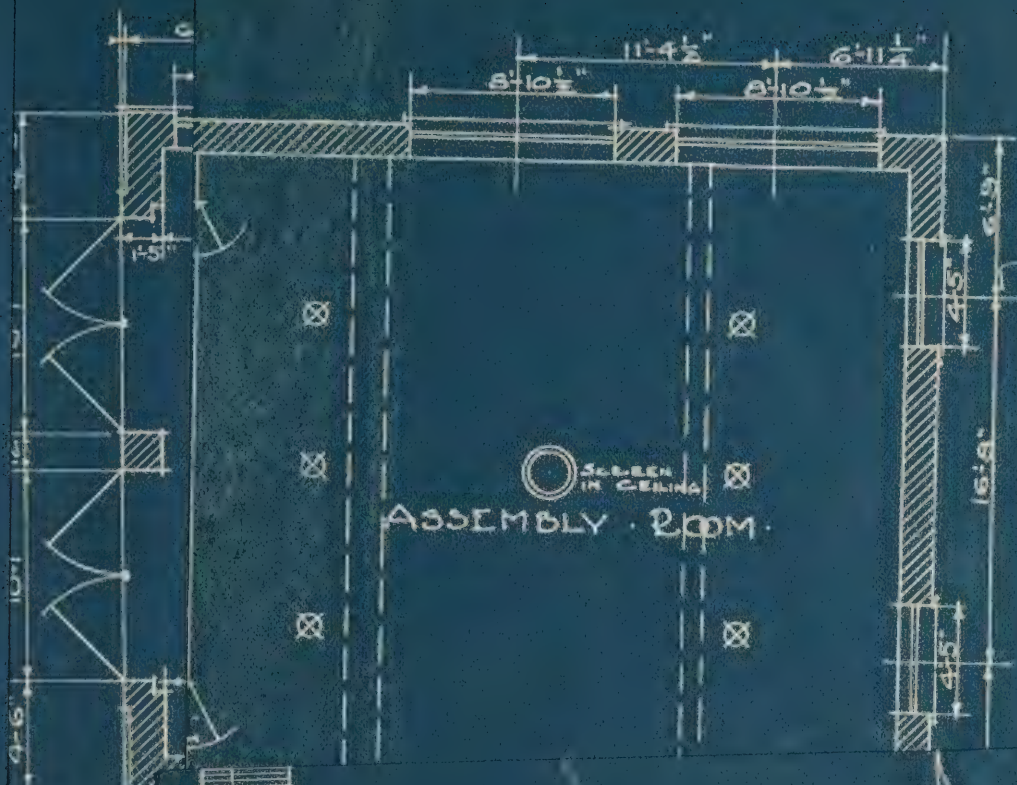
A notable fact in this connection, is that the report of the Committee on Labor Relations, in favor of the open shop, was signed by William G. Lee, president of the Brotherhood of Railway Trainmen, and by Warren S. Stone, Grand Chief of the Brotherhood of Locomotive Engineers, members of the above committee.



Town Hall at Grosse Pointe, Michigan

Mildner & Eisen, Architects

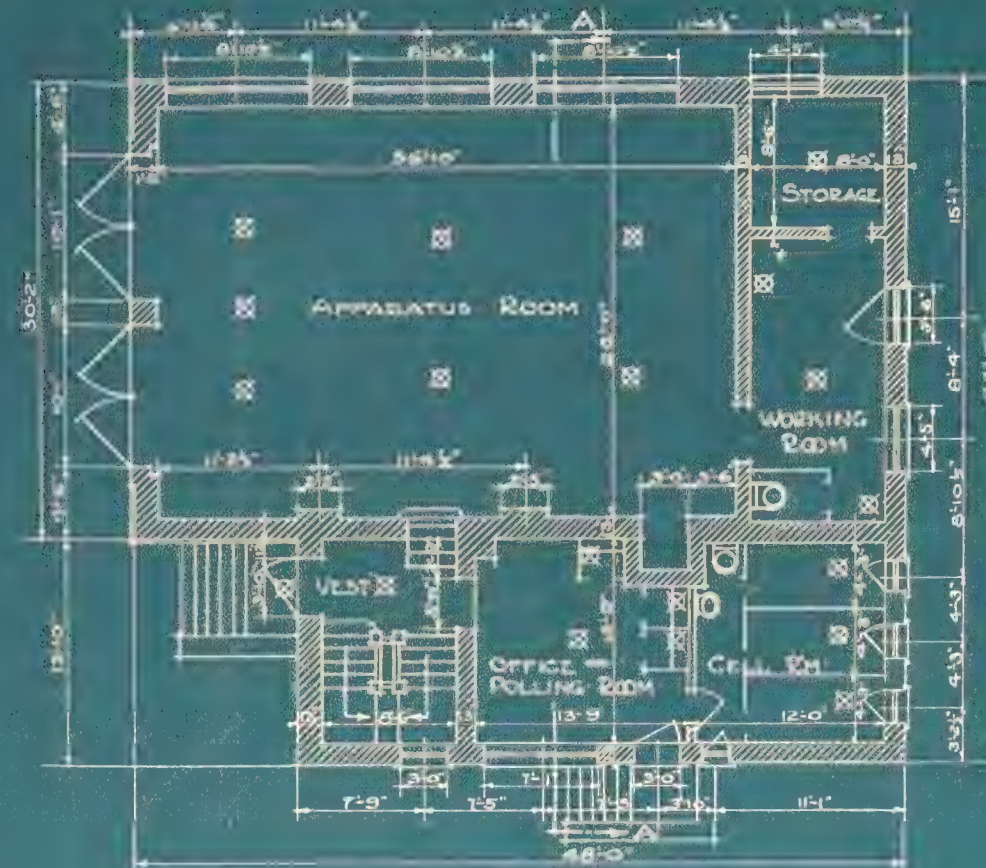
See descriptive text on following page, also complete working drawings in blueprint supplement to this issue



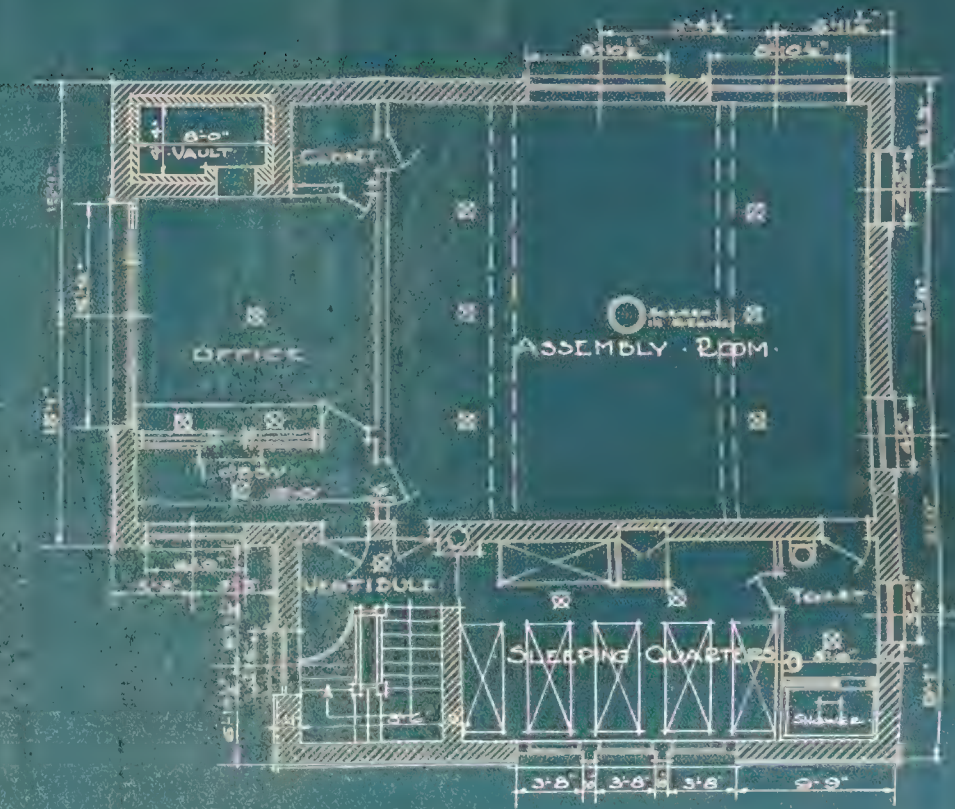
SIDE ELEVATION



BASEMENT & FOUNDATION PLAN



FIRST FLOOR PLAN



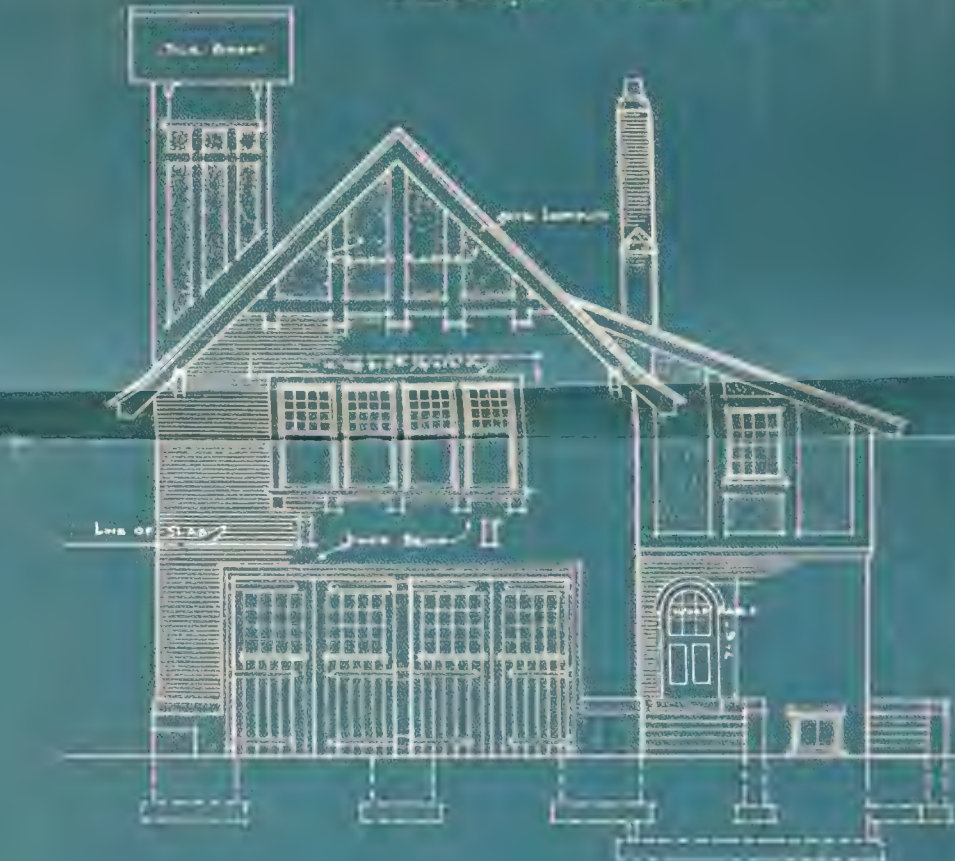
SECOND FLOOR PLAN



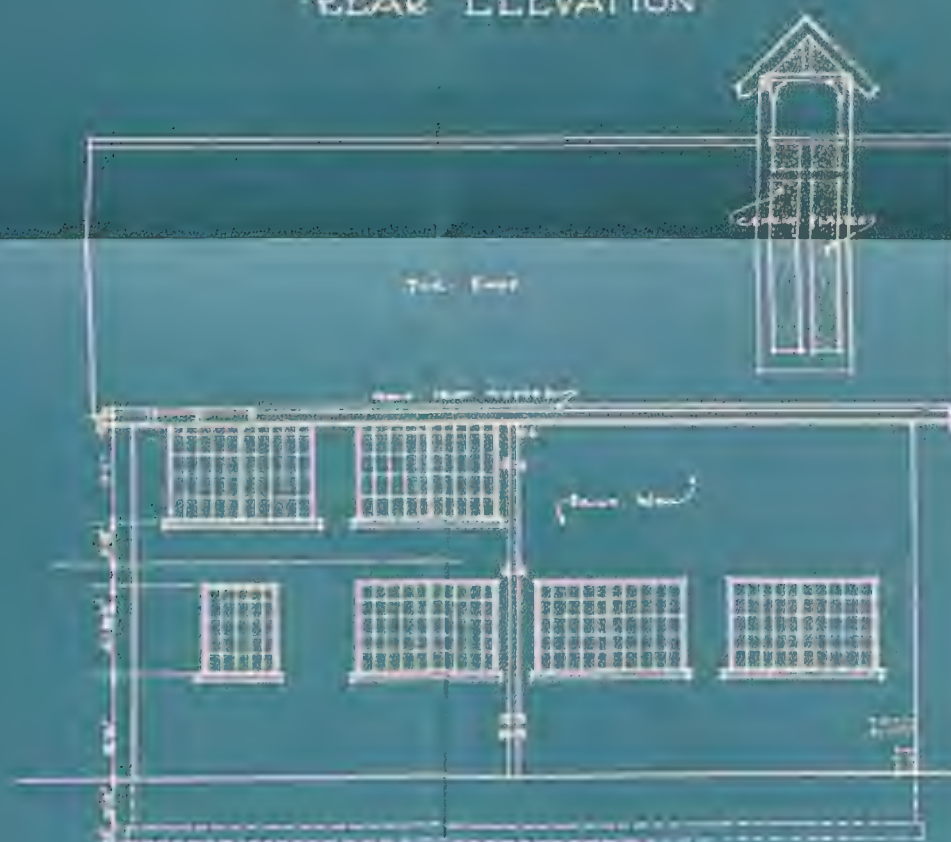
REAR ELEVATION



SECTION ON LINE 'A-A'
Scale 1/8" = 1'-0"



FRONT ELEVATION



LEFT SIDE ELEVATION



RIGHT SIDE ELEVATION

NATIONAL BUILDER SUPPLEMENT

September, 1920

A TOWN HALL
Mildner & Eisen, Architects

Scale: 1-8 inch to one foot

See Photograph and Description in Reading Pages.

A Town Hall

Supplement

ONE of the surest evidences of civic pride, or its lack, is the provision that is made by a community for housing its public servants, official and otherwise. An attractive town hall for instance reflects the prosperity and public spirit of the local citizens. It stimulates their pride and plays a large part in attracting new citizens and industries of a progressive type. Farmers and others are attracted from surrounding communities, thus expanding the trade territory, and the town's moral tone is bettered because of the dignity added to its ordinances and officials.

For a small community the town hall need not be large nor expensive. It should be centrally located and have open ground on all sides. It may provide space for fire fighting equipment, including a dormitory for firemen if a paid fire department is maintained. The calaboose may also be located in the building. A council room which may also be used as a police court should also be provided. It is usually a good plan to also include at least one office for the use of the mayor and the more important boards, commissioners, and other administrative bodies and also a vault for protecting public records. A community hall and even the public library might also be included in the building.

The town hall which forms the subject of this month's supplement is located in the village of Grosse Pointe, Michigan, and was designed by Mildner & Eisen, architects. It is an unusually attractive example of this type of building and one of which the citizens may well be proud.

The construction, with the exception of the tower and roof framing is fireproof throughout. The foundation is of concrete and the upper walls are of brick. The front gable, the walls of the tower and a portion of the second story walls have a half-timber effect with stucco panels. All floors are of concrete, those over the basement and in the second story are reinforced. The roof is of tile, on wooden framing. All sash and frames, with the exception of a few in the second story, are of metal. A small amount of stone trim is used on the exterior and all lintels are of steel.

Only a part of the basement is excavated. This provides space for the boiler and fuel room. A steam system is used for heating and a separate heater is provided for heating water when the large boiler is not in use. An interior stair leads to the first story vestibule and to a grade line entrance at the side.

The apparatus room for fire fighting equipment is located at the ground level. Wide double doors open to the outside and a sep-

arate entrance is provided from the vestibule. The equipment is motor driven and therefore no provision for sheltering horses is required, but a workroom for making repairs is provided at the rear. This space

The Blueprint Supplement to This Issue of National Builder Gives Full Working Drawings of the Town Hall Described in This Article

contains a slop sink, a toilet room and a large storage closet. The apparatus room contains a rack for drying fire hose after use, and two catch basins are provided in the floor to catch waste water and the mud which is washed from the fire apparatus.

The main or public entrance to the building is at the side and open into a vestibule which contains the stair. An office opens from the vestibule and contains movable counters and booths so that it may be used as a polling room. The office may also be entered by way of a separate outside door at its side. This door may be used as a prisoners' entrance to the calaboose or cell room which is located at the rear. The cell room is separated from the office by an iron door and a reinforced concrete partition. It contains three modern, steel cells and provides a toilet and lavatory for the use of prisoners. A hose cock and a floor drain are provided in the cell room so that it may be flushed out with water when necessary.

The second floor contains an assembly room large enough for use as a hall for the town council, police court and for small meetings. The roof framing over the assembly room is of a modified scissors truss type with a collar beam tie member. The plastered ceiling follows the slope of the rafters at each side until it flattens out under the collar beams, thus forming a splayed or tent ceiling, a very desirable feature for a room of this type, from a standpoint of both ventilation and appearance. Additional ventilation is assured by a ceiling grille opening into the attic which is ventilated by louvers in the gables at each end. In front of the assembly hall is a large office which contains a fireproof vault and a large closet. The office is separated from a lobby or waiting room by a glazed partition containing a counter shelf and a hinged grille or wicket. The closet and the lobby open into the assembly room as well as the office.

At the side of the assembly room is the dormitory for the firemen. It contains sleeping provisions for six men in single bunks. A brass slide pole leads to the apparatus room below. At the rear is a large toilet room which also opens into the assembly room. It contains a shower bath in addition to the usual conveniences.

The tower forms an important element in the ventilation of the attic as it contains louvers in the upper panels to assist in creating a circulation of air. The open belfry contains a bell for use in sounding fire alarms and for calling meetings together. The tower and belfry are reached by means of ladders leading from the closet near the second floor office. In many town halls the tower is used for drying fire hose which is pulled up by means of block and tackle. In the present instance, however, the hose racks in the apparatus room probably prove more desirable.

Special Points About Apartment Buildings--By Charles E. White, Jr.

IT has been found in modern apartment building design that there are some little "kinks" in arrangement and construction that appeal especially to tenants. It is therefore a good idea when considering plans for an apartment building to make a little private investigation of the merit of special building materials, apparatus and equipment to ascertain whether the increased outlay is worth while in view of the fact that every dollar spent on the new building must bring in commercial returns on the capital invested.

in construction, builders of apartment buildings proceed to erect "false fronts" with hipped or pitch roofs. The result has been a cheap and ugly imitation of the roof usually applied to private residences.

In some communities it may pay in increased revenue to provide a high roof with attic space for the use of tenants, but in most cases the increased cost of an attic is not worth while. For that reason it will usually be found more practicable to build a flat roof with merely sufficient space between the ceiling of the uppermost apart-

Do Fireplaces Pay?

The fireplace proposition is largely a matter for each building owner to settle so no general rules can be laid down. In some towns and cities tenants demand real fireplaces with "honest to goodness" flues, making it possible to burn either wood or coal. In other places gas fireplaces are more popular because it is so much more convenient to secure heat quickly by the mere turning of a valve and application of a match.

Landlords should investigate the tenden-



A modern "front-room" apartment building enriched by the use of Bedford stone. Note the sunrooms on all principal flats; French doors opening down to the floors, guarded by iron balcony rails, make many of the living rooms most attractive. Schmidt, Garden and Martin, Architects

For instance, experts have given much attention to the style of roof practicable for apartment buildings together with a study of roof construction and the materials most economical for roofs.

In one town I know of, near a large city, the building laws require that every apartment building shall have a pitch or hipped roof. This is a residence town and the idea was that flat buildings in a high-class residence neighborhood should partake somewhat of the character of a residence. It was believed that causing a hipped or pitch roof to be included on every apartment building would accomplish this result.

As a matter of fact, the drastic ordinance in this town has hurt the appearance of flat buildings instead of improving them. In order to follow the building code and at the same time take advantage of economy

ments and the roof, to give sufficient insulation from heat and cold. A minimum space of 18 inches is usually sufficient for this, especially when, by reason of the slope of the roof, the space at the high end is considerably more.

Often this "attic" space can be ventilated by opening it into a spare flue in the chimney. It frequently pays to have metal ventilators installed in several places on the roof, or have the roof space aired at the ends by means of ventilating openings under the eaves.

Whatever can be reasonably done to ventilate (and consequently, to render more cool) the roof space should be done in the interests of tenants who will appreciate every attempt made to render their apartments more comfortable. A ventilated roof space is a good talking point for the agent when renting apartments.

cies in their own town to see what sort of fireplaces are most popular, and then meet the popular demand.

That there will be a fireplace of some kind in every flat of four, five or more rooms is now granted to be the modern requirement. Even when not in use, a fireplace in the principal room is an excellent means of ventilation. It also has a decorative value and makes the flat look more cozy and home like.

Materials for fireplaces are of many varieties. Face brick is used extensively and may be taken to be the most popular material if a wide use of any material be taken as a token of its popularity. Many of the mantels can be purchased in units of molded and plain brick all ready to put together at the job and there are many excellent designs of fireplaces of this char-



A three-story and "English" basement apartment in which every flat has a sunroom. Although this design has a flat roof, there is no reason why it should not prove attractive, even in a first-class residence section. John VanBergen, Architect

acter, topped out with either brick or wooden shelves.

Another excellent material for fireplace facings is tile, which comes in such a variety of shades that any decorative scheme can be carried out in an apartment with the sure knowledge that tile of the right tint can always be found. There are also molded and ornamental tile to be had when a particularly rich design is required. Cement mantels have been introduced in many modern apartment buildings.

Marble facings are popular in high grade apartments, used either in conjunction with marble mantels or wood mantels.

Many of the most pleasing mantels are built entirely of wood, with merely a narrow facing of tile, brick or marble. Usually the front hearth is of the same material as the facings.

Should There Be Tile Bathrooms?

The owner will come up against this proposition rather early in the game and must decide whether to cover floors with tile and use tile wainscots or employ merely wooden floors with plaster walls.

Of course, tile floors and wainscots will prove, not only more sanitary, but much more beautiful. Tenants are usually impressed with tile floors and the additional cost of tile over wooden floors frequently results in an increased income because ten-

ants, such people as are renting apartment buildings of the better class, will pay more rent for tiled bathrooms. Indeed, tenants often move from old apartments into new ones equipped with tile bathrooms although in the latter buildings considerably more rent is charged.

Formerly, it was the custom to use tile of many colors in bathrooms but some of the newer and more tasteful apartment buildings now employ only pure white tile, with possibly a small, inconspicuous border of blue on floors and walls.

Tide floors and marble steps are recommended for vestibules because a touch of elegance at the entrance of the building always impresses tenants most favorably. A little extra money spent here will bring in rich returns in increased profit.

Built-in Furniture for the Modern Flat

A certain amount of built-in furniture pays in most flats and the progressive owner who wants to make money out of his property will do well to consider bookcases, china cabinets and kitchen cabinets as part of the regular equipment. Anything that reduces housekeeping cares is always acceptable to tenants. Also, such standard fixtures as bookcases and china cabinets, articles which are needed in every home, should be included in all small apartments, at least, because this policy

will attract a large class of well-paying tenants who do not have a great deal of furniture of their own.

There are certain desirable tenants (who might be termed "flat-dwellers") who never live in homes of their own. These people do not acquire the usual amount of household furniture and for this reason they will patronize flats where standard furniture such as a bookcase, sideboard, kitchen cabinet, wall bed, etc., are included in the equipment.

In larger and more pretentious apartments which are to be rented to more prosperous tenants there is less demand for built-in furniture because families of this class usually have a great deal of furniture of their own. In such apartment buildings it is no longer customary to furnish even a sideboard in the dining room because tenants prefer their own portable sideboard as it matches their dining set.

The Sunroom Is Almost a Necessity

No feature of the modern apartment building has proved more popular than the sunroom and every building catering to high class tenants should have a number of apartments with sunrooms. These rooms are furnished as a den, usually, and frequently a couch or day bed is placed there which can be used as extra bed accommodation in an emergency.



In many of the most modern apartments china cabinets are built into the space separating the dining-room and living-room. Bookcases are also furnished in the living-rooms. Note the attractive brick fireplace in this most interesting apartment. E. E. Roberts, Architect

Some of the prettiest of the sunrooms are furnished with wicker furniture throughout, and often the floor is of tile. Usually French doors open broadly from the living room.

Casement windows are preferred for the sunroom because they give the greatest amount of light and air. As the sunroom is really a sort of enclosed porch in summer, it is a good idea to provide a sufficient number of windows to make the room as nearly like "out-of-doors" as possible.

Among the successful sunroom windows are casements which slide in grooves, top and bottom, and can be opened the entire length of the room. These windows are hung in pairs, any pair of which can be opened, or all may be pushed to one side or the other, providing an unusually large opening.

Screens for windows of this sort are usually sliding metal screens, as they have been found the most practicable.

The Importance of First Impressions

Do not fail to remember that your building is half "sold" when it makes an instantaneous appeal because of its pleasing architectural character.

A judicious use of Bedford stone trimmings on the brick exterior will add "class"



Fig. 1



Fig. 2

Fig. 1. A tile floor and marble steps in the vestibule will do much to create an instant impression that the building is of the highest possible class. Tenants are willing to pay more rent in a building containing a pleasing entrance. Fig. 2. The inside communicating telephone set is now standard equipment in most apartment buildings. It connects with the combination mail-box vestibule set and takes the place of the old-fashioned speaking tube

to the building at very slight additional cost. The approaches to the building should be carefully thought out to contain a bit of green sward and a flower vase or two with other planting when possible.

First class sidewalks and entrance steps with well constructed buttresses at the sides are important.

A combination mail box and telephone system looks well in the vestibule and ten-

ants will appreciate its convenience. They will enjoy having a modern telephone in their own little corridors instead of the old-fashioned and unsightly speaking tube.

A Parish House

A PARISH HOUSE for St. Paul's church at Pawtucket, Rhode Island, is here illustrated and described. The architect, Gorham Henshaw has designed a number of buildings of this character.

The parish house was built at the end of an existing church building, and it was of course necessary to arrange for good circulation or communication between the two buildings, while at the same time preserving certain features of lighting and

dings. The pitched roof is covered with slate, while the flat portion is of felt and gravel.

The church and the parish house are connected by a two story wing. The entrance leads through a vestibule into a small hall which contains the stair to the second story. At the right of the hall is the reception room which has a high, paneled wainscot, and contains a mantel flanked with built-in seats. Bookcases are

The guild room contains three large closets which are useful for storing sewing machines and other supplies used by the women's guilds.

Facing the entrance doors are doors which open into a passage which leads to the rear hall. The entrance to the guild room is from the passage. The passage is lighted from the coat room by means of a glazed partition.

The coat room overlooks a light well



Fig. 1—Exterior of St. Paul's Parish House, Pawtucket, R. I. Gorham Henshaw, architect

ventilation in the church and avoiding changes in the existing passages or halls.

The exterior of the parish house is perpendicular Gothic in style. The walls are of rough textured brick with stoe trim-

built in at the opposite end of the room.

Wide, sliding doors take up most of the wall space between the reception room and the guild room, thus making it possible to throw these rooms into one when desired.

which gives light and ventilation to both the church and the parish house. The light well is planted with vines and shrubs, thus turning what is usually allowed to become an eyesore into an attractive fea-



Fig. 2—The auditorium looking toward the stage



Fig. 3—The reception room. An inexpensive but handsome room

ture of the building.

Beyond the coat room is a small kitchen or sewing room which is connected with the large kitchen above by means of two dumb-waiters.

At the end of the passage is the rear hall which communicates directly with a corridor in the church. A stair in the rear hall leads to the second story and under this stair is one leading to the basement.

In one corner is located the ladies' dressing room with a connecting toilet room. In the other corner is a large lounge or men's room which also has a connecting toilet room.

The men's room has a paneled wainscot and a fireplace flanked by built-in seats. Two closets for storing games and folding chairs and tables are provided in this room. The men's room has a separate entrance to the yard. Under this entrance is the entrance to the recreation room which is located in the basement. The recreation room extends the full length of the parish house and has a pair of bowling alleys along one side. One corner is taken up by the boiler room which contains two

boilers, one of which may be used as an auxiliary during cold weather.

The second story contains a large auditorium with a seating capacity of about 350 persons. At one end are two stairs leading to a balcony which provided 110 additional seats. During banquets 250 people can be accommodated in this room at one time.

From the stage stairs lead to the dressing rooms that are located in the third or attic story. There is an exit to the front hall and one to the rear hall, and on the opposite side of the room are two fire escape exits, thus ample security is provided for this floor.

The main kitchen is used for preparing large suppers and banquets. A built-in cabinet extends along the wall between the kitchen and the auditorium and sliding windows in this wall are used for sewing. The kitchen overlooks the light court and is provided with the most modern equipment.

The refrigerator is located near the dumb-waiters which run to the first floor. At each end of the kitchen cabinet are linen closets and a wide working counter forms the base shelf of the cabinet. A

smaller cabinet is provided at one end of the room. The range is against the court wall and between two windows. A small movable table is near the range. A steam table two feet wide by 12 feet long is provided for cooking and for keeping foods warm. There are also two large sinks with drain boards near the center of the room. A smaller sink with a filter for drinking water is located at one end of the kitchen. The kitchen is accessible from either the front or rear halls and is lighted from the light court and from two skylights in the roof.

Opening from the rear hall is the robing room for the clergy. This room is provided with a closet for vestments and a parish toilet room.

The interior finish throughout the building is of chestnut and hard pine, stained. Maple floors are used throughout with the exception of the kitchen and the basement where hard pine floors are used. The reception room has an oak floor.

The ceiling of the recreation room is sheathed with pine ceiling and the walls are of red face brick. There is no plaster



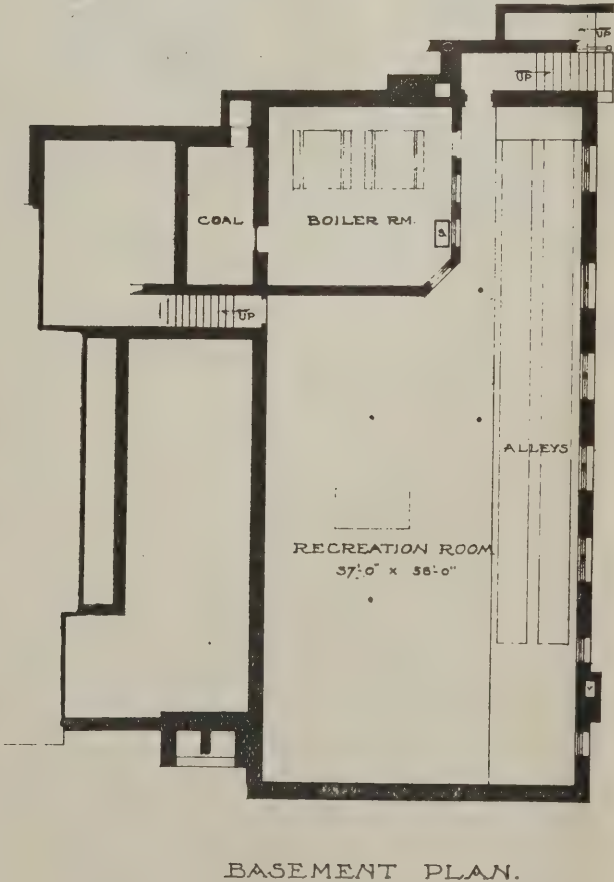
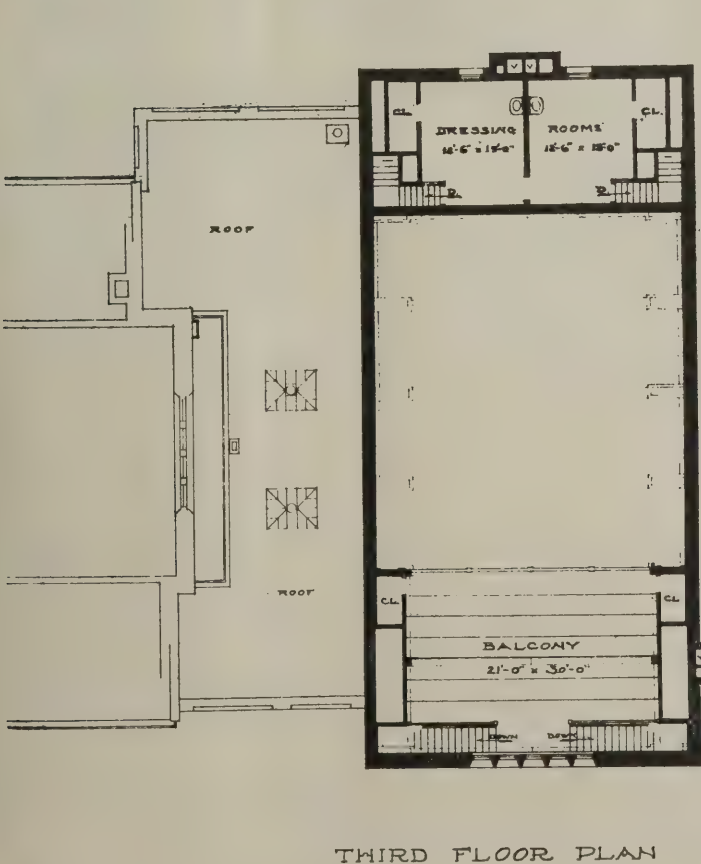
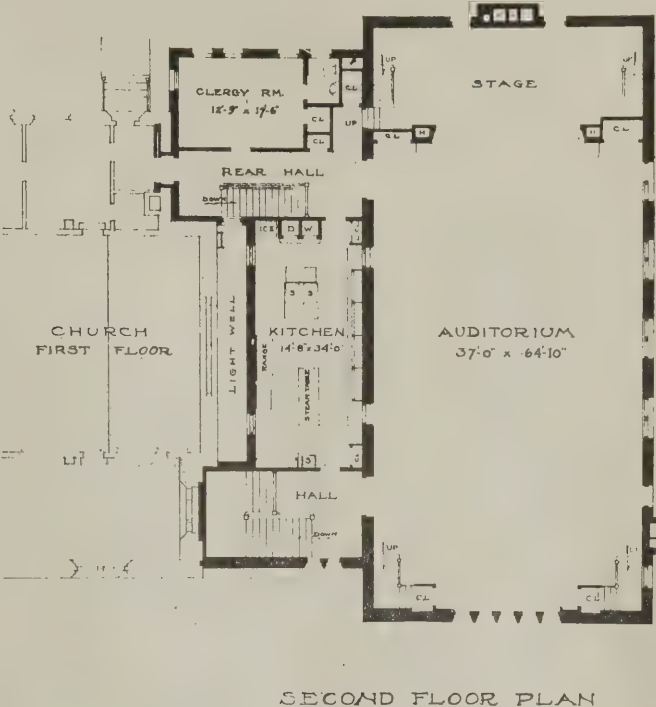
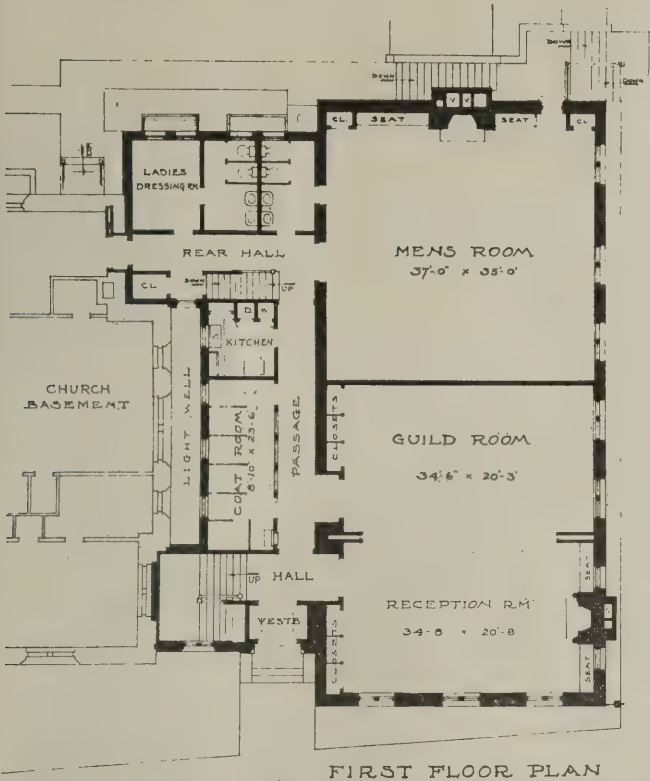
Fig. 4—The men's room is restful and almost homelike in its effect



Fig. 5—The kitchen is up-to-date in its arrangement and equipment

in this room to be damaged in playing games.

The auditorium, the recreation room and the toilets are ventilated in addition to the fresh air furnished by the windows and other openings. The ventilators which appear on the ridge of the roof in the exterior view are of copper and are worthy of note in that they show that a ventilator may be designed so that it becomes a pleasing detail rather than the unsightly excrescence that is commonly used.



Apartment House for a Small City

AN apartment house for a small town or city must usually offer a variety of accommodations to suit the living requirements of different families. That is, while it is often practicable and desirable to plan a large city apartment house with

plicity and general composition. Stone trimmings are used sparingly but with good effect, and the entrance porches are of wooden construction. The porches are a trifle "squatty" in appearance, and would probably be more pleasing in proportion if

unusual and interesting. The middle suite extends through two stories, and on the first floor contains a large living room across the front with a combination kitchen and dining room and a bedroom at the rear overlooking a light court. In this



Apartment house at Mishawaka, Ind. J. H. Wiekamp, designer and builder

uniform suites throughout, the suites of an apartment house for a small town should be varied in size and arrangement. The number of tenants in a small town is comparatively limited and for that reason an apartment building must attempt to meet such a condition by providing several different types of suites so that the accommodations will be attractive to all prospective renters.

The accompanying illustrations show an apartment house for a small city. It was designed and built by J. H. Wiekamp, of Mishawaka, Indiana.

The interior is a straightforward design, free from frills yet pleasing in its sim-

ple and general composition. Stone trimmings are used sparingly but with good effect, and the entrance porches are of wooden construction. The porches are a trifle "squatty" in appearance, and would probably be more pleasing in proportion if

their cornices were lined up with the belt course above them. The construction is brick veneer on wood frame for the exterior walls, and wood frame, plaster partitions for the interior. The foundation is of concrete and the roof is of felt and gravel.

Only a small portion of the basement is excavated—enough to furnish space for the heating plant and coal bunker. The designer suggests that if buildings of this type were built slightly higher above grade level, additional apartments could be provided in the basement at slight additional expense.

The arrangement of the apartments is

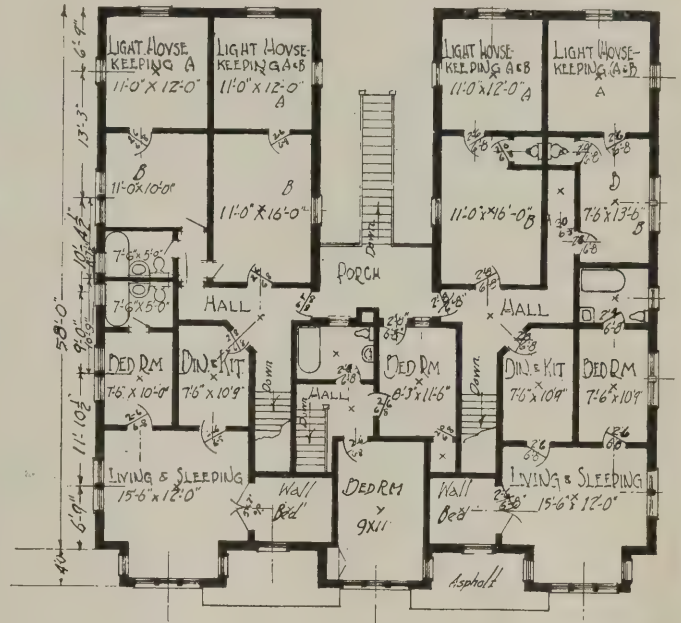
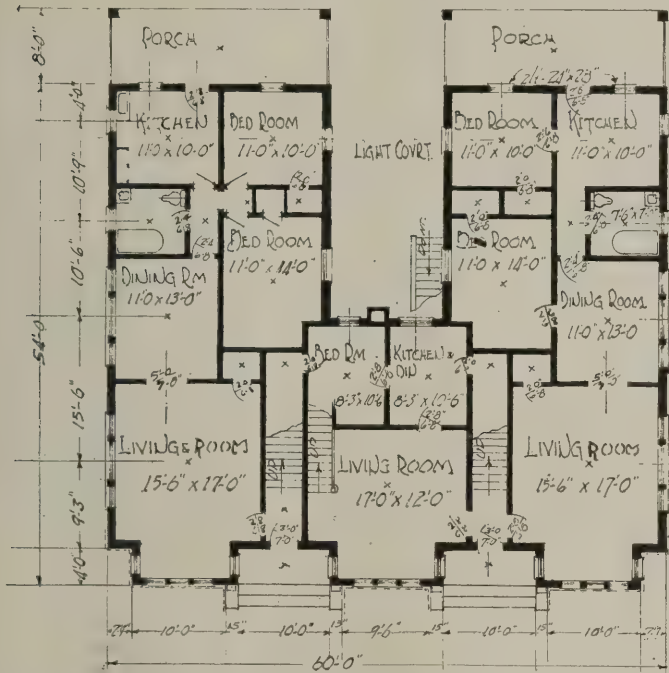
suite a private stair leads from the living room to the second story portion which contains two bedrooms and a bathroom opening from a small hall. One of the bedrooms opens onto a rear porch.

At the sides of the middle apartment on the first floor are two large suites each containing five rooms with bath, all in the first story. The arrangement of these two suites are exactly alike. The living rooms are placed across the front of the building and are entered through the main stair halls. Coat closets are provided in one corner of the living rooms and cased openings lead to the dining rooms. At the rear of the dining rooms is a passage lead-

ing to the bathrooms and kitchens, and at the rear of the kitchens are large rear porches. Each bedroom has a large closet and the rear bedrooms have cross ventilation. In each of these apartments one bedroom opens from the dining room and one

crete House Construction submitted many valuable suggestions. Among the most impressive and one that everyone interested in building may well add his weight to is that relating to legislation and building codes.

ments. The thickness of walls as frequently required by present building laws is greater than is essential to the safety of the structure. The requirements for the use of concrete in dwellings are fixed by regulations which govern the construction



from the kitchen as shown in the right hand suite. An alternate arrangement of the bedroom doors which would probably prove more satisfactory is shown for the left hand suite.

The main stair leads from the entrance to a second story hall which communicates with the suites on this floor. The second story hall also opens onto the rear porch in the light court which provides a stair for the delivery of goods and for use in case of fire or other emergency.

The floor plan arrangement of each side of the second story is exactly similar. In the front in each case is a three-room suite with bath. The living rooms are across the front and contain wall beds which take the place of extra bedrooms, thus cutting down expense as well as housework. In addition to the living rooms, each of the three-room suites contain a combined dining room and kitchen and a bedroom opening into a bathroom.

At the rear of each three-room suite, a pair of two-room suites are provided, the rear rooms of which extend over the rear porches below them. Each two-room suite contains a private toilet lighted and ventilated by skylights as shown for the right hand suites. No bathroom is provided for the two-room suites, but could be cheaply installed as shown for the left hand suites.

It is urged that building officials give their support and influence in securing economies in construction by standardization of requirements for building materials

of warehouses. Lights walls and floors, possible with concrete and ample for the needs of the ordinary house, are prohibited by these laws. Nor does the value of the concrete from the standpoint of fire protection receive the recognition it deserves. If these discriminations were removed there would be made available for more extensive use a material, to a large extent of local origin, and employing local labor in its fabrication for the relief of the housing situation.

We (the conference) submit the foregoing to all citizens and groups of citizens who may be interested in solving a problem rapidly becoming the most acute which the nation has to face. We believe that informed public opinion is the greatest agency for the accomplishment of necessary and desirable changes.

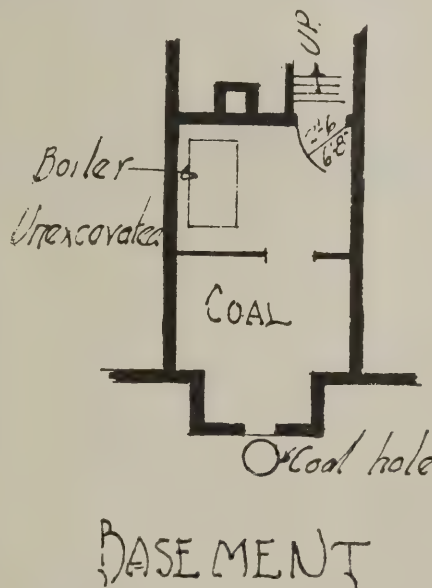
With the housing famine already of a most serious nature, we face an industrial development in which every thousand dollars invested in a plant would require about \$5,000 invested in housing.

We submit that no one should rest content with informing himself as to this situation, but should make opportunities to impress upon others the necessity for putting into effect the foregoing principles.

He serves himself best who serves his country best. He makes his own rights secure who respects the equal rights of others. The right to equality of opportunity is a statement of only half the case. There must be equality of responsibility as well if the Nation is to maintain its equilibrium.

Service for service is the law of life.

and supplies of all kinds and the removal of undue restrictions applying to the erection of homes. It is particularly urged that legislative bodies enact more reasonable laws governing the use of concrete in the erection of houses so that the construction of better and more nearly fireproof and permanent structures may be encouraged as contrasted with an existing tendency to accept less desirable construction, while the users of better materials are frequently penalized by excessive require-



Legislation and Building Codes

The report of the committee on resolutions of the National Conference on Con-

The consciousness of owning a stake in the country is a prime factor in intelligent patriotism, since in this light the encouragement of home ownership assumes the

aspect of a high civic virtue.

To clear away the obstacles which prevent every citizen who wills it from becoming a home owner, is a moral obligation

upon everyone whose intelligence is sufficiently developed to enable him to estimate the importance of such a policy.

Formal and Picturesque Houses

GENERALLY speaking, house designs may be grouped into one or the other of two types; formal houses or picturesque ones. Each type has its adherents among designers, some of whom allow prejudice to overcome common sense, re-

usually implies a pose and we are more resentful of its unnaturalness.

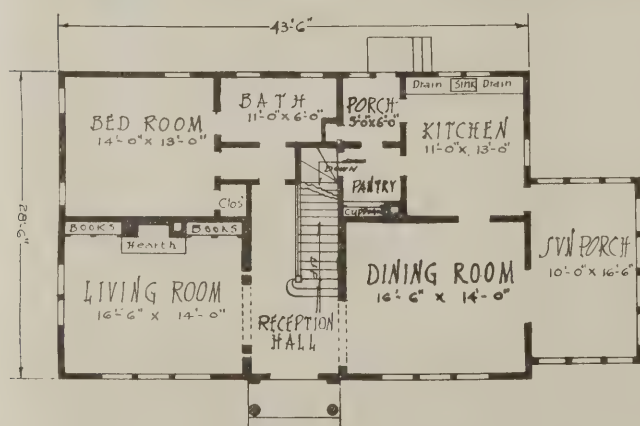
No hard and fast rules can be laid down for exact guidance in the use of either of the types. It may be said, however, that the small narrow lots of most cities are

lend themselves more freely to a picturesque treatment than do large ones, although in a few instances the latter have been effectively handled in a picturesque manner.

It should be remembered that pictures-



Fig. 1—Formal type



FIRST FLOOR PLAN



SECOND FLOOR PLAN

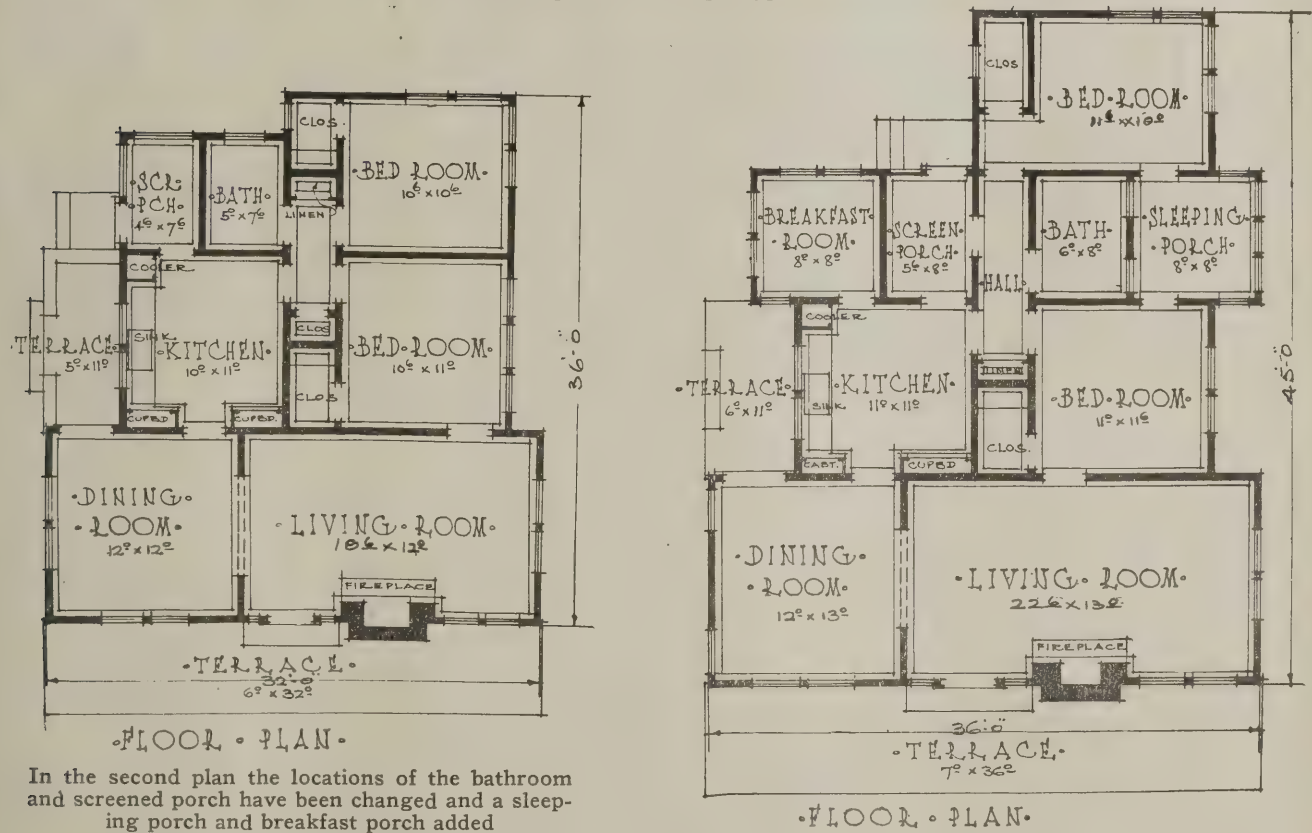
sulting quite frequently in a formal design being placed in a picturesque locality, or vice versa. Of the two faults the first is usually the least evident, as long association has made us more or less tolerant of formality in house design. On the other hand, picturesqueness out of place,

unsuited to picturesque houses unless all of the surrounding houses are of the same picturesque character, or unless the conditions of the site are especially favorable. Trees and other natural features are always an asset in aiding picturesqueness, but are not absolutely essential. Small houses

queness does not depend upon a jumbled mass of features, each clashing with the others for supremacy, nor does simplicity belong exclusively to formality. In fact, the most of the successful picturesque houses—both old and new—are simple in design and treatment. They seem to have



Fig. 2—Picturesque type



grown not merely *on*, but *with* their site.

The two houses which accompany this article were designed by Ye Planry of Dallas, Texas.

Figure 1 is of the formal type. Four square with a symmetrical front elevation. The windows and other details uniformly spaced on either side of the entrance, the sun parlor at one end balancing the porte cochere at the other.

Figure 2 shows a house of the picturesque type. No attempt is made toward obtaining symmetry. The entrance is a trifle off center as is the well designed chimney, which is made one of the most important features of the design. The low spreading roofs and the simplicity of the entrance are also important factors in the picturesque result.

It will be noted that the character of the

design of each house is also expressed in the plans. The plan of Figure 1 is almost rigid in its expression of formality, with the wide entrance hall separating the living room and the dining room. The living room contains a fireplace flanked by tall book-cases. The arrangement of the kitchen and the dining room is such that the sun porch may also be conveniently used as a breakfast porch if desired. The kitchen

has cross ventilation and opens onto a small rear porch. Both the kitchen and rear porch open into a pantry from which leads the stair to the basement. A novelty of the first floor plan is the bathroom and bedroom arrangement at the rear of the entrance hall. This would prove invaluable during serious illness or could be used as a maid's quarter. On a farm it would furnish quarters for a hired man and could easily be rearranged to provide a separate entrance from the exterior if desired.

The second floor contains four bedrooms

and two bathrooms. All bedrooms have closets and three of them have cross ventilation. The remaining bedroom opens onto a small sleeping porch.

Two plans are shown for Figure 2. Each of them are of an informal type, with the entrances directly into the living rooms. The smaller plan contains five rooms and a bath. The living room contains a large fireplace and is separated from the dining room by a wide, cased opening. The dining room opens onto a small paved terrace. The kitchen contains two built-in cupboards and a cooler and opens onto a screened

porch. A small hall contains two closets and opens into the kitchen, the bath and the two bedrooms. Each bedroom has a large closet and one of them has cross ventilation. The front bedroom opens into the living room.

The larger plan for this house is almost exactly the same as the smaller one. The locations of the bathroom and screened porch have been changed, and a sleeping porch and a breakfast porch have been added. Otherwise, except for size, they are very similar.

House for a Physician



Fig. 1—Construction photograph made before the planting and sodding were complete

DESIGNING a house for a physician usually presents a problem somewhat more difficult than that of designing an ordinary house, as the nature of a physician's practice usually makes it necessary for him to do a certain amount of professional work at his home, even though he maintains a regular office at some other place. In some cases a complete professional establishment is provided at the physician's house, including an office, reception room, surgery, bath and so forth, but in most cases only the office and waiting room are desired. These rooms should be easily accessible from the street, and should have a separate entrance easily distinguished from the main entrance to the house. The office should be well lighted and together with the waiting room should be accessible from the other rooms of the house, yet at the same time isolated from those rooms.

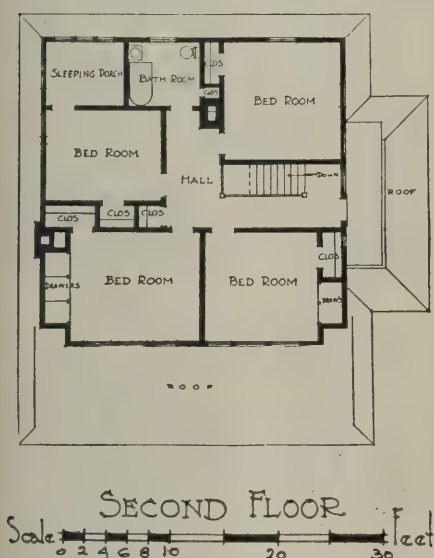
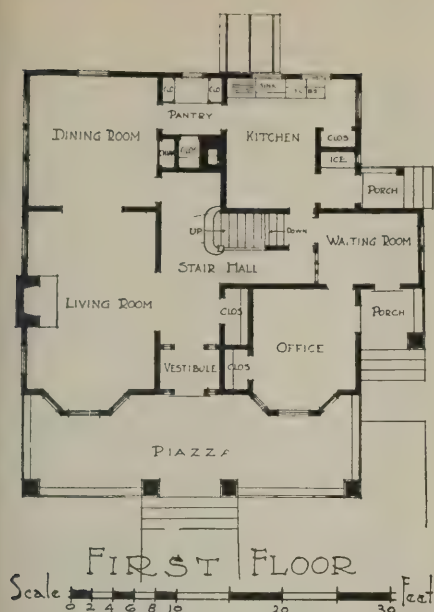
The accompanying illustrations show a house designed for Dr. Graves at Presque Isle, Maine, by Henry A. Mears, architect of Boston. The construction is of frame on a concrete foundation.

A wide porch extends across the front from which opens the main entrance. The entrance to the waiting room and office is at the side, near the front yet subordinated to the main entrance so that confusion is unlikely. The side entrance has a small porch and opens into both the office and the waiting room. The office contains a large closet and is well lighted by a bay window. The waiting room opens from the office and has a glazed partition between it and the rear portion of the main stair hall. A door opens from the waiting room into the hall.

The main entrance to the living portion of the house is through a vestibule leading from the front porch into the stair hall, which contains a large coat closet and the stair to the second story. At the left is a wide cased opening leading to the living room, which contains a fireplace at one side and a bay window to balance the one in the office. A cased opening separates the living room and the dining room, and the latter



Fig. 2—Architect's perspective showing the side entrance leading to the office and the waiting room



contains a built-in china case. A pantry with two built-in cases and a closet is placed between the dining room and the kitchen. The kitchen contains a large closet and the laundry tubs are placed here instead of in the basement. A rear entry containing space for a refrigerator opens from the kitchen onto a rear porch that is contained under the same roof as that which covers the side entrance and the end of the waiting room. The inside basement stair is placed under the main stair and an outside basement stair is placed in a bulkhead at the rear of the house. The kitchen opens into the rear portion of the stair hall and makes it convenient for the maid to reach the basement and also to answer either the front door bell or that of the office. The hall arrangements of this house is excellent, making it possible to reach the living room, dining room, kitchen, waiting room, or the basement without passing through any other room.

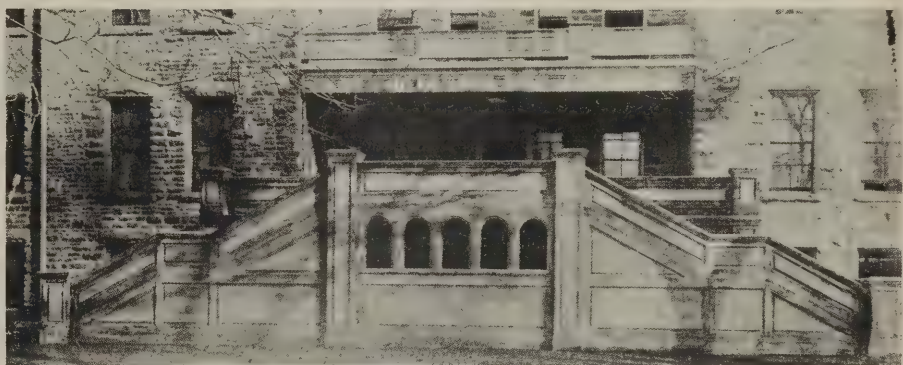
The main stair leads to a large hall in the second story. The second story hall contains a linen closet and opens at one

end onto a deck formed in the roof over the side entrances and waiting room. There are four bedrooms and a bathroom on the second floor. All of the bedrooms have large closets and the two front ones have built-in wardrobes and drawers in addition. A sleeping porch opens from the

smaller of the two rear bedrooms. The other rear bedroom has three large windows affording cross ventilation.

Taken as a whole this house is well designed and offers many suggestions that may be employed in houses other than those intended for the use of a physician.

Reinforced Concrete Porch



Reinforced concrete porch, steps and balcony

Herewith is shown a reinforced concrete porch, steps and balcony, designed and built by A. Munich for a large institution at Kankakee, Illinois.

The concrete had not thoroughly dried when the photograph was made, which accounts for the "spotty" appearance.

The Cost of Building

When the dollar buys a hundred cents worth, a carpenter, for instance, receives wages of about \$4 a day; when it buys 50 cents worth, he receives about \$8 a day. Really he is getting the same thing either way, but the blacksmith or the quarryman

who wants a home of his own and is also getting wages on the same comparative basis, refuses to see it that way. He thinks he ought to have the \$8 a day, but the carpenter, the plumber, the painter, the lumberman and the mason ought to still be satisfied with the old \$4, in order that he, the blacksmith or the quarryman, might still buy the kind of house he wants for 4,000 of the 50-cent dollars he would pay for it.

It isn't difficult to make an intelligent, reasonable man see all this; in fact, most of them understand it now. Therefore, the time is ripe and all conditions favor a great home-building and home-owning campaign.

Gypsum-Block Houses in Canada

GYPSUM blocks for exterior construction is being largely used in Winnipeg, Canada, according to a report in *Rock Products*. About fifty houses of the type shown in the illustrations have been built this season, and the work is proceeding as fast as the gypsum-block material can be supplied.

side of the blocks are waterproofed with a coat of waterproofing and stuccoed with a lime-cement mortar. The interior wall has 1x2-in. strapping nailed to the blocks, to which is fastened gypsum plaster board and the usual two-coat plastering. Even the chimney is built of 17x17x12-in. gypsum blocks with a 10x10-in. opening to receive

gypsum block starts. The block should always be laid in gypsum mortar, consisting of one part gypsum and two parts sand. One 100-lb. sack of gypsum will lay about 80 ft. of 6-in. block.

"After the walls are built and before applying the outside stucco, give blocks one good coat of waterproofing, being careful



Gypsum-block house under construction



Manitoba gypsum-block bungalow



Completed bungalow—note "brick-top" chimney



Example of moderate price residence

The blocks are 6x12x18 in., and are hollow, weighing 24 lbs. per sq. ft., and 8x12x18 in., weighing 27 lbs. per sq. ft. of wall. Tests of these blocks by the engineering department of the University of Manitoba give a crushing strength of 300 lbs. per sq. in. for the 6-in. blocks and 500 lbs. per sq. in. for the 8-in. blocks. They are used for the outside walls of both one and two story buildings.

The accompanying sketches show graphically the principal specifications. The out-

side of the blocks are waterproofed with a coat of waterproofing and stuccoed with a lime-cement mortar. Above the roof bricks are used for the sake of appearance.

The specifications read:

"Build foundation of stone or concrete to top of first floor joist.

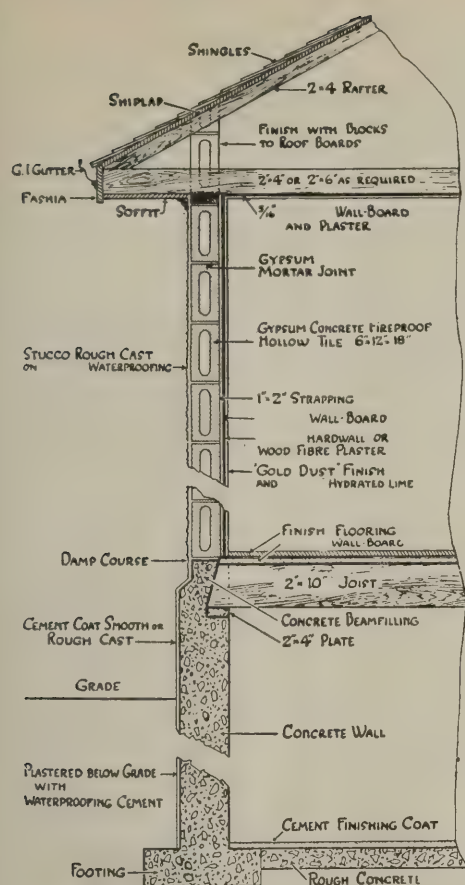
"At this point a damp course should be placed on top of the walls, consisting of a heavy coat of pitch, or two ply of composition roofing cut in strips 8 in. wide. On top of this damp course the building of the

to cover the entire surface. Let this coat soak in before applying outside stucco.

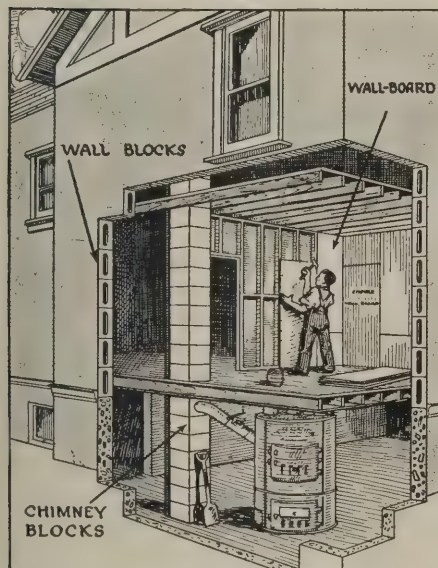
Outside Stucco—One 50-lb. sack of hydrated lime, making one part. Clean, sharp sand five parts. Add a small quantity of hair (using about half a bushel per 100 yards); mix these materials thoroughly together, making a mortar. If possible, make the mortar the day before using. Before applying mortar to the wall, gauge the mixture with Portland cement, using one part cement to three yards mortar. If the wall

Cement Waterproofing, 2 lbs.
Rough cast should be applied before the second coat gets dry.

Cement Waterproofing (2%) should be mixed in the cement used to make up the rough cast, and in gauging the first coat.



Showing Section Through Wall



Structural features of gypsum-block houses

is laid up straight and true it will not require a heavy coat—about $\frac{1}{4}$ inch—and it can be darbied up to receive rough cast, which should be dashed on before the first coat gets dry.

Rough Cast Coat—

Hydrated lime, one 50-lb. sack (1 part).

Clean, fine gravel through a $\frac{3}{8}$ -in. screen or a fine limestone dust (10 parts).

Clean, sharp sand (2 parts).

Portland cement, one 87½-lb. sack.

Concrete Housing

Portion of an address by Irving K. Pond, Architect, before the National Conference on Concrete Housing

Imitations

Concrete has a character of its own; there is no call to torture it into imitations of stone, wood, bronze or other material. Details cast in moulds should bear the plastic touch of the modeler and not the chisel marks of the sculptor.

Economy

Forms suited to the special purpose should be used—forms extravagant of labor and material should be avoided and should be employed only where duplication can be accomplished without monotony.

Monotony

Even a good thing ceases to be a good thing when used in excess and two concrete houses from the same forms, placed side by side, is an excess—such treatment is permissible only in barracks where men are in uniform and drilled into the same line of thought, act and movement, all individuality being eliminated.

Slabs

Flat slab roofs may at times and in places be appropriate. A general use would be deadly unless counteracted by features the initial expense of which would more than offset the element of economy which alone would seem to call for a wide prevalence of such roofs.

Monolithic Forms

This method presents advantages in certain types of structure. The appearance of mass and strength is enhanced by monolithic treatment. Openings and corners can be characteristically and ornamentally treated at slight or no additional expense. Houses pre-cast from monolithic forms and transported as slabs or as units are to be looked upon with suspicion as tending to create types and general monotony. The Committee on Monolithic Houses will have more to say on this subject.

Block

As units. Concrete block laid to be effective as units may perform a legitimate aesthetic as well as structural service. Texture and color can be given them. Their danger lies in exaggerated scale and general uniformity. Stone has the advantage of lending itself to cutting and fitting in length and height without consequent economic waste. The manufacture of concrete block should be studied with variety of size as well as appropriate scale in mind. Corners and angles should be true, and crude and rock faced surfaces avoided.

Block

As backing for stucco. This is a legiti-

mate field for the use of concrete block. Scale need not be taken into account; neither need such matters as sharpness of corners and angles or crudity of surface. Uneven chipping where blocks are cut approximately to the desired outline presents no obstacle to the perfect finish. Surfaces should be such as to which the stucco will most readily adhere.

Costs and Permanence

In a letter from an official of the United States Housing Corporation I find these words:

"We were satisfied that there were certain types which would produce a good, practical house at a very moderate cost, but it appeared to us that this could be done only where the same unit was repeated indefinitely, and our belief was that this would produce a deadly monotony."

As to the monotony we have already heard; as to the cost and permanence or durability let me say that there may be cases where permanent houses would be a drawback in a developing community. There would be very little salvage in a wrecked concrete house, while the wrecking would entail almost as much expense as the constructing. Unless a community is well "zoned," buildings of a too permanent nature are an economic waste even though the initial cost may be the same as for a building of less permanent character. Where, as in many of our communities, change is the order of the day, well constructed buildings of a more temporary nature are desirable. Buildings of a temporary nature can be "fire stopped" and made safe for occupancy.

Fireproof Character of Concrete Houses

In the letter above referred to these words appear: "We found that the people who were interested in the concrete house were, almost without exception, trying to build every part of the house in concrete, including porches and all the trim." This would seem to me to indicate a deficient sense of humor on the part of the people referred to, as well as defective vision. I will grant that the designs of many architects who never intended to make a joke of their work are such as to be readily translated into concrete and would not lose in the process; but a concrete man with a sense of fitness, I'll call it humor, would not design to effect the translation. I must still warn the enthusiast against excess—excess of imagination as well as excess in

material—or some of them may wish to make the door hinges out of concrete after all! Fireproofness, so to speak, and permanence are good qualities, for which it is possible at times to pay too much.

Methods and Means

How to make the house reasonably fire-proof, reasonably durable, reasonably attractive and reasonably economical in cost and in upkeep presents a series of problems for the architect and the concrete expert. As an architect I shall receive the findings of the concrete expert and will make such application of the methods and means presented as may suit the particular case. I will even present the case beforehand to the expert, if it is not already covered, and aid him in his solution. I will even ask him now to present types of floors in structure and finish which are durable, economical, and appropriate to a small house. I will ask the same concerning the roofs, high pitched, low pitched and flat.

Standard Concrete Block and Tile Sizes

From the Report of Sub-Committee B of the National Conference on Concrete House Construction, Consisting of M. Wetstein, Chairman; H. D. Kerr, Secretary; Gilbert Cooper, G. M. Friel, F. J. Kinzinger, F. M. Leach and L. P. Willsea

In general, all block and tile are made with hollow spaces or of two-piece construction so as to secure air space as an insulating medium, lighter weight, and to realize economy in materials.

There are five common types of concrete units.

- Solid Units
- Concrete Hollow Block
- Concrete Building Tile
- Solid Slab Block
- Architectural Concrete Shapes

A tabulation of sizes of block and tile, as now manufactured, is shown in Table I. The name of the manufacturer is followed by the width, height and length of unit, the actual size of the block or tile being given. A block listed as 8 in. wide, 7¾ in. high, and 15¾ in. long, is ordinarily referred to in practice as an 8x8x16-in. block. These units are purposely made smaller to allow for the mortar joint, which, when added to length and height, produces a unit of full length and height.

As a help to the designer in determining the most desirable distance horizontally between doors and windows, and also the most desirable widths of door and window openings, Table II has been prepared. Lengths of wall sections and door and window openings should be, as far as possible, multiples of quarter block.

Table II gives the length of wall sections of from one to eighteen units by ¼ units. Your committee believes that a quarter length is as small a fraction of a unit as

TABLE I STANDARD CONCRETE BLOCK AND TILE SIZE			
Manufacturer of Mold	Height, Inches	Width, Inches	Length, Inches
Anchor Concrete Machinery Co..... Rock Rapids, Iowa	7½	8-9-10-11-12	15½ & 23½
Bradstad Concrete Machinery Co..... Canton, So. Dak.	7¾	10	23¾
The Brandell Co..... Cincinnati, Ohio	7¾	4-6-8-10-12	15¾
The Brandell Co., Cincinnati, Ohio.....	7¾	4-6-8-10-12	15¾-23¾
The Hamilton Concrete Machinery Co..... Cleveland, Ohio	5	4-6-8-12	8-10-12
The Anchor Concrete Mach. Co. (Hobbs).. Columbus, Ohio	3 to 12 ins.	3 to 12 ins.	3 to 24 ins.
The Besser Manufacturing Co..... Alpena, Mich.	7¾	7¾-9¾-11¾	15¾
Flexo Concrete Mold Co..... Cedar Rapids, Iowa	5⅝-7⅝	8-10-12	15⅝-23⅝
Zagelmeyer Cast. Stone Block Mach. Co..... Bav City, Mich.	7⅝	8-10-12	15⅝-23⅝
The Federal Cement Products Co..... Cleveland, Ohio	5	8½-12½-16½	12
The Ferguson Synstone Co..... Denver, Colo.	11⅝	8-12	23⅝
The Helm Brick Machine Co..... Cadillac, Mich.	7¼	10	23¼
Hvdro Stone Co., Chicago.....	8⅝-11⅝	4½ to 17	23⅝
The Multiplex Concrete Machinery Co..... Elmore, Ohio	3⅝-5⅝-7⅝	8-10-12	19⅝
Peters Eastman Greer Co..... Indianapolis, Ind.	3 to 6 by ins.	7-10	20
Century Cement Machine Co..... Rochester, N. Y.	4 to 16 by ins.	4 to 20 by ins.	4 in. to 6 ft.
W. E. Dunn Mfg. Co., Holland, Mich.....	7¾	8-10-12	15¾
Francis Concrete Machinery Co..... St. Louis, Mo.	7¾	8-10-12	15¾-23¾
The Hayden Auto Block Mach. Co..... Columbus, Ohio	7¾	4-6-8-10-12	15¾-19¾-23¾
Northwestern Steel & Iron Works..... Eau Claire, Wis.	7¾	9-12	23¾
The Pettyjohn Co., Terre Haute, Ind.....	7¾	7¾	15¾-19¾-23¾
Republic Iron Works, Tecumseh, Mch.....	7¾	2-4-8-10-12	15¾
Stewart Mfg. Co., Waterloo, Iowa.....	7¾	8-10	15¾

TABLE II TABLE SHOWING RELATION BETWEEN NUMBER OF COURSES OF CONCRETE BLOCK AND TILE AND THE HEIGHT OF WALL FORMED BY UNITS OF DIFFERENT SIZES									
No. of Courses	Height of Wall Sections Formed								
	3 In. Block Ft. In.	4 In. Block Ft. In.	5 In. Block Ft. In.	6 In. Block Ft. In.	8 In. Block Ft. In.	9 In. Block Ft. In.	10 In. Block Ft. In.	12 In. Block Ft. In.	
1	0 3	0 4	0 5	0 6	0 8	0 9	0 10	1 0	
2	0 6	0 8	0 10	1 0	1 4	1 6	1 8	2 0	
3	0 9	1 0	1 3	1 6	2 0	2 3	2 6	3 0	
4	1 0	1 4	1 8	2 0	2 8	3 0	3 4	4 0	
5	1 3	1 8	2 1	2 6	3 4	3 9	4 2	5 0	
6	1 6	2 0	2 6	3 0	4 0	4 6	5 0	6 0	
7	1 9	2 4	2 11	3 6	4 8	5 3	5 10	7 0	
8	2 0	2 8	3 4	4 0	5 4	6 0	6 8	8 0	
9	2 3	3 0	3 9	4 6	6 0	6 9	7 6	9 0	
10	2 6	3 4	4 2	5 0	6 8	7 6	8 4	10 0	
11	2 9	3 8	4 7	5 6	7 4	8 3	9 2	11 0	
12	3 0	4 0	5 0	6 0	8 0	9 0	10 0	12 0	
13	3 3	4 4	5 5	6 6	8 8	9 9	10 10	13 0	
14	3 6	4 8	5 10	7 0	9 4	10 6	11 8	14 0	
15	3 9	5 0	6 3	7 6	10 0	11 3	12 6	15 0	
16	4 0	5 4	6 8	8 0	10 8	12 0	13 4	16 0	
17	4 3	5 8	7 1	8 6	11 4	12 9	14 2	17 0	
18	4 6	6 0	7 6	9 0	12 0	13 6	15 0	18 0	
19	4 9	6 4	7 11	9 6	12 8	14 3	15 10	19 0	
20	5 0	6 8	8 4	10 0	13 4	15 0	16 8	20 0	
21	5 3	7 0	8 9	10 6	14 0	15 9	17 6	21 0	
22	5 6	7 4	9 2	11 0	14 8	16 6	18 4	22 0	
23	5 9	7 8	9 7	11 6	15 4	17 3	19 2	23 0	
24	6 0	8 0	10 0	12 0	16 0	18 0	20 0	24 0	
25	6 3	8 4	10 5	12 6	16 8	18 9	20 10	25 0	
26	6 6	8 8	10 10	13 0	17 4	19 6	21 8	26 0	
27	6 9	9 0	11 3	13 6	18 0	20 3	22 6	27 0	
28	7 0	9 4	11 8	14 0	18 8	21 0	23 4	28 0	
29	7 3	9 8	12 1	14 6	19 4	21 9	24 2	29 0	
30	7 6	10 0	12 6	15 0	20 0	22 6	25 0	30 0	
31	7 9	10 4	12 11	15 6	20 8	23 3	25 10	31 0	
32	8 0	10 8	13 4	16 0	21 4	24 0	26 8	32 0	

TABLE III
TABLE SHOWING NUMBER OF BLOCK REQUIRED FOR WALL SECTION
OF VARIOUS LENGTHS

No. of Block and Fraction of Block	Length of Wall Sections							
	12-Inch Block		16-Inch Block		20-Inch Block		24-Inch Block	
	Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches
1	1	0	1	4	1	8	2	0
1¼	---	---	1	8	2	1	2	6
1½	1	6	2	0	2	6	3	0
1¾	---	---	2	4	2	11	3	6
2	2	0	2	8	3	4	4	0
2¼	---	---	3	0	3	9	4	6
2½	2	6	3	4	4	2	5	0
2¾	---	---	3	8	4	7	5	6
3	3	0	4	0	5	0	6	0
3¼	---	---	4	4	5	5	6	6
3½	3	6	4	8	5	10	7	0
3¾	---	---	5	0	6	3	7	6
4	4	0	5	4	6	8	8	0
4¼	---	---	5	8	7	1	8	6
4½	4	6	6	0	7	6	9	0
4¾	---	---	6	4	7	11	9	6
5	5	0	6	8	8	4	10	0
5¼	---	---	7	0	8	9	10	6
5½	5	6	7	4	9	2	11	0
5¾	---	---	7	8	9	7	11	6
6	6	0	8	0	10	0	12	0
6¼	---	---	8	4	10	5	12	6
6½	6	6	8	8	10	10	13	0
6¾	---	---	9	0	11	3	13	6
7	7	0	9	4	11	8	14	0
7¼	---	---	9	8	12	1	14	6
7½	7	6	10	0	12	6	15	0
7¾	---	---	10	4	12	11	15	6
8	8	0	10	8	13	4	16	0
8¼	---	---	11	0	13	9	16	6
8½	8	6	11	4	14	2	17	0
8¾	---	---	11	8	14	7	17	6
9	9	0	12	0	15	0	18	0
9¼	9	3	12	4	15	5	18	6
9½	9	6	12	8	15	10	19	0
9¾	9	9	13	0	16	3	19	6
10	10	0	13	4	16	8	20	0
10¼	10	3	13	8	17	1	20	6
10½	10	6	14	0	17	6	21	0
10¾	10	9	14	4	17	11	21	6
11	11	0	14	8	18	4	22	0
11¼	11	3	15	0	18	9	22	6
11½	11	6	15	4	19	2	23	0
11¾	11	9	15	8	19	7	23	6
12	12	0	16	0	20	0	24	0
12¼	12	3	16	4	20	5	24	6
12½	12	6	16	8	20	10	25	0
12¾	12	9	17	0	21	3	25	6
13	13	0	17	4	21	8	26	0
13¼	13	3	17	8	22	1	26	6
13½	13	6	18	0	22	6	27	0
13¾	13	9	18	4	22	11	27	6
14	14	0	18	8	23	4	28	0
14¼	14	3	19	0	23	9	28	6
14½	14	6	19	4	24	2	29	0
14¾	14	9	19	8	24	7	29	6
15	15	0	20	0	25	0	30	0
15¼	15	3	20	4	25	5	30	6
15½	15	6	20	8	25	10	31	0
15¾	15	9	21	0	26	3	31	6
16	16	0	21	4	26	8	32	0
16¼	16	3	21	8	27	1	32	6
16½	16	6	22	0	27	6	33	0
16¾	16	9	22	4	27	11	33	6
17	17	0	22	8	28	4	34	0
17¼	17	3	23	0	28	9	34	6
17½	17	6	23	4	29	2	35	0
17¾	17	9	23	8	29	7	35	6
18	18	0	24	0	30	0	36	0

is necessary or desirable and that manufacturers of molds should adapt their machines and furnish suitable division plates for making ¼, ½ and ¾ length block. By careful design it is often possible to utilize only two sizes of units—the full length and the half length units.

The purpose of Table III is similar to that of Table II. It is intended to help the designer determine the most suitable height for door and window openings and other vertical wall heights.

To explain the use of Table II and III, a drawing of a house elevation is presented.

The distance "A" corresponds to the wall lengths shown in Table III and the distance "B" to heights specified in Table II. The purpose of both tables is to assist the designer in laying out the house so as to require no cutting of block which is costly, and which unless skillfully done produces a structure of unattractive appearance. Both tables will be found helpful in estimating the number of concrete units for a particular job.

Corner block, joist block, sills, lintels, and other special shapes should be furnished by the concrete products manufacturer so as to make it possible for the constructor to erect the building complete. Nothing detracts more from the appearance of a structure than poorly made and improperly fitted building trim. It has been suggested that jamb block be used next to all doors and windows in places of the block with an ordinary end.

It is often difficult to select the exact size of block or tile for certain work. There are many factors to be taken into consideration, such as nature of building, size of wall space, weight of unit and architectural effect desired. Each size of unit has its particular uses. The size of joints is of importance. There is a great variation in this respect and the general feeling of your committee is that the ¼-in. joint be used, and that this be borne in mind by the manufacturers of machines and molds so that equipment for making block and tile may be designed accordingly.

The question has arisen as to the best method for designating sizes of block, and your committee recommends the designation of height, width and length.

Test of Aged Cement in Concrete Mixtures

Owing to a shortage of cement in the District of Columbia for use on construction work being carried out by the Engineer Corps of the Army, reports the Technical News Bulletin No. 40, the Bureau of Standards was asked to determine the strength of concrete made up from cement which had been in storage for about a year and a half. The cement as received was first put through a sieving process to remove the lumps. The cement after sieving, as well as the crushed lumps were then made into separate concretes which were compared with concrete made from cement recently purchased in the local market. It was found that a 1:1¼:2½ mix of the old cement would give approximately the same strength as a 1:2:4 mix of fresh cement, and it was recommended that the lumps be sieved out of the old cement before using. Similar tests were conducted on aged cements submitted by the U. S. Engineer Office at Vicksburg, Miss. The results indicated that a 1:2¼:4½ mix of the aged cements gave approximately the same strength as a 1:3:6 mix of fresh cement.

Construction Wages

Compiled from Statistics Collected by the Associated General Contractors of America and Corrected to July, 1920

City	Basis of Scale	Masons	Brick Layers	Carpenters	Hod Carriers	Laborers	Condition of Employment
Alabama —Birmingham	Non-Union			.70-.80		.35-.40	Open
	Union	1.12½	1.12½	.90	.50	.40	
Montgomery	Union	.87½	.87½	.75	.35	.35	
	Non-Union	.87½		.55-.75		.25-.35	Open
Arkansas —Helena	Non-Union			1.00		.35-.50	Open
California —Los Angeles	Non-Union	1.25	1.25	.87½	1.00	.50	Open
Oakland	Union	1.25	1.25	1.06¼	1.06¼	.81¼	Closed
San Francisco	Union	1.12½	1.25	1.06¼	.93¾	.75	Closed
					1.06¼		
San Jose	Union	1.35	1.35	1.12½	1.12½	.94	Closed
Connecticut —Bridgeport	Non-Union						Open and Closed
	Union	1.12½	1.12½	1.00	.60-.65	.50-.60	
Delaware —Wilmington	Union						
	Non-Union	1.10	1.25	1.00	.75	.50 up	Open
District of Columbia —Washington	Union	1.00	1.00	.95	.62½	.45-.50	Closed
Florida —Chattahoochee	Non-Union		.50	.50-.70		.30-.50	Open
Georgia —Atlanta	Non-Union	1.25	1.25	.75		.40	Open
Savannah	Union						Open
	Non-Union			.75-.90			
Illinois —Chicago	Union	1.25	1.25	.90-1.25	1.00	1.00	Closed
			1.27½			1.12½	
	Non-Union	1.27½	1.00	.87½	.65	.55	Closed
Rock Island	Union	1.00	1.00	.87½	.65	.55	Closed
Springfield	Union	1.25	1.25	1.00	.70	.60	Open and Closed
	Non-Union			1.00	.70	.55	
Indiana —Evansville	Union	1.25	1.25	1.00	.70	.40	Closed
Richmond	Union	.85	1.25	.85		.50-.60	
South Bend	Non-Union				.75	.65	Open and Closed
	Union	1.25	1.25	1.00			
Terre Haute	Union	1.00	1.00	.90			Closed
Iowa —Cedar Rapids	Union	1.12½	1.12½	.93¾	.73¼	.62½	Closed
Sioux City	Union	1.25	1.25	1.00			Open and Closed
	Non-Union				.75	.65	
Waterloo	Union	1.25	1.25	.87½	.75	.60	
Kansas —Wichita	Union	1.12½	1.12½	1.00	.75	.62½	Open
Kentucky —Louisville	Non-Union				.50	.40	Open
	Union		1.25	.80	.80		
Louisiana —Alexandria	Non-Union					.35	Closed
	Union	.80	.80	.85			
Lake Charles	Non-Union	1.25	1.25	.75	.388-9	.331-3	Open and Closed
	Union	1.12½	1.12½	.87½			
New Orleans	Non-Union	.87½	.87½	.75	.60	.35	Open
	Union	1.00	1.00	.75	.60-.87½	.40-.50	
Shreveport	Union	1.50	1.50	1.00	.60	.50	Closed
Maryland —Baltimore	Union	1.12½	1.12½	.90		.45	Closed
Cumberland	Non-Union			.70-.80		.50	Open
Hagerstown	Non-Union	.90		.75		.40	Open
Massachusetts —Boston	Union	1.00	1.00	1.00	.70	.67½	Closed
Fall River	Union	1.15	1.15	1.00	.67½	.62½	Open
Holyoke	Union	1.05	1.05		.75	.55-5-9	Closed
Salem	Union	1.00	1.00	1.00	.90	.70	Closed
Springfield	Union	1.05	1.05	.95	.75	.67½	
Michigan —Battle Creek	Union	1.25		1.00	.60-.75	.60-.75	Open and Closed
Detroit		1.25	1.25	.85-1.00	.65-.75	.60-.75	
Grand Rapids	Non-Union			.85-1.00	.65	.55-.65	Open
	Union	1.10	1.10				
Kalamazoo	Non-Union				.70	.65	Open and Closed
	Union		1.35	.85			
Minnesota —Hibbing	Non-Union					.60	Open and Closed
	Union	1.30	1.25	1.10			
Mankato	Non-Union			.80		.50-.60	Open and Closed
Minneapolis	Non-Union	1.25	1.25	1.00	.75	.60	Open
	Union	1.25	1.25	1.00	.75-.87½	.55-.60	
St. Paul	Union				.80	.61¼	Open and Closed
Missouri —St. Joseph	Non-Union			.60	.60	.45	Open and Closed
	Union	1.12½	1.12½	.87½			
St. Louis	Union	1.00	1.25	1.00	.85	.67½	Closed
Nebraska —Omaha	Union	1.25	1.25	1.12½	.75	.75	Open and Closed
	Non-Union	1.25	1.25	1.12½	.50-.65	.50-.65	
New York —Albany	Union	1.12½	1.12½	1.00	.66⅔	.66⅔	Closed
Amsterdam	Union	1.12½	1.12½	.90	.60	.60	Closed
Buffalo	Union			1.00		.55	Closed
	Non-Union				.55	.55	
Cornwall	Non-Union	.87½		.75		.50-.55	Closed
Elmira	Union	.90	.90	.90	.55	.50-.65	Closed
Ithaca	Non-Union				.60	.55	Open and Closed
	Union	1.00	1.00	.75			

City	Basis of Scale	Masons	Brick Layers	Carpenters	Hod Carriers	Laborers	Condition of Employment
Jamestown	Non-Union				.70	.60	Open and Closed
Kingston	Union	1.25	1.25	.90			
Little Falls	Non-Union	1.12½	1.12½	.87½	.65	.55	Open
New York	Union	1.00	1.00	.90	.65	.65	Closed
Newburgh	Union	1.25	1.25	1.12½	.87½	.81¼	Closed
Rochester	Union	1.12½	1.12½	.87½	.62½	.50-.60	Closed
Syracuse	Union	1.25	1.25	1.00	.65	.65	Closed
Troy	Union	1.00	1.00	.90	.65	.65	Closed
Tuxedo Park	Union			.87½	.55	.55	Open
	Non-Union	.75	.75	.75	.50	.50	Open and Closed
	Union	1.00	1.00	.75	.50	.50	
North Carolina—Durham	Non-Union		1.25	.80-.90		.40	Open and Closed
North Dakota—Fargo	Union	1.12½	1.12½	.90		.50-.60	Open and Closed
Ohio—Akron		1.25	1.25	.85-.90	.60-.87½	.60	Open and Closed
Canton		1.25	1.25	1.00	.60-.75	.45-.65	
Cincinnati	Non-Union	.90	1.25	1.00	.75	.45-.50	Closed
Cleveland	Union	1.25	1.25	1.25	.87½	.87½	Closed
					.92½		
Dayton	Non-Union						Open and Closed
	Union	1.00					
Newark	Union	1.12½	1.12½	.90	.80	.60	Closed
Tiffin	Non-Union		1.25	.70-.80		.45	Open
Toledo		1.25	1.25	.80-.90	.75-.80	.60-.70	
Youngstown		1.25	1.25	1.15	.85	.60-.70	
Oregon—Astoria	Union	1.25	1.25	1.00	.87½	.75	Closed
Roseburg	Non-Union			.87½		.62½	Open
Pennsylvania—Erie	Non-Union				.60-.70	.50-.60	Open and Closed
	Union	1.15	1.25	1.00			
Philadelphia	Union	1.30	1.30	1.12½	1.10	.75	Closed
Pittsburgh		1.15	1.12½	.90	.80	.60	
			1.50*	1.25*	1.00*	.80*	
Scranton	Union	.95	1.25	.87½	.58½	.58½	Closed
South Dakota—Aberdeen	Union	1.25	1.25	.85			Open
	Non-Union			.85	.60-.65	.55-.60	
Redfield	Union	1.25	1.25				
	Non-Union			.80-.85		.60	Open
Tennessee—Chattanooga	Union	.81½	1.25	.75	.40	.35	Open and Closed
Memphis	Non-Union	1.25	1.25	.50	.50-.65	.30-.35	Open and Closed
	Union	1.25	1.25	1.00	.62½		
Nashville	Non-Union			.65		.35-.40	Open and Closed
	Union	.75	1.12½	.75			
Texas—Dallas	Union	1.25	1.25	1.00	.75	.50	Open and Closed
	Non-Union			.87½	.62½	.50	
San Antonio	Union		1.12½	.87½		.37½	Open
Utah—Salt Lake City	Non-Union	1.25	1.25	1.12½		.68¾	Open
Virginia—Petersburg	Non-Union	.80	.80	.65	.45	.42	Open
Washington—Seattle	Non-Union	1.25	1.25	1.00	.87½	.75	Open
Tacoma	Union	1.25	1.25	1.00	.87½	.75	Closed
West Virginia—Wheeling	Union	1.25	1.25	1.00	.55	.55	Closed
Wisconsin—Appleton	Non-Union	.80	.80	.65		.55	Open
Beloit	Non-Union	.75	.75	.85		.55-.60	Open
Green Bay	Non-Union	1.00	1.00	.80		.50	Open
Janesville	Non-Union	.75	.75	.62½		.60-.65	Open
La Crosse	Non-Union	1.00	1.00	.75		.60	Open
Madison	Non-Union	.90	.90	.62½		.50-.60	Open
Manitowoc	Non-Union	1.00	1.00	.80		.55	Open
Milwaukee	Union	1.25	1.25	1.00	.75	.50	Open and Closed
Oshkosh	Non-Union	1.00	1.00	.65		.85-.90	Open
Racine	Non-Union	1.25	1.25	1.12½		.85-.90	Open
Sheboygan	Non-Union	1.00	1.00	.90		.55	Open
Superior	Non-union			.80			Open
	Union			.80			
Watertown	Non-Union	1.00	1.00	.65		.40-.50	Open
Wausau	Non-Union	1.00	1.00	.80		.50	Open

* Want this increase.

How the Federal Government Spends Its Money

An interesting report has recently appeared in the *Journal of the Washington Academy of Science* in which a critical study is made of the Federal governmental functions and of the amount of money devoted to each. Total figures are of no special concern in this connection, but the interesting feature is the percentage distribution of these expenditures. For the year 1919-20, 67.8 per cent of these funds are expended on account of obligations growing out of wars in which this country has been engaged. Twenty-five per cent

is devoted to the maintenance of the War and Navy Departments, making a total of 92.8 per cent of the total expenditure which goes for war purposes. Three per cent is devoted to public works. Three and two-tenths per cent is given to the maintenance of primary government functions—that is, the maintenance of the various legislative, judicial, and executive departments and offices, and only 1 per cent is devoted to all educational, research, and development purposes. This includes all of the money that is granted to various universities, museums, national parks, and other activities designed to increase the productive capacity of the people and to develop the resources of the

country. Fifty dollars per capita per year is collected for all Federal purposes, and only fifty cents per capita per year of this amount is put into research, educational, and development work. From *The Economic Importance of the Scientific Work of the Government*, by E. B. Rosa.

Face Brick Construction

The American Face Brick Association, 110 South Dearborn Street, Chicago, Ill., has just issued a handsome manual under the above title, treating of brick historically and practically. Perspectives of houses are shown in colors with plans studied to meet modern requirements.

Casement Windows--By A. Benton Greene

CASEMENT window is the general term applied to windows in which the sashes are divided vertically and are hinged at the sides to swing in or out like a pair of doors.

In our country the casement window has not attained the popularity it has enjoyed in Europe, particularly in England. There are many reasons for our hesitancy in its general adoption. The objections to the use of the inward-opening casement are: (1), the difficulty of making it weather-tight; and (2), its interference with shades, portiers, furniture or other bric-a-brac which are usually placed near a window. Of the outward-opening type, the two most serious drawbacks are: (1), the possibility of injury by wind or storm to the sash when partially or entirely open; and (2), the impracticability of the use of outside window screens.

The problem of screening the outward-opening casement has been solved by various patented sash adjusters which permit the sash to be opened or closed without disturbing the screen. Moreover, these adjusters are so constructed that the sash can be held firmly fixed at any angle, thus overcoming the first objection, namely, the possible injury to the sash if opened in a strong wind or driving rain. In general, the outward-opening casement is to be preferred to the inward-opening kind.

Since both types possess inherent disadvantages, the question naturally arises why use them at all? The reason is that they are charming in appearance and add beauty to any house, whatever its design, in which they appear. But far more important than this aesthetic consideration is the highly practical value of a casement window. When fully opened it admits more light and affords greater ventilation than the ordinary double-hung window, which can never be opened more than half way and which, owing to the presence of the meeting rail, obstructs one's view.

Casement sash should be strongly made, for, being hung at the side, it is subjected to considerable strain. The sash in small casement windows should be at least $1\frac{3}{4}$ in. thick, 3 in. wide at the top and sides, and 4 in. wide at the bottom. Sash in large casement windows should be $2\frac{1}{2}$ in. thick.

The construction of the frame of a casement window is very much like that of a door. Such changes as do occur are those which are necessarily required by the window to fully and efficiently discharge its functions. The details to which we will particularly devote our attention are those which have to do with making the window water-tight and weather-tight.

Figs. A and B show two examples of out-swinging casements. The one shown at A

is for a frame wall. The wall is constructed in the usual manner, with 2-in. x 4-in. studs, set 16 in. on centers and doubled around all openings. The entire frame-work is then sheathed and the shingles or clapboards applied over building paper on the outside, and lathed and plastered on the inside.

Section 1 of Fig. A is taken through the head of the window. Here we note the cap of the outside architrave flashed with tin (copper or other suitable sheet metal may be used) carried over the crown molding and extending up behind the shingles about 6 in. The small strip of wood (a), called "cant strip," is inserted to give the first course of shingles the proper and necessary tilt. The frame is cut with a double rebate and is made to extend across the entire thickness of the wall proper, from sheathing to plaster. The reason for rabbeting the frame is to insure a weather-tight shoulder for the sash to strike against.

A horizontal section through the jamb is shown at 2. The double rebate of the side jambs is the same as that of the head jamb. In fact, all the details of one are repeated in the other. The only point requiring explanation is the semi-circular channel (b). This should be continuous, extending up on both the side jambs and across the head jamb. Its function is to catch and convey downward any water which may beat, in between the sash and frame, and discharging it directly on to the sill. As a further precaution against the penetration of moisture into the joint between the sash and frame at the head, is to work a drip mold on the lower edge of the exterior casing, as shown at (c), Section A-1.

At No. 3 is illustrated a section taken through the sill. It is so constructed as to intercept any water that may find its way in the joint between sash and sill. The lip on the bottom rail prevents any moisture from penetrating in ordinary weather. In severe rain storms any water that works its way into this joint falls into a throat which is plowed in the upper end of the sill. The sill of a casement window should be given a greater pitch than is given for that of any other type of window. To effectually offset the ravages of capillary attraction every precaution should be taken to bar the entrance of wind and water. And as all the grooves or channels which intercept moisture of any kind are discharged on the sill, the latter member should be given considerable pitch, at least one inch in two inches.

Section 4 is taken through the transom bar. The projecting portion is pitched to throw off water and has a drip grooved on the underside. The inside of the transom bar is finished with moldings to correspond

and miter with those of the inside trim.

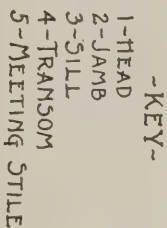
Single casement windows are hard to clean. They should therefore be hung in pairs so that the opening of one leaf will facilitate the cleaning of the other. At 5 is shown a section through the meeting stile of such a window. Note the groove in the joint—a precautionary measure taken to intercept any water that may have worked its way in at this joint, carrying it down and discharging it on the sill.

Fig. B indicates the method of setting an out-swinging casement window in a brick wall. A rebate is provided in the wall for the frame and a brick mold is substituted for the outside architrave; otherwise, the details are practically the same as those shown for wooden construction.

The frame of a casement window in a brick wall, as delineated in Fig. B-2, is held in place by means of wrought iron anchors. These are screwed into the frame and built into the joints of the brickwork. The reason for the drainage channel in the sashes has already been explained. The only new detail in this figure that warrants more detailed explanation is section 3. The lower rail of the sash is provided with a drip mold. This mold, together with the groove on the under side of the sash, contributes to prevent the penetration of moisture at this point. The wood sill should overlap the stone sill at least 2 in. and should be well bedded in cement. In fact, all spaces between frame and masonry should be thoroughly calked with oakum or scratch coat of mortar. This makes for a wind-proof joint. The stone sill is usually two courses of brick high and is made 4 in. longer, on each side, than the window opening. The upper surface is cut with a wash to pitch off water, and has a seat or lug at each end to receive the brick impost. The stone sill extends about $1\frac{1}{2}$ in. beyond the face of the wall and is cut with a drip on the under side.

Two examples of in-swinging casements, one in a frame wall and the other in a brick wall, are presented respectively in Figs. C and D. These details, except for the structural changes necessary to make them swing in instead of out, are identical with those discussed in the previous paragraphs in connection with the out-swinging type.

Casement windows opening inward are exceedingly difficult to make watertight, particularly at the junction of sash and sill. One method of constructing this joint is shown at Fig. 3-C. A draught-tight shoulder for the sash is formed at the upper end of the sill. A semicircular gutter is then plowed into the sill directly opposite a semi-circular gutter in the bottom edge of



OPENING INWARD

To obtain a water-tight joint between sash and sill, a drip mould is housed into the sash and a gutter is plowed into the sill. In the illustration to the left, the gutter is drained by holes $\frac{3}{8}$ " in diameter, spaced about 2 ft. apart.

NOTES

Casement windows open inward or outward, like a door. If they extend down to the floor, they are called "FRENCH WINDOWS." (See Plate 1.) Casements may consist of single or folding sashes. These should not be less than 1½" thick. The essential feature of all casement sashes is the small groove at the side, either in the jamb or sash. The purpose of this groove is to carry down to the sill any water which may beat in between the sash and jamb. The sill, in turn, should also be made weather-proof, using any of the approved methods shown above.

CASEMENT WINDOWS



the sash. This channel catches any water that may have worked its way in at the joint. Holes bored into the sill, at intervals of about 18 in., help to drain this channel of any moisture that may have collected. The drip mold let into the bottom rail of the sash acts as an umbrella, preventing any rain from being blown into the joint and shedding any water that may be washed down the outside surface of the sash. A similar contraption is shown in Fig. D-3, which is a section through the

side of an inward opening casement in a masonry wall.

Sketch 2, Fig. C, shows a semicircular groove cut into the jamb, into which fits a half-round projection on the upper edge of the sash. In the corresponding section in Fig. D we note a rabbeted frame and a plowed-in stop so formed that its inner edge forms a channel for the drainage of water that may beat in between sash and jamb. This water is discharged onto the

sill in a manner previously described.

Now observe the section through the head of the casement window in a frame wall, Fig. C-1, and one through the head of a casement window in a brick wall, Fig. D-1. It would be difficult to distinguish either figure from a section through the head of a door, if it were not for the accompanying drawings. In fact, no differences are discerned until the jamb and sill sections, particularly the latter, are studied.

A Seven Room Bungalow

A BUNGALOW designed by Charles P. Rawson for Fred Sebright of Huntsville, Illinois, is the subject of the illustrations and descriptions in this article.

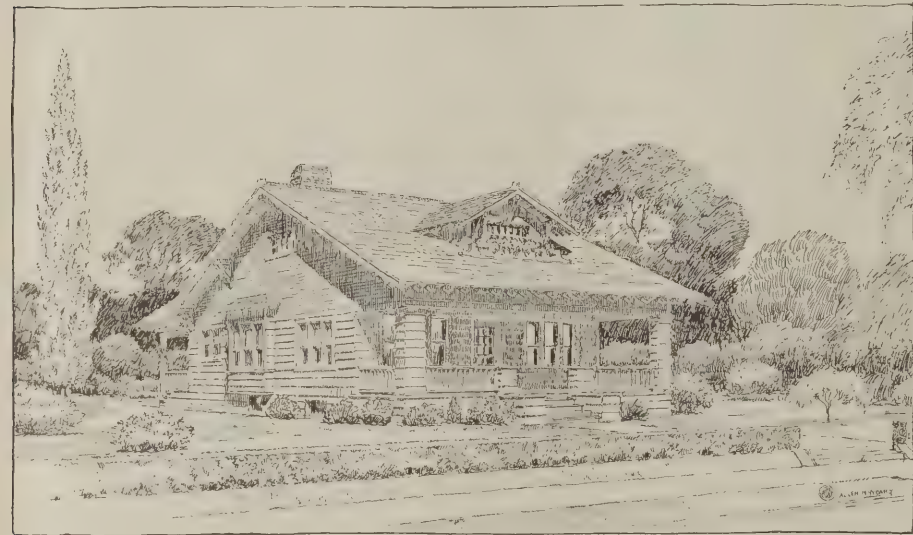
The perspective drawing shows a design that has several rather attractive features. The use of wide clapboards on the lower walls with narrow siding in the gables is

and fireplace flues may be grouped in one chimney.

The kitchen has no pantry but is larger than usual and is provided with built-in cupboards and with drawers under the work board. Stairs lead from the kitchen to the basement and there is a roomy rear porch.

storage rooms are partitioned off with sheathed partions.

The criticisms offered in this article should be tempered by the well known fact that the owner of a house often exacts requirements that make logical planning impossible. That is considered his right, as he is the one who is to live in the house, and if he is content to accept inconven-



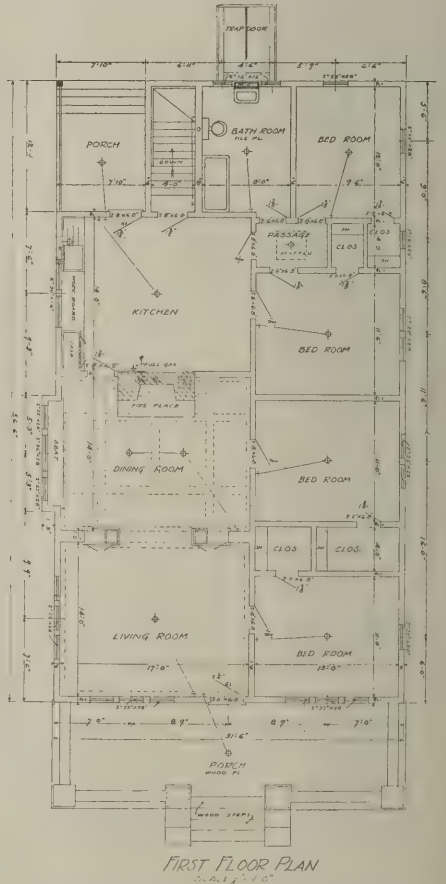
novel and pleasing. The dormer with the flower box on the roof is also attractive. Carrying the main roof forward over the porch is always effective in giving an air of repose to a house of this type. The wide span of porch girder, however, is not so satisfactory.

The plan shows seven rooms. The living room and dining room are separated by a wide opening forming a so-called colonnade arch. This treatment is now somewhat in disfavor among most people and is giving way to the smaller opening filled with French doors which gives more privacy and reduces drafts. The dining room contains a built-in window seat and a brick fireplace. The placing of the fireplace in the dining room instead of in the living room is probably satisfactory when the two rooms are so closely related as in this house. Its greatest practical advantage lies in the fact that the kitchen, furnace

The arrangement of the bedrooms and the bath room is subject to criticism. It seems that it would be more desirable to place the bath room in a more central location—at the side between the bedrooms—and make it possible to reach the bedrooms from a small hall or passage, so that none of these rooms,—with the possible exception of the rear bedroom—would open directly into the more public rooms. With the present arrangement it is necessary to pass through the living room, the dining room and the kitchen in order to reach the bath room from the front bedroom.

The attic is apparently quite large, but no stairs has been provided to serve it. This would also prove objectionable to many people.

The basement extends under the entire main portion of the house and contains the heating and laundry equipment. Several



ences in order to obtain certain features, it's his business alone. In such cases it should be pointed out, however, that circumstances may arise which will cause the owner to attempt to dispose of the house, and that in such an event an inconvenient house will usually prove to be a white elephant that must be sold at a sacrifice.

How to Stain, Fill and Finish Hard Woods--By A. Ashmun Kelly

AS BOOKS are usually started off with a "foreword" or "preface," it may be as well to offer something of the kind in the beginning of this article and series of articles that are to follow. I shall quote from a subscriber's letter, part of which the editor has sent me for my guidance.

"Nearly every painter likes to mix his own material, but the results are not always satisfactory; after the carpenter has done his work thoroughly in preparing the material to be finished, the painter can ruin his work by the stroke of his brush, or by unsatisfactory ingredients in his paint pot."

Perhaps it is not so much what the painter has in his paint pot as the way he does the work. Let us see.

Filling the Wood

There are many formulas for making wood fillers. Different substances are used. The very best and most generally satisfactory filler for hard wood is pulverized silica. Here is a formula for the best that can be made: Mix together two parts of good coach japan and three parts of pure raw linseed oil, each by weight. Add to this liquid enough silica to form a stiff paste. The ingredients should be well mixed together, and if run through a hand mill will be in perfect condition, though by working with a paddle it will do, as the silica is fine as flour to begin with, and the ingredients need only to be mixed together in a homogenous mass. Any desired coloring may be worked into the mass when mixing. The filler should always be slightly darker than the wood, if anything, but as near the color of the wood as possible. The wood is usually colored, and hence the filler also.

Woods that require a paste filler are Ash, Beech, Butternut, Baywood, Black Walnut, Oak and Rosewood. There are some woods that are not open of pore, yet require paste filling. All soft woods should be filled or surfaced with liquid filler. These are white pine, etc. The purpose of the filler is to give the surface of the wood a dense, solid coating that will bear up the coats of varnish that follow and finish the work, for unless this is done and done right the wood will rob the varnish of some of its liquids and cause a poor finish. Besides this the wood itself will lose much of its attractiveness when not properly filled and finished.

If, quoting again from the correspondent's letter, "so many painters cannot fill the pores in oak," it is because they don't try; perhaps they don't care; maybe they don't know how. Or it is possible that the filler they use is not adapted to the work. He

adds that some use silica, or starch, or whitening, or wheat flour, etc. All these substances may very properly be used in certain cases, but for oak I should want only the pulverized and floated silica, which is simply a very fine form of quartz. It is a singular characteristic of silica filler that its minute grains are really needle-like forms that no amount of grinding can reduce to any other form; these tiny crystals fill the pores of the wood in criss-cross fashion, and stay where put for that reason. This is why silica or silex is so efficient a wood filler. No other filler does this. Moreover, silex is not affected by dampness or any other influence excepting fire. Now take such substances as we have mentioned—flour, whitening or chalk, starch, and the deduction is inevitable, they cannot endure. They will not hold in the pores, they will swell or shrink, dampness will affect them. Then again, the liquids used with the filler are important. Pure turpentine and the best japan driers only can be depended upon. But benzine and rosin oil enter into the make-up of some wood fillers.

One reason why the pores of a wood are not filled is that not enough filler has been pressed into them. It is up to the workman. First, in applying the filler it should be rubbed into the wood liberally, with plenty of it on top of the wood. After setting, say fifteen minutes, the stuff must be rubbed off the surface, and it is in this rubbing that sometimes the pores don't get filled. Instead of rubbing in the workmen often pull out the stuff. Taking a bunch of tow or piece of burlap the workman should rub across the grain of the wood and press down hard, to get the stuff into the wood.

There is of course a knack in doing this right; to get the pores full and not take any of the filler out again. It is a good idea to have a magnifying glass, one of moderate power will do, and examine the wood to see the condition of the pores and see whether they have been properly filled or not. If one coat of filler fails to fill properly, another coat is advisable. When rubbing take off all the surplus filler from surface of the work, for that will lessen the amount of sandpapering necessary to give a clean and smooth finish for the varnishing.

A wood as porous as chestnut requires a filler made up of bulky substance, and here is where the wheat flour comes in, and corn starch. To mix such a filler place the flour or starch on a slab or other suitable surface and mix it with shellac varnish, and at once fill the wood with it. When it has become dry it may be sandpapered smooth. Shellac seems dry when it is only

surface dry, hence it should have a day at least for drying. The finish on this filler may be as fine as you like, French polish for instance; or any good varnish may be applied.

A small quantity of silica paste filler may be made upon this formula: Mix four and one-half pounds of silica, a mixture of half pint each of raw linseed oil, pale drying japan and turpentine. Gold size japan is best to use.

When making paste filler take the lightest colored ingredient first and mix it with the oil; mix the colored portion with the turpentine, and add this to the first mixture, after which add the balance of the thinning liquids. If corn starch is used, then pour the thinning liquids on it, and let the liquids percolate through the mass; this will save time and labor in the mixing. Make a paste very stiff, and when it is wanted for use it can be thinned down to any desired consistency.

As a general thing close-textured woods cannot be filled with paste filler, because the coarse particles of the filler cannot enter the pores of the wood, but when paste filler is used in filling curly and burl woods some very fine effects can be effected, and which cannot be had from liquid filler. Take curly hard pine, for instance, and finish with this paste filler and varnish coat.

Close grained woods are to be treated with liquid fillers, and thinning down the paste filler will give you a very good one. The liquid filler saturates the surface wood and seals up its pores. Shellac is one of the most efficient of such fillers. In former times close grained woods were filled with varnish, each coat of the first two or three being rubbed into the wood with a soft wooden paddle; after the varnish was dry, of course. This method required considerable labor and time, but it made a very fine job.

Whereas, paste fillers may be and often are more or less colored with some pigment, liquid filler never is, because the coloring would give the finish a painty look. Shellac gives a nice effect on cypress. But ordinary varnish will serve as the medium for liquid fillers for ordinary jobs.

Golden Oak

When golden oak finish first made its appearance the effect was obtained by the use of asphaltum; it was applied as a stain, and then it was wiped off clean, the wood afterwards being filled with paste filler, made very dark with burnt umber and black. After standing 48 hours the work was sandpapered (first having been rubbed across the grain when the filler was wet),

No. 00 paper being used. The flakes were carefully sandpapered to remove all stain, then a light polishing varnish was applied, followed by rubbing and polishing to the finish. This not giving as dark a color as was desired water stain was employed, which gave a deeper stain, but caused the fibers of the wood to rise, necessitating more sandpapering and of course more expense. They turned again to asphaltum stain, but not in the original way; the asphaltum was added to the paste filler this time, and the result was even more unsatisfactory than the water stain method. The flakes were badly smirched, the finish was poor, and the stuff dried very slowly, taking nearly double time. Again, the asphaltum shrank in the pores, and it sweat out in the finish, so that articles of furniture finished this way could not be sold.

To protect the bad effect of the asphaltum on the flakes of the wood the flakes were shellacked. The shellac was applied with a soft hair pencil, and the shellac varnish was used very thin. This was not satisfactory either, for the edges of the shellac showed, as the edges were higher than the surface surrounding them. Had the flakes

been lightly sandpapered the edges would have been removed; this could have been done before the staining; then, with another sandpapering, after the staining, the flake edges would have been entirely removed and the work would have appeared nicely blended.

Colors in Fillers

Understanding the effect of coloring matter placed in a paste filler will save the worker some trouble. There used to be as much as 25 per cent used in paste fillers. You can't fill the pores of the wood with soft color. The more color you use in the filler the less silica can be used. Hence the filling is imperfect. Another trouble from a soft filling is found in the time required for such a filling to dry; and if the varnish is applied before the filler is quite dry the turpentine in the varnish softens the color and spoils the finish.

Filling the Wood

Some finishers apply a coat of raw linseed oil, with a little drier in it, and when it is dry they apply the paste filler. This is a good idea, for the oil prevents the raw wood from extracting the liquids from the filler.

While some finishers prefer a short, stubby brush for applying the filler, others use a round or flat brush. The former would be the best, as it enables one to rub the filler into the wood better than it can be done with a softer brush. Get plenty of the filler on the wood, and rub it in.

The Rubbing

The rule is to let the filler stand for about fifteen minutes, or until it begins to look dead and dry, then take tow or burlap and rub it off, against the grain. Some follow this with a coat of liquid filler, but when the paste filling has been well done it will not need a liquid surfacing.

As to the finishing, that depends upon the character of the wood, the different kinds requiring different treatments, and in the next article I purpose telling how to manage with all the commonly used hard and soft woods, the staining, filling and varnishing. It seems so simple a work, and yet how easy to do the work wrong, how liable one is to make some blunder and get poor work where the best was looked for. I hope to point out many causes of failures, and give plans for avoiding them.

Various Buildings

THE group of illustrations herewith show various buildings throughout the country, presenting an assortment of ideas that may be found useful in designing similar buildings.

Figure 1 is the Y. W. C. A. Building at Madison, Wisconsin. It is a thoroughly modern fireproof building and is exceptional from the fact that it runs entirely through the block and faces on two streets. The lower story is of cut stone, carefully detailed. The upper stories are of gray brick with a terra cotta cornice and belt course. The large, two-story windows are trimmed with sheet metal. The balconies above are of wrought iron.

Figure 2 shows the U. S. Custom House and Post-Office at Lake Charles, Louisiana. This is a very handsome building of a modified renaissance style. It is built of cream colored stone and has a red Spanish tile roof. The details are simple and dignified in character and are well placed. The small balconies are of bronze and the cornice is of copper. It is rich with suggestions for buildings of a similar public character, and for clubs, telephone buildings, and so forth.

Figure 3 is the entrance to a confectionery and light lunch establishment. It is located at the end of a blind alley in the business district of Boston, Mass., and offers a suggestion for utilizing properties having similar locations. This was a remodeling job carried out in white marble with the wall surface above finished with stucco. The lettering is bronze. The de-

sign is well conceived and very appropriate and is perhaps as well adapted to terra cotta as to marble. The open space in front is used as an open air sewing space and is filled with tables when in use. The surrounding walls are decorated with wooden trelliswork.

Figure 4 shows a small bank building at Wallis, Texas. It is of hollow tile construction faced with brick and trimmed with cement stone. The cornice is of red Spanish tile. It is interesting to note that the store building at the left has the same general lines. The slight difference in detailing adds interest to both buildings and overcomes the "sameness" often found in such groups.

Figure 5 shows the Slattery Building, a combined office and store building in Hartford, Conn. The photograph was made at a rather steep angle and does not show the building to its best advantage. The crisp Gothic detailing is admirably rendered in the gray terra cotta used for the facing of this building.

Cheap Paint Vs. Good Paint

There is no question about the fact that cheap paint never pays. However, many people have always insisted they would rather put on cheap paint and repaint oftener than to pay more for a more durable, lasting paint in the first place.

Granting that there may have been slight grounds for such reasoning some

years ago, when good painters could be employed at 30 or 40 cents an hour, but can there be any question about it now that painters must have 80 cents to \$1.25 an hour?

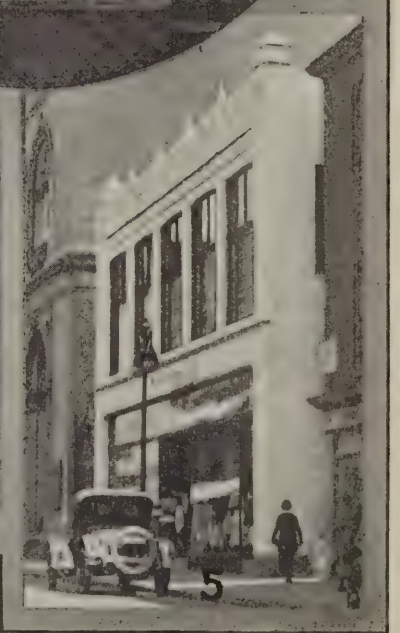
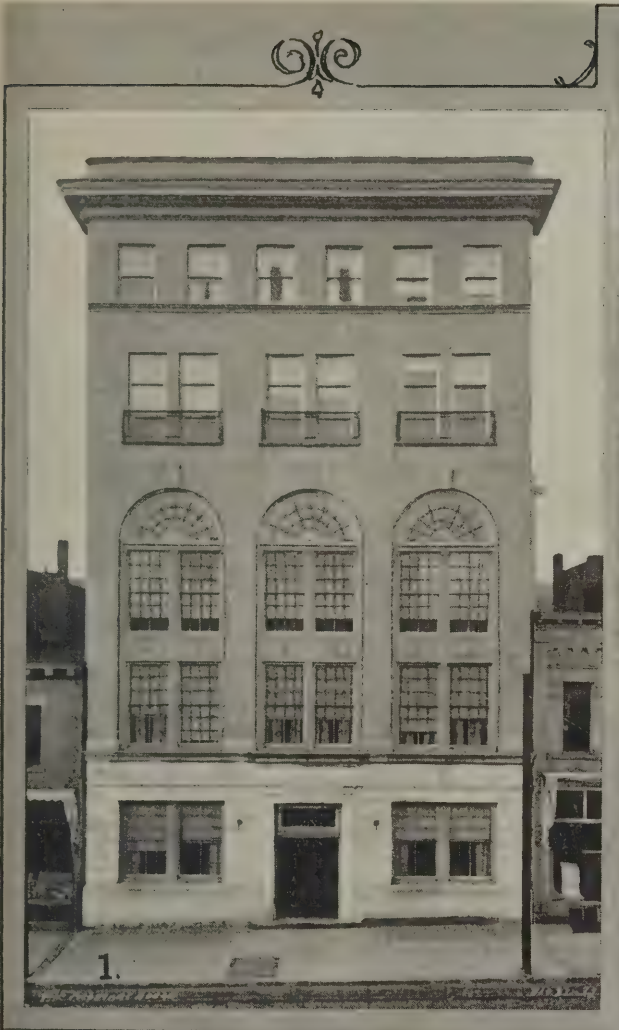
With labor cost so greatly exceeding the cost of paint, shouldn't every builder make it his business to convince the customer that the best grades—the most durable, lasting paints—are cheapest in the long run?

To put it another way, can a builder escape criticism if he doesn't make every honest effort to show his customer that a second or third grade paint is not a good investment, because it costs just as much to have it applied as the very best grade, and it cannot be expected to give nearly the same service and wear.

In short, cheap paint plus 100 per cent labor cost is dearer from a service standpoint than first grade paint plus 100 per cent labor cost.

To Re-Sharpen Files

Well-worn files are first carefully cleansed with hot water and soda; they are then brought into connection with the positive pole of a battery, in a bath composed of 40 parts of sulphuric acid and 1,000 of water. The negative is formed of a copper spiral surrounding the files, but not touching them; the coil terminating in a wire which rises to the surface. This arrangement is the result of practical experience. When the files have been in the bath for 10 minutes they are taken out, washed, and dried.



Housing at Waterbury, Connecticut

THE houses constructed at Waterbury, for the U. S. Housing Corporation consist of detached houses to serve 28 families, and semi-detached or two-family houses to serve 26 families. Murphy & Dana were the architects for the development, which offered many difficulties owing to the irregularity of the site. The land is hilly and bowldery and the location of previously existing streets and property lines complicated the grouping and general arrangement of the houses.

Due to the very excellent designs of the houses, however, the grouping is pleasing, and on the steeper slopes presents an attractive irregularity of roof lines and building masses.

The general construction is wood frame on stone foundations. The basements have concrete floors, and the roofs are of ready-stained shingles with reshingled ridges. The exterior walls are of magnesite stucco on prepared sheathing board which has dove-tailed lath mounted on an asphalted backing. This sheathing material makes a dry, substantial stucco base that is easily and rapidly put in place. The window blinds were dipped in stain, and the porch woodwork is also stained. In some cases the window frames are stained, in others they are painted.

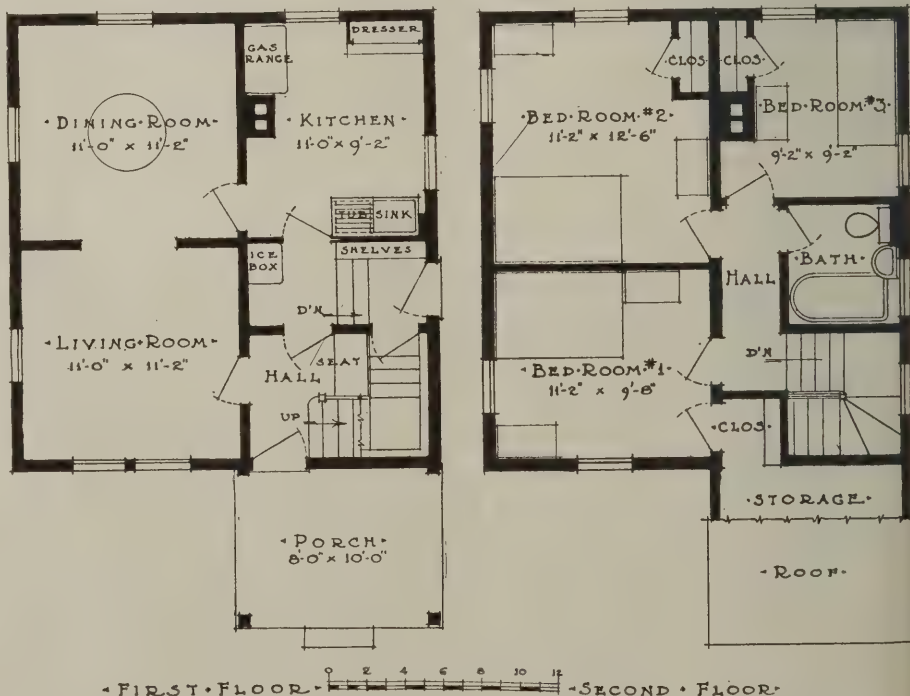
Exterior casing around door and window openings is omitted. Only the sills and the drip formed at the heads project beyond the stucco line. This makes a simple and effective window treatment. The roofs project only very slightly beyond the gables, forming a cheaper and more pleasing treatment than the wide overhangs so often used for similar points. The eaves, however, project well beyond the walls, thus producing good shadows and aiding roof water to fall clear of the walls—a very necessary provision in these houses, as no gutters nor down-spouts are used except over porches. Wooden louver ventilators are used in the gables or in the roofs to provide air circulation in the attics.

The interior walls and ceilings are of two-coat, smooth finished plaster. The floors are of pine, stained and varnished. The doors and interior finish have a waxed finish.

Separate warm-air furnaces with recirculating ducts are provided for each family, and fuel gas is provided for the ranges and for the hot-water heaters. All houses are lighted by electricity, and contain modern plumbing equipment, including a combination sink and laundry tub in each kitchen. The general construction of these houses was specially commended by the Housing Corporation who report that



Fig. 1—Single family six-room house at Waterbury. Murphy & Dana, architects



Plan 1—Plans for the house shown in Fig. 1. The plans and the photograph are reversed



Fig. 2—Two-family, six-room houses at Waterbury. Murphy & Dana, architects

they rank among the best work done for the corporation.

The houses are well spaced, with average intervals of 20 to 25 feet between single houses and 25 to 35 feet between double ones. In some cases, however, porches encroach upon this space. Lots average about 40 feet wide by 100 feet deep.

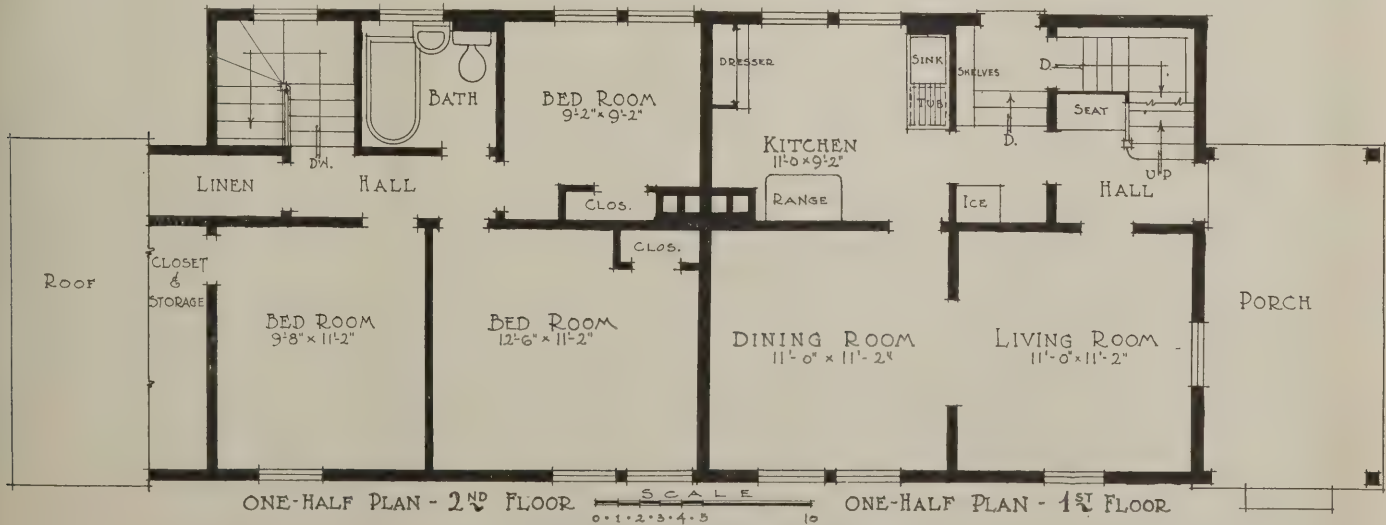
Only two general types of plan were used throughout the development. One for a five-room house, the other for six rooms. On the six-room plan, six exteriors were based, and three exteriors for the five-room plan. Slight changes in the position of

porches, windows and so forth made these variations possible without essentially changing the plans. Owing to the similarity of the designs and the use of similar materials throughout, however, the differences between houses is not so marked as to be displeasing when considered as a group. The basic scheme for grouping is a double house flanked by single ones. This system is repeated throughout the development, sometimes with one, again with two single houses between two double ones. Usually the houses are without variation in setback, thus simplifying the effect and

at the same time recognizing the prejudice that many people hold against houses that are set back farther than those of the neighbors.

The approximate cost of the houses is given as \$3500 and \$3800 per family for five- and six-room houses, respectively. The rents vary from \$25 to \$36 per month.

The ceilings of these houses have been kept quite low, (7 feet 10 inches for the first story and 7 feet 6 inches for the second story). This, together with the low roof treatment of the porches, gives the houses



Plan 2—Plans for the house shown in Fig. 2



Fig. 3—Houses on a hillside street at Waterbury. Murphy & Dana, architects

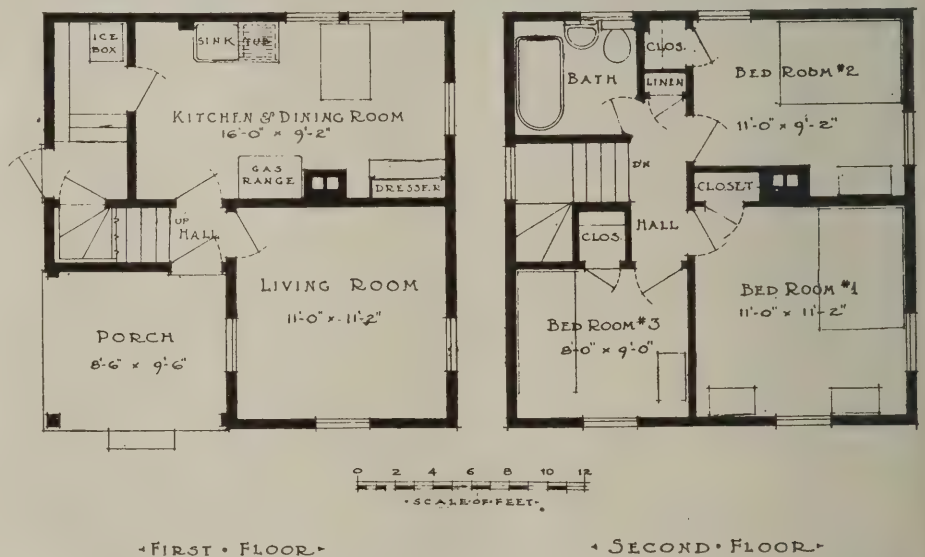
the low effect so necessary in obtaining pleasing proportions for small houses.

The plan of the six-room type has the entrance leading from the porch into the hall. In some houses of this type the porch is on the front as shown on plan No. 1, in others the house is turned and the porch is at the side as shown on plan No. 2.

The first floor hall contains a seat built into the angle of the stair. At the left a door opens into the living room which is separated from the dining room by a cased opening. A door opens from the dining room directly into the kitchen which contains a built-in cabinet and a combination sink and tub. The kitchen opens into the rear entry which also has a door into the hall. The rear entry is of the grade-line type with a stair to the basement. The entry also serves as a pantry and provides space for a refrigerator and for shelving.

The second floors contain three bedrooms, all of which have closets. A short hall leads from the stair to the bedrooms and the bathroom, and considerable storage space is provided under the roof and the porch.

The six-room double houses are formed by combining two of the plans under one roof. This causes some of the rooms to lose the benefit of direct cross ventilation, but the loss is not serious, as in such cases the remaining windows are made double ones, and besides, the houses are only two rooms deep even when combined. Other changes such as the relocation of the porch, combined chimneys and so forth are shown in Plan 2.



Plan 3—Plans for the five-room, single house shown as the fourth house in Fig. 3

Plan 3 shows a typical five-room single house. The porch is contained within the wall lines and opens into a hall that is the last word in compactness. From the hall, doors open directly into the living room and the combined kitchen and dining room. In the latter is provided a built-in cabinet and a combination sink and tub, together with wall space for additional fittings. The kitchen end opens into a rear entry of the grade-line type and containing the basement stair and space for a refrigerator and shelving.

The second floor contains three bedrooms and a bath, all connected by a small hall.

Each bedroom has a closet and a linen closet opens from the hall.

In the five-room double houses the loss of cross ventilation is subject to the same remarks that were applied to the similar condition in the six-room houses. Plan 4 shows a five-room double house based on the same plan used for the single houses of Plan 3. The only apparent difference lies in the combination of the chimneys, the opening of a door between the kitchen and the living room, and the relocation of the kitchen cabinet.

The only serious criticism of the plans may be directed toward the fact that in the



Fig. 4—A street view in Waterbury, showing a double house flanked by single ones. Murphy & Dana, architects

double houses the bathrooms are so widely separated that the use of single plumbing stacks to serve both bathrooms is rendered impracticable. It is of course recognized that to accomplish this result, material changes in the plans would be made necessary. The fact remains, however, that the combination of plumbing stacks forms one of the major economies which should result from the use of semi-detached houses.

Importance of a Gasoline Saw Rig to the Small Builder

Gasoline saw rigs are being purchased more and more by the small contractor, builder and even the journeyman carpenter. Men who at one time would have considered an investment of \$400 to \$500 as beyond their means are beginning to realize that they are losing money by not purchasing a saw rig. Many small builders whose work is confined to cottages, barns, garages and even small interior work, such as putting in doors, window frames and base boards, find that the time, labor and material which a saw rig saves them, soon pays for the entire outfit.

A conservative estimate of the life of a first-class gasoline saw rig is six years. Assuming a cost of \$440, this means only a yearly investment of \$74. Figuring repairs at \$25, the complete cost per year is only about \$120.

Adding another \$73 for depreciation, the total yearly cost of a gasoline saw rig is less than \$200, including a sinking fund that will enable the contractor to pay cash for a new outfit when the old one wears out. Of course, many contractors have used saw rigs steadily for nine or ten years without needing any but the minor repairs.



Plan 4—Plans for the five-room double house shown as the second house in Fig. 3

A saw rig outfit will save the time of at least two men; in other words, one man with a saw rig can accomplish as much in a day as three skilled carpenters working with hand tools. This means a saving of \$16 a day. Assuming two gallons of gasoline, at 30 cents a gallon, are consumed in a day the net saving amounts to \$15.40 a day. So in thirteen working days the total yearly cost of a gasoline saw rig, together with the sinking fund for a new outfit, is made up. The balance of the year the saw rig operates at a very handsome profit.

A first-class gasoline saw rig with its attachments will perform the following operation: Joints, grinds, mitres, sands, rabbets, tenons, bores, bevels, rip saws, cross cuts, band saws, dadoes and mortises.

Practically all hand sawing is eliminated from every building job. Rafters, framing, step risers, casings, mantle heads, veranda rails, window sash and trim can

be turned out in just as satisfactory manner with fewer men and in less than half the time by a good saw rig. Many carpenters who put in their usual eight hours working for a contractor have a saw rig in their barn or shed at home, on which they make screens and storm doors in their spare time.

Nothing is quite so convincing as the word of a man who has used a saw rig. Here is a portion of a letter from a contractor in a small town in Ohio:

"My work is mostly barns with a great deal of heavy sawing such as rafters with eleven pieces to cut. For a fair sized barn, say seventy feet, by hand this would take two men two or three days according to the lumber used. With a saw rig two men can do it in three or four hours.

"I do not use the saw rig for sawing alone. I built skids 12 feet long and fastened the rig on one end and a hoist on the



Fig. 5—Rear view of some of the houses at Waterbury. Murphy & Dana, architects

other. With this I raise all the rafters to place, saving a lot of hard work. I also raise roof boards and shingles.

"In this way my men are able to do more work as they do not get tired out sawing and lifting. And besides this a lot of lumber that used to be wasted is now utilized. I saved the price of the saw rig on my first job."

This is what a Bloomingdale, Michigan, contractor says:

"It would take me too long to mention all the money-saving points that are tied up in that saw rig. I have had mine three years and it has not cost me one penny for repairs. It would take a large building to hold all the work I have put over it.

"I built a dwelling last season and made most of the millwork and all of my frames. In fact it saves me from \$50 to \$125 on each job.

"With a saw rig nothing is wasted. I make use of every piece of wood that will make a strip 2-in. thick and a foot long. Only last fall I sold \$42 worth of crates which I made from pieces that would have gone into kindling wood had it not been for my 'mill' as I call my saw rig."

A somewhat larger builder in Alabama writes:

"We bought this saw rig for use in construction of our Eva Jane Village, which consists of 150 cottages. We were able to use it in cutting all of the framing, step risers, etc., and also in making up the window and door frames. As a time and labor saver we know of nothing that will take its place."



Fig. 6—A typical living room in the development at Waterbury. Murphy & Dana, architects

A contractor no longer has to depend upon the planing mill when he has his own saw rig. All the mill work profits become his own and, more than this, he is saving the delay which often holds up big jobs, due to late delivery of materials from the planing mill. Most gasoline saw rigs are highly portable and can be moved on skids from one job to another. In winter they may be set up at home for making up odds and ends of lumber. Contractors re-

port that they no longer have costly piles of scrap after a job is finished—everything is made up into something worth while. Small builders and contractors who have ever used gasoline saw rigs cannot get along without them. They find that these handy outfits pay for themselves in time and labor that they save on four or five jobs.

Lumber dealers, even those with small yards are installing saw rigs, which they

use in the shed or move from one lumber pile to another. Odd lots of all descriptions can in this way be made into saleable lumber.

Reasonable in first cost, sparing in its use of gasoline, practically trouble-proof in its design and construction, with requirements for repairs years apart, a sturdy gasoline saw rig outfit is the best buy on the market for any contractor or builder, large or small.

Handy Features for Combination Crib and Granary

To John W. Philpot of Weeping Water goes the credit of having one of the handiest combination cribs in Nebraska. It has all the features ordinarily found on this type of building and many more.

The construction is familiar to most of the readers of this magazine. The building is 32 feet wide by 40 feet, having a 12-foot driveway and 10-foot cribs on each side.

crete chute for the sheller drag. The drag is seen in position in the chute on the left side. At shelling time, the end crib door is opened and the corn allowed to fall into the conveyor. When the shelling has proceeded sufficiently, the short boards covering the chute are removed and the corn allowed to run directly into the drag. This arrangement does away with several shovel-

so designed that the conveyor can be easily removed thru it if necessary. Ordinarily this can be accomplished only with considerable difficulty.

Any crib or bin in the entire structure can be emptied into the pit and re-elevated into any other bin or loaded on to a wagon. Wagons may be loaded in the alley, or if the alley is full of stored machinery, as is often the case, they may be loaded outside of the crib. This is accomplished by running a tube from the elevator head out thru the side of the building. This feature could be easily and cheaply added to any granary and found very convenient.

The cribs are all floored with concrete which will always be found satisfactory if underlaid with three or four inches of gravel and elevated above the level of the surrounding ground. A grinder is situated in a grinder room. Grain is fed to it and ground feed from it without hand labor. M. Philpot feels that the hand features of his granary are well worth while. Farm help is too scarce and expensive to admit of doing anything by hand that can be done more quickly and cheaply by gasoline.

—Ivan D. Wood, Lincoln, Neb.



Combination crib and granary

A glance at the illustration will show that the structure stands on a side hill and that the crib floor is 2 feet higher on one side than on the other. The long studding are approximately 17 feet in length.

So the front of the building and on left side of the driveway may be seen a concrete hatchway with the door open. You might mistake it for a cellar entrance but it leads to a small concreted, underground chamber which houses a 6-horse power gasoline engine, the power plant. The belt box can be seen leading to the line shaft to one side of the door. Mr. Philpot finds that the underground power plant is well protected against cold weather, that the cooling water never freezes and that no trouble is ever experienced in starting.

Under each crib may be seen the con-

ers, which is quite an item in these days of high-priced hired help.

The elevator is of the cub type, capable of handling either small grain or ear corn. The pit, into which grain is dumped previous to being elevated, is of large capacity. Mr. Philpot has added two ingenious features in the pit construction. On the left side of the crib near the center may be seen an opening. This opening leads down into the pit and to the conveyor and permits of repairs being made even tho the pit be full of unelevated grain. With the ordinary type of construction it is necessary to empty the pit by hand if anything goes wrong with the elevator or conveyor since it is impossible to make repairs on account of the grain being in the way. This opening in the side of the foundation is

Preserving the Surface of Stone Structures

The Technical New Bulletin, No. 40, of the Bureau of Standards, Department of Commerce, Washington, D. C., announces that at the request of the National Park Commission, the Bureau is making a study of various types of colorless surface treatments on stone for the prevention of disintegration by weathering. This question came up through the desire of the Park Commission to secure some form of protective treatment to aid in the preservation of ancient inscriptions on a large sandstone mesa at Elo Morro, New Mexico. The results of the investigation will undoubtedly be of more general interest, however, as all types of stone suffer more or less decay upon exposure to the weather, and a surface treatment which will not mar the appearance of the stone and yet prove to be fairly durable would be of great value.

Bricklaying

By William Carver, Architect, and Andrew Pentland, Mason Contractor

This is the First of a Series of Articles Describing the Practice of Bricklaying. While Addressed to the Apprentice, the Aim is to Show How Dexterity and Speed May be Attained, Better Work Secured and the Strain Upon the Worker Minimized

BUILDING is one of the most complex of all our basic industries. None other equals it in the vast variety of materials employed or in the number of separate trades and professions which depend upon it and upon which it depends.

There is probably more specialization in the building industry than in any other line

some day he can take contracts of his own and become a good, reliable general contractor. The wages of a journeyman bricklayer, it may be whispered, are by no means the lowest of the building trades; and the financial rewards from independent operations as a contractor will be limited only by the extent of his business sagacity. Many stories could be told of great achievements by men who started life as a bricklayer's apprentice. But such men never allowed themselves to become narrow specialists whose total interest in a building

tions how materials are to be employed.

At the outset the question arises: What is the best way to learn bricklaying? Undoubtedly the answer is to become apprenticed in the regular way for four years to a good contractor. There are trade schools which claim to turn out finished bricklayers in a few months, but schools of that class should be avoided. Bricklaying requires much practice and dexterity and takes time to learn. There are, however, several good trade schools with more conservative methods, such as the Dunwoody Institute, which offer splendid courses.

A boy must fulfill the terms of his apprenticeship, or he will be allowed to join the union only at a higher rate. The union also has other regulations regarding apprentices. If the contractor to whom the boy is apprenticed is short of work, the apprentice may, on application to the union, get temporary work with some other contractor; but he must return when the contractor to whom he is bound can again provide him with work.

An apprentice is first of all taught the correct way to handle his trowel and to become familiar with brick and mortar. He is assigned to the rougher



Fig. 1—Correct way of holding trowel. Note handle between thumb and forefinger. Fingers loose

of human endeavor. Between the common laborer at the bottom and the engineer and the architect at the top we find scores of highly specialized trades, each demanding years of steady application before proficiency can be attained in it. But the apprentice to any of the building trades should never lose sight of the fact that all these trades and professions are but cogs in a machine working to produce comfortable and sightly buildings for the rest of mankind.

The boy who decides to be a bricklayer is to be congratulated. The need for more permanent buildings was never so urgent as now. America is discovering that she cannot be prodigal of her resources for ever, and that the average building of the near future must be constructed of brick, stone or cement. At the threshold of what is practically a revolution in building, the outlook is particularly bright for any boy who becomes a good bricklayer, and brighter still if in addition he studies other trades and estimating methods, so that



Fig. 2—Incorrect. Note "stranglehold" on trowel. Fingers and thumb tight and rigid

began and ended with the actual brickwork.

It is necessary to specially emphasize this point in connection with bricklaying. Far too many bricklayers not only take no interest whatever in other trades, but actually specialize in their own. Some men can work only on the wall and do not understand fireproofing. Other bricklayers can do fireproofing only and would be lost on the wall. Success in the broadest sense of the term cannot come to such men. If he would achieve something worth while the apprentice will have eyes and ears open all the time to learn all he can about all the trades on the building. He will study plan reading and estimating in the evenings, for he will never be able to give a safe, accurate estimate until he can read a plan, which is simply the language used by the architect or engineer in giving direc-



Fig. 3—Correct position in lifting mortar from board. Note position of thumb on top of trowel



Fig. 4—Correct. Bricklayer ready to spread mortar on wall



Fig. 5—Incorrect. Thumb should be on top of trowel

parts of the work at first, such as filling in the middle of the wall and backing up the facing; all of his early work being in places which will not be exposed to view after the building is finished. The foreman will generally take care to put him alongside of his best men, for it is of the utmost importance that he should learn the correct way of doing things at the start. Many bricklayers have a permanent handicap because they acquired a set of incorrect habits when learning their trade, and which they are unable to shake off afterwards. The expert bricklayer does his work with the minimum of motions. Some bricklayers "fuss around" and put the same number of motions and the same amount of energy in placing two bricks that a better bricklayer would require in placing three or four. In rowing and other sports it is vital first of all to go through the motions slowly time after time to make quite sure that every posture is correct, then practice slowly so that the body assumes the correct positions instinctively; afterwards speeding up.

Even more care and practice should be devoted to motion study by the apprentice, who is learning the serious business of his

lifetime—for upon it will depend his future skill, speed and earning capacity. In slack times the best men are the last to be laid off, and the first to be taken on when work opens up. The apprentice should notice very carefully how the best men work and strive to imitate them.

The apprentice may be kept on backing

work for some time, depending on the ideas of the foreman and his own adaptability. A few foremen believe in putting the apprentice on facing work right from the start.

The trowel with which the apprentice must provide himself must be selected with some care. He should buy a smaller one than the majority of journeymen use. The larger the trowel the more mortar it will hold and the harder it will be on the undeveloped muscles of his wrist and forearm. Not only must it be comparatively small, but it should have the proper *shape*. A long and slender trowel will have its center of gravity further away from the wrist and therefore cause greater strain than a shorter trowel holding the same quantity of mortar. The first trowel should therefore be rather wide near the handle, and taper off sharply. In a few months, after his muscles have hardened up, he can get a bigger and longer trowel.

It is a mistake to pick a trowel in which the blade drops away from the handle. The blade should be either parallel to the handle or have a slight raise. With the former type it is harder to handle the mor-



Fig. 6—Correct. Beginning to spread mortar. Notice fingers commencing to loosen as weight leaves the trowel



Fig. 7



Fig. 8

Fig. 7—Correct. End of movement in spreading mortar. Note fingers are now loose again and that trowel is held by thumb and forefinger. An upward arc has been described by the trowel between position in Fig. 4 and in this picture

Fig. 8—Incorrect. Mortar has been spread with a stiff arm, the result of incorrect grip on the trowel. Note that mortar does not spread so far

tar, as it has a tendency to slide off the end of the blade.

When watching a good bricklayer spread mortar it looks as easy as rolling off a log. But the fact is there is a fine art even in that seemingly simple operation. The principal things to remember are that the mortar must be spread to the correct thickness, depending on the width of joint.

The natural tendency of the beginner is to grasp the trowel in the palm of his hand with all his fingers surrounding and tightly holding the handle, and after filling it with mortar, to spread the latter by main strength, holding the elbow up and keeping the arm and wrist muscles stiff.

Every one of these natural tendencies is the reverse of the new habits which the apprentice must cultivate.

The accompanying figure (Fig. 1) shows the correct method of holding the trowel. It must be held between the thumb and forefinger, the rest of the fingers grasping it loosely. Hold the trowel loosely; don't squeeze it. The wrist must be loose and supple and the muscles of the forearm must be likewise. It takes a good deal of practice and physical discomfort to learn the trick. The muscles in the wrist, hand and forearm will get quite sore and may even swell up under the unaccustomed exercise. They will, however, speedily get supple and strong and usually the bricklayer will have no trouble afterwards.

The accompanying figures show better than words can describe the motions followed in spreading mortar. Note that the entire forearm, wrist and hand are loose and supple, and that the elbow is held comparatively low. The hand must be so trained so that as soon as the weight of the mortar is off the trowel it is automatically loose. This could not be accomplished unless the wrist were very supple.

The apprentice should remember that bricks and mortar cost good money, and that it always pays to be careful and that he can often make good use of scrap pieces. Often a hodcarrier when dumping brick breaks some of them. When a bat for a closer or any other purpose is required, use a brick already so broken instead of breaking a whole one. With cement, lime and sand at their present prices, mortar, too, is precious, and care should be taken so that it will not drop on the scaffold or on the ground. Remember, too, that mortar on the scaffold means mortar on the shoes, and there is nothing which will rot shoe leather so quickly as mortar. So it will pay the beginner himself to be careful with materials.

Immigration Increasing

The Department of Labor announces that more than 5,000 immigrants are arriving daily at Ellis Island, and foreign steamships state that all accommodations for a year in advance have been booked by prospective immigrants.

A Round Barn

L. W., of Washington, asks for a photograph showing the interior of a round barn.

The accompanying illustrations show a round barn built by James K. Putt of Hershey, Pennsylvania. The barn is 104 feet in diameter and provides space for 250 head of calves on the first floor. The second floor holds enough hay to feed 300 head the year around.

The construction of the walls, roof and second floor is of frame. The first floor is of concrete with concrete mangers and

iron pipe fittings. The second floor is supported on wood girders which run fanwise to the center of the barn. The center columns are reinforced concrete while the intermediate ones are of iron. The roof is self-supporting and there are no timber braces or other obstructions on either floor.

The roof ventilator is of sheet metal and is 37 feet in diameter and 12 feet high. The barn is equipped with a litter, feed and hay carrier, and also a bucket carrier for feeding small calves.



Fig. 1—View showing round barn and a few of the other farm buildings



Fig. 2—Interior view of the round barn showing the equipment

Suggestions for Doing Concrete Work in Cold Weather

TO carry on concrete work when the thermometer registered below freezing and even below zero would have been considered out of the question not so very many years ago. Now concreting in cold weather has become a practice with some

possible for him to keep his tools and equipment in continuous operation, thus lowering overhead costs. Such work also enables him to keep his workmen as there will be no need to turn them off at the approach of cold weather as is often the

making it necessary for him to fill their places with new men oftentimes inexperienced. Continuing operations throughout the winter months forestalls this serious and costly state of affairs.

When construction is uninterrupted by



Fig. 1



Fig. 2

Fig. 1—A combination water and sand heater. A metal tank supported on concrete block provides a good furnace for heating the water, while sand is banked over the cylinder leading to the chimney. The sand pile is covered with a tarpaulin for holding the heat

Fig. 2—A fire built in a section of an old smokestack will heat sand and pebbles piled over it. This method of warming aggregate is very commonly used on small jobs

contractors and every year more are arranging their equipment for making every month a concrete month.

There are several good reasons why the contractor should put his business on a year round basis. Winter work makes it

case when the contractor is not prepared for winter work. Steady work tends to make satisfied employees and that means increased efficiency. The contractor who lets his men go in the fall is very likely to lose some of his most skilled workers,

cold weather it is often possible to complete a building from 3 to 6 months sooner and the owner realizes an earlier return on his investment. Winter work costs somewhat more than that done in summer on account of the expense attending the

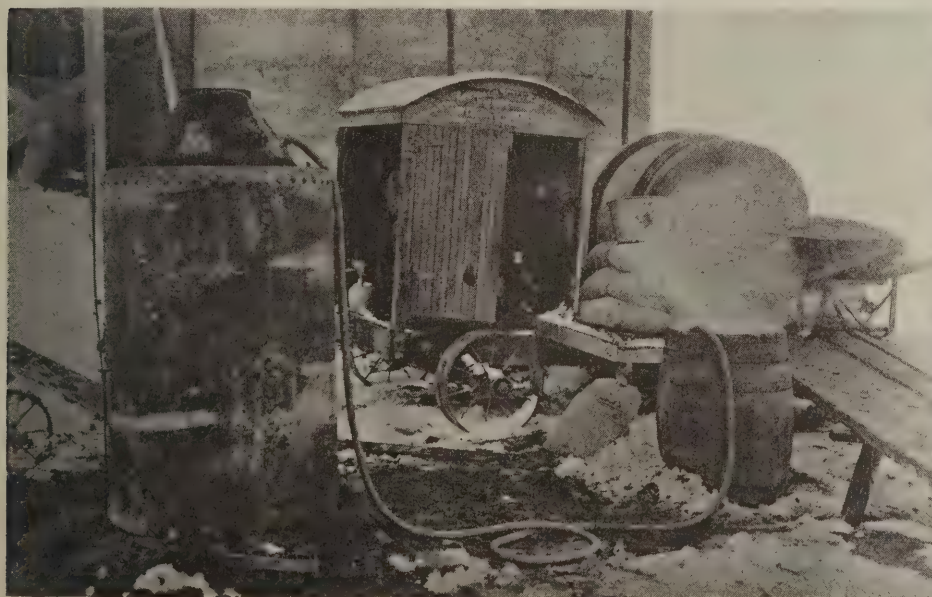


Fig. 3

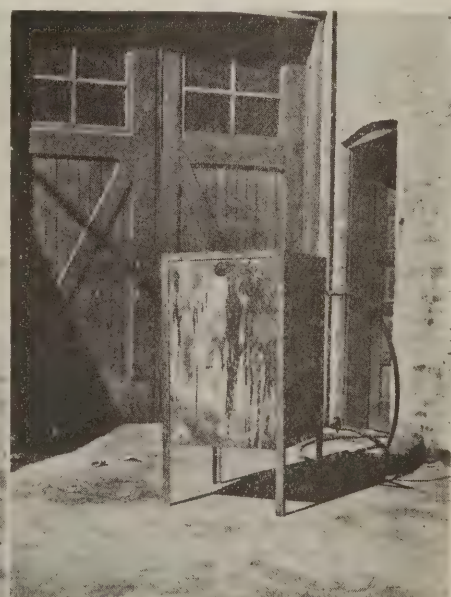
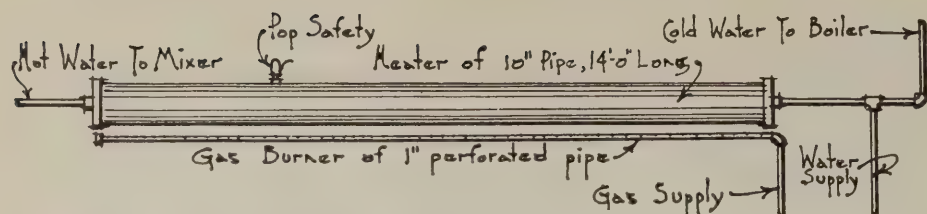


Fig. 4

Fig. 3—Heating water by blowing live steam in a barrel of mixing water standing alongside the mixer
Fig. 4—A combination water heater and salamander. It consists of a sheet steel box mounted on angle iron legs. The inside is lined with coils of pipe through which water circulates. Known as a Londelius heater



Water heater devised by a contractor

heating of the materials artificially and because of the decreased efficiency of the workmen. Fingers numbed with cold are not an incentive to rapid work. However, since the building will be ready for occupancy sooner the owner does not usually mind the extra cost.

By observing a few precautions concreting in cold weather is easily accomplished. Any one who has had any experience with concrete work knows that heat accelerates the hardening of concrete while cold retards it. Bearing these

of 10 degrees below the freezing point. When the temperature of the concrete is 32 degrees or lower the hardening action is very sluggish. Salt is also open to the objection that a whitish deposit or efflorescence appears on the surface of the concrete in which it is used. In reinforced concrete salt is likely to corrode the steel. By far the most satisfactory method is to heat the materials and then retain the heat thus applied by protecting the work in one of the ways described in the following paragraphs.

mixer, as the city pressure forces the water to any height desired.

It consists of a 10-inch casing about 14 feet long, reducing the ends to 1 inch to receive 1-inch pipes. One of these pipes is attached to the city pressure and fills the heater with cold water. The pipe at the other end delivers the hot water after it leaves the heater. A gas burner made of 1-inch pipe with holes drilled four inches apart is run under the full length of the heater.

As the water is forced up into the mixer a safety valve is placed on the heater. It will also be necessary to run a separate line to the boiler from the cold water line as an injector will not operate with hot water. To conserve heat the heater and burner should be enclosed when gas is used. It may, however, be operated with wood or coal for fuel if desired.

Sand and pebbles may be heated by banking them over an old sheet metal smoke-



Fig. 5

Fig. 5—Heating aggregate by blowing live steam into the pile. The pipes which are thrust into the pile are perforated so that the steam can escape



Fig. 6

Fig. 6—A group of salamanders which will be used for heating the canvas enclosure in the background as fast as fires are started in them

facts in mind the contractor who makes a practice of placing concrete in cold weather uses artificial heat in winter for warming the water, sand and pebbles which enter into the concrete mixture and then keeps the new concrete from freezing until early hardening has taken place. It is the general opinion that freezing will not injure concrete which has first had an opportunity to harden for 48 hours under favorable conditions. However, it is preferable to provide protection against frost for a period of 4 or 5 days. At the end of this time the new concrete will safely withstand freezing. Alternate freezing and thawing is particularly injurious to concrete during the early hardening stage.

Sometimes common salt is added to the mixing water as a protective measure. Salt lowers the freezing point one degree for each per cent of salt added. An addition of more than 10 per cent is not permissible as salt reduces the strength of concrete. Its use is being discontinued as it offers protection only against a maximum drop

Water is perhaps the easiest ingredient to heat. On small jobs it is usually heated in large kettles hung over a fire or in a small tank supported so that a fire can be built underneath. On large jobs where a large quantity of water is required it is very often heated by steam. If a steam engine is used to propel the mixed exhaust steam is often allowed to discharge into the tank on the mixer or into a barrel of water standing alongside. In some cases live steam is blown directly into the water. This method will provide hot water at a rapid rate.

A type of water-heater devised by a subscriber to NATIONAL BUILDER and described by him in a recent issue may fittingly be recalled to the attention of readers. The subscriber says he has used this type to furnish plenty of hot water on jobs where he was running two shifts—a day and a night force. This heater does not require any tanks elevated in the air to supply the pressure to supply the water to the

stack, an old culvert pipe or an old boiler shell and then kindling a fire on the inside. It is a good plan to rake the pile over frequently so that all of the particles will become heated uniformly and also to prevent those next to the fire from becoming too hot. It is not considered good practice to heat pebbles to more than 150 degrees Fahrenheit as some kinds are injured by a higher temperature. Separate heaters should be provided for the sand and pebbles so that these two materials will not get mixed together resulting in improperly proportioned concrete.

Concrete should be mixed as rapidly as possible so that little heat will be lost. It should be placed in the forms immediately. When placed in the forms it is desirable that the temperature of the concrete be at least 80 degrees F. All pieces of ice or frozen material of any kind should be removed from the forms by means of hot water or a jet of steam. Metal forms should always be warmed prior to receiving the concrete.

Once inside the forms it is necessary to retain as much of the heat as possible in order to hasten hardening. A number of successful ways have been developed for protecting new work from frost. On some jobs such as floors and foundations a covering of hay, straw or manure may furnish sufficient protection. However, manure should never be placed directly on the new concrete. Several thicknesses of waterproof paper should be first laid over the concrete. Manure not only stains new concrete but is also likely to cause the surface to be pitted due to the nitric acid nearly always present in manure undergoing decomposition.

When concreting is carried on indoors open coke stoves or salamanders are used to maintain the desired temperature. These stoves furnish a great deal of heat and do not smoke. Any other type of heater which has these characteristics may be used instead. Steam pipes are often used when this form of heat is available.

Outside work is ordinarily housed in by stretching canvass around and over it and then heating the enclosed space as described above. Sometimes the work is inclosed with a temporary wooden structure.

Earlier in this article mention is made that protection against freezing should continue for at least 48 hours and if pos-

sible for 4 or 5 days. Forms must not be taken off too soon. Before removing forms it is advisable to test the concrete carefully to ascertain whether it has hardened sufficiently to be self sustaining or is merely frozen. Frozen concrete has some of the same properties as concrete which has hardened properly. It looks the same and will ring when struck a blow with a hammer, therefore these tests cannot be relied upon. The only dependable way to find out if the concrete is frozen is to apply heat to it. This may be done by pouring hot water on it or by subjecting it to a jet of steam. If frozen the mixing water will be thawed in this way and the concrete softened.

Questions and Answers

Abusing Materials

Careless storage on the job is a source of much loss and damage of building ma-



Fig. 1—Rolls of roofing

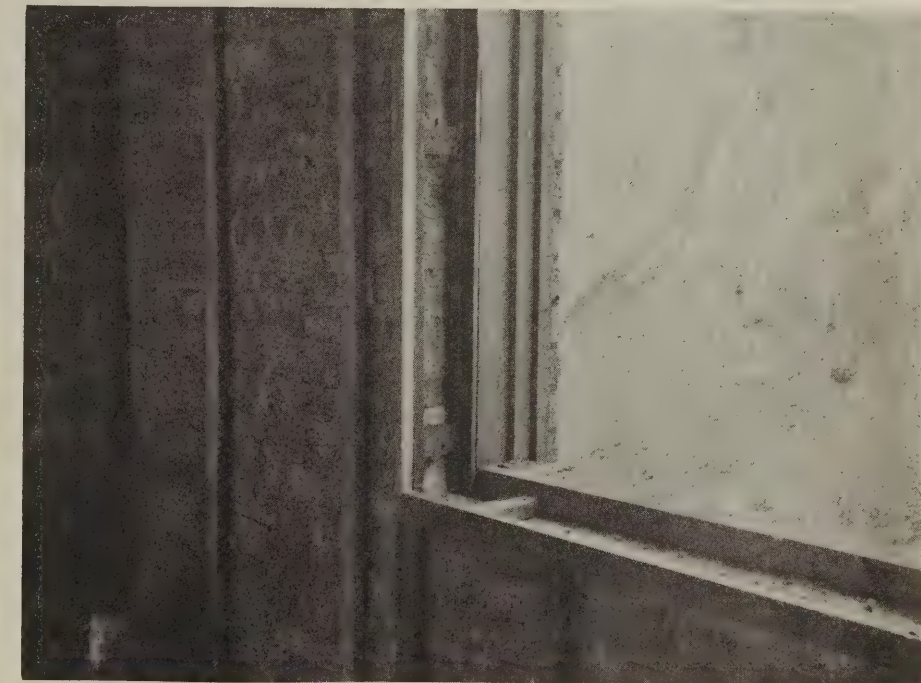
terials. Material men are constantly receiving complaints which they realize are due to improper treatment on the job rather than to any defect in the material.



Fig. 2—Asphalt shingles

Figure 1 shows a careless treatment of rolled roofing. Apparently it has been dumped from a truck with no effort made to follow the manufacturers' advice ("stand on end") which is stamped in large letters on each roll.

Even if no damage were likely to result, the moral effect on the workmen and on prospective clients who might visit the job,



Furring and Grounds

should be considered. Figure 2 shows a pile of asphalt shingles which have been more considerably handled. The pile is neat and implies efficiency on the part of the builder and his men. A couple of planks to keep the shingles off the ground would be more in order however.

face of which is to be flush with the finished surface of the plaster.

Furring is used to prevent the passage of moisture through walls; while grounds are used as a nailing member for the attachment of trim, and also to furnish a convenient guide for plastering.

Furring and Grounds

G. M., of New York, asks for the distinction between furring and grounds.

We were fortunate to receive a photograph which illustrates this point clearly. In the photograph the vertical strips on the walls are *furring*, to which the lath are nailed. It will be noticed at the edge of the window, however, that the vertical member is composed of two strips, one on top of another. The under strip is furring strip while the upper one is a ground, the

Questions

M. A., of Ohio, wants a design for a temple. First floor to contain an attractive entrance, lobby, two small stores, two small meeting rooms and a billiard room. Second floor to have one large meeting hall, one costume (dressing?) room and a large dance hall. Basement to have a large dining room, kitchen, smoking room and a fuel room. Each floor to have toilet rooms. Lot is 51 by 190 feet and the second floor may be built the entire width without windows.

J. J. D., of Virginia, wants a diagram showing the connections for a hot-water tank.

F. B., of Colorado, wants a detail of an inside opening casement window that will be water-tight at the sill.

D. K. L., Western Canada, wants to roof a building that is to have a skating space 60 by 160 feet, with lean-tos at the sides for curling ice and for walks for spectators. Wood construction is to be used and the roof must resist high winds which have wrecked several skating rinks in the neighborhood.

Figure 1 shows the rings after being removed from the forms. The low row of rings in the foreground are for use as chimney caps, but the ones in the background are for the body of the chimneys. The forms may be made of either wood or of metal.

Figure 2 shows the rings in the process of air drying or curing before use. Note the wooden racks which prevent the weight of the upper blocks coming onto the lower ones while they are curing.

Figure 3 shows the tile flue lining which is used in connection with the concrete

joists are uniformly loaded, and that they are of sound fir or yellow pine. Assuming a fiber stress of 1200 pounds per square inch, each joist will safely support a load of about 2200 pounds or a total of about 20,000 pounds for all joists occurring in the given span.

This is considerably less than half the load that the I-beam will carry and a 10-inch, 30-pound, or a 12-inch, 28-pound, I-beam could be safely substituted for the 15-inch I-beam. Of course by using 3 by 16-inch joists instead of 2 by 16, and by spacing them only 12 inches instead of

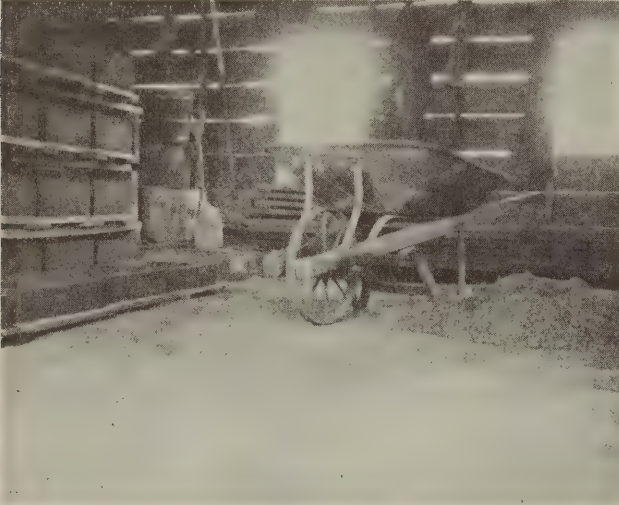


Fig. 1—Concrete chimney rings



Fig. 2—Rings in curing process

Concrete Block Chimneys

The accompanying illustrations show a method of using concrete for ordinary chimney construction. The blocks used are rings of concrete about 8 inches high, with the open space in the middle made large enough to receive the required number of flues. The walls should be at least 4 inches thick.

blocks. The use of flue lining not only simplifies the construction of the blocks by making concrete webs or divisions between flues unnecessary, but also reduces the fire hazard. The latter is a frequent basis of objection to the use of unreinforced concrete in chimney construction.

Brick may be used for the chimney walls where they are exposed above the roof or the concrete rings may be given a stucco finish.

16 inches apart, the load that could be carried would be increased to about 35,000 pounds and the 15-inch beam would be about as economical as any.

Safe Load for I-Beam

J. R., of Idaho, asks what safe load will be carried by a 15-inch, 42-pound, I-beam, 27 feet and 3 inches long with a supporting column at the center. Also what safe load will 2 by 16-inch joists spaced 16 inches apart, carry on a 22-foot span.

It is assumed that the beam has joists on both sides to provide against lateral deflection; that the beam does not carry any extra loads from walls or other members; that the spans given include the end bearings and are not merely the clear distance between supports, and that the beam is uniformly loaded.

The column support at the center of the beam reduces the span to 13 feet 7½ inches. Under the above conditions of loading and span a 15-inch, 42-pound I-beam will safely support about 46,000 pounds.

It is also assumed that the 2 by 16-inch



Fig. 3—Flue lining

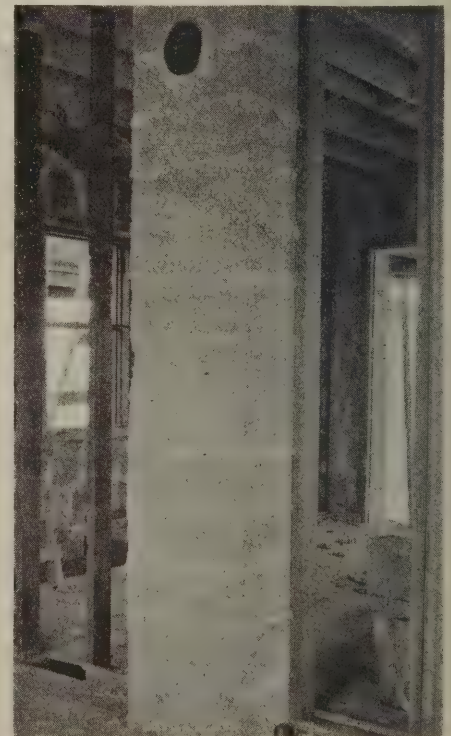


Fig. 4—Concrete block chimney

National Garage Hardware

THE garage owner invariably reacts violently to a poor choice of hardware. And the reputation of the Architect or Builder suffers.

“National” Garage Hardware insures easily opened doors on any type of garage.

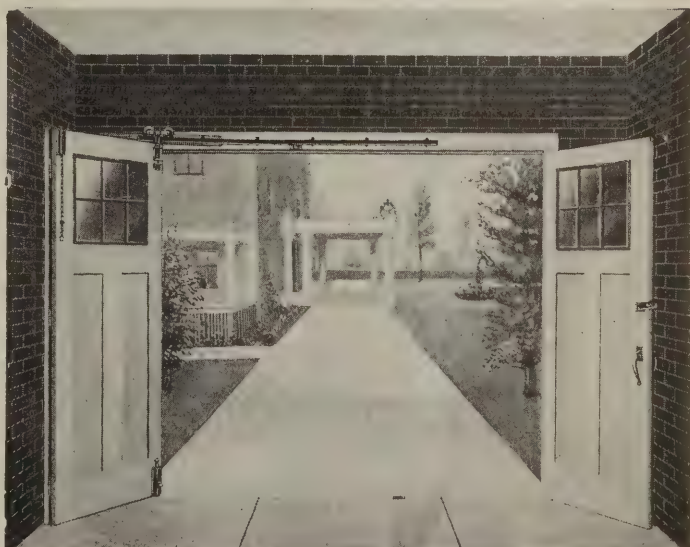


THE National Garage Set pictured swings the garage doors inward, making them independent of any outside obstructions—this is a valuable winter feature, as illustrated. Access to garage can be had thru but one door when desired.

“National” Garage Door Hangers are fore-runners to a complete line of “National” Builders Hardware. To use or specify the entire “National” line is to safeguard your reputation as a professional man who knows.

Write for our Booklet, “National Garage Hardware.”

National Mfg. Co.
Sterling, Illinois



Announcements and Publications

Housing at Bridgeport, Conn.—By implication the article on the Crane development at Bridgeport, Conn., appearing in our August issue failed to state that this work was under the direct charge of Mr. Andrew H. Hepburn, Architect, and associates, with Mr. Sturgis as consulting architect.

The Joke About Housing, By Charles Harris Whitaker, Marshall Jones Company, publishers, 212 Summer street, Boston, Mass. This handsomely printed book is one of the most thought-provocate contributions to the housing problem that has so far been published. It presents conditions and probabilities in a strong light and should be valuable in the preparations that are now on foot to dealing in a national way with the building situation.

Standard Electrical Dictionary, By T. O'Connor Sloane, A.M., M.E., Ph.D., published by the Norman W. Henley Publishing Co., 2 West 45th street, New York, price \$5.00, appears in a new edition showing all recent improvements. This encyclopedia of electricity in all its phases and recent developments gives definitions of terms and descriptions with illustrations of all electrical appliances and connections, making an elaborate presentation of modern electrical theory, experimentation and engineering.

The Model T Ford Car, Including Farm Tractor, F. A. Starting and Lighting, by Victor W. Page, M.S.A.E., published by the Norman W. Henley Publishing Company, 2 West 45th street, New York, is a complete practical treatise revised and enlarged as its name indicates of the Ford car and its conversion sets. Price \$1.50.

Experimental Wireless Stations, Their Theory, Design, Construction and Operation, by Philip E. Edelman, E.E., published by the Norman W. Henley Publishing Company. Price \$3.00. 392 pages. Fully illustrated.

Shop Practice for Home Mechanics, by Raymond Francis Yates, published by Norman W. Henley Publishing Co., price \$3.00, is a comprehensive treatise on shop work for the machinist amateur, with a chapter on theoretical mechanics and miscellaneous information relating to shop work. 320 pages and 309 engravings.

The Austin Machinery Corporation announce the consolidation of the F. C. Austin Machinery Co., Inc., Linderman Steel & Machine Co., F. C. Austin Drainage Excavator Co., Toledo Bridge & Crane Co., Municipal Engineering & Contracting Co., and other large manu-

facturers of kindred lines with plants at Toledo, Ohio; Muskegon, Mich.; Winthrop Harbor, Ill., and Woodstock, Ontario. The combined energy and capacity of these organizations will be devoted to mass production and to supplying a complete line of earth-moving and concrete-mixing machinery to meet the unprecedented period of construction, road-making, reclamation, excavation and irrigation. Distributing points will be extended throughout the world.

Trailmobile is the title of a twenty-two page catalogue issued by the Trailmobile Company, 2930 Robertson avenue, Oakley, Cincinnati, Ohio, illustrating and describing the line of trailmobiles manufactured by that concern, showing the variety of models and their adaptations with specifications and weights and dimensions, with useful data for truck and trail users.

Recommended Practice for Portland Cement Stucco is the title of an authorized reprint from the proceedings of the American Concrete Institute from the report of the Committee on Treatment of Concrete Surfaces, issued by the Portland Cement Association, 111 West Washington street, Chicago.

Koehring Construction Mixers is the title of an elaborate catalogue issued by the Koehring Machine Company, Milwaukee, Wis., in which the varied line of mixers manufactured by the company are shown with details of their principles and construction with valuable tables and data of general interest to builders.

Modern Oak Floors Good for a Hundred Years, published by the Oak Floor Manufacturers Association, 1014 Ashland Block, Chicago, is an artistically designed catalog elaborately illustrated, describing the various styles of oak floors and the approved method of laying them.

Registers "H & C" issued by the Hart & Cooley Company, New Britain Conn., as catalogue 16, illustrates and describes the line of wrought steel floor registers, faces, floor borders, side-wall and base-board registers, grilles, ventilators, cold-air intakes, and furnace regulators manufactured by the company, with valuable tables and data relating to heating installations.

Burglar Foils—an Important New Lock is a booklet describing a new addition to the art of lock-making and to the line of products of the Yale & Towne Manufacturing Co., Stamford, Conn.

Pozzo—the Italian Process Stucco—Strong as the Everlasting Hills, is the title of an historical and descriptive catalogue issued by the American Pozzolana

Company, Pennway building, Indianapolis, Ind., in which comparative costs are shown in favor of pozzolana for exterior and interior structures of from 25 to 40 per cent.

An Ally of Good Living is a booklet illustrative and descriptive of the "Pittsburg-Bungalow" automatic water heaters and smaller "Bungalow" heaters manufactured by the Pittsburg Water Heater Company, Pittsburgh, Pa.

The Excelsior Pedestal Monopipe-Furnace Register is the title of a leaflet announcing a new style register for use with pipeless furnaces, offering numerous advantages. Issued by the Excelsior Steel Furnace Co., 114-118 S. Clinton street, Chicago, Ill.

The J. E. Porter Corporation, Ottawa, Ill., founded 1888, manufacturers of hay tools, single lever friction hoists, door tracks and hangers, garage door sets, steel stalls and stanchions and pens; horse and barn equipment, litter carriers, and hardware specialties, announce an increase of capitalization to \$400,000 and the election of A. S. Hook as president; R. B. Loudon, vice-president; W. L. Weintz, secretary; and B. S. Jordan, treasurer. Branch offices have been opened at Minneapolis, Minn., with Mr. Wm. Elander as manager, assisted by a staff of twelve salesmen out of this branch covering the northwestern states.

The Griffin Manufacturing Co., Erie, Pa., manufacturers of steel strap T and butt hinges, etc., announce an authorized increase of capital stock from \$1,000,000 to \$2,500,000, the re-election of former officers and an increase of the directorate to seven, so as to bring some of the younger members of the corporation into closer touch with its affairs.

The Davis No. 1 Blaster is an illustrated descriptive leaflet of a new small, light-weight blasting machine, just placed on the market by the Atlas Powder Company, Philadelphia, Pa.

The Story of Kellastone Imperishable Stucco and Specifications for Stucco are two comprehensive and well illustrated contributions issued by the National Kellastone Co., 155 E. Superior street, Chicago.

Millers Falls Co., tool manufacturers, Millers Falls, Mass., announce the purchase of the West Haven Manufacturing Co., West Haven, Conn., manufacturers of Universal and other brands of hack saws, band saws and small tools. The Millers Falls Co. will be operated hereafter through its plants at Millers Falls, its plant at Brattleboro, Vt., and its new plant at West Haven, Conn.

STUCCO^{AND} PLASTER BASE

BISHOPRIC

INSULATING SHEATHING

GOOD—

that which possesses desirable qualities—promotes success—is SERVICEABLE, DURABLE—SOUND—RELIABLE and ECONOMICAL.

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NATIONAL BUILDER

Volume 63

Chicago, October, 1920

Number 10

The Situation

CONDITIONS in the building field collected by NATIONAL BUILDER from towns and villages throughout the country show a mixed condition. In the main encouraging activity is reported considering the obstacles of the slowly improving labor, coal, material and transportation situations. These reports are appended in brief.

A survey of national conditions prepared by Franklin K. Lane from telegraphic reports and issued September 21 by the Fidelity and Deposit Company, Baltimore, Md., says in part:

"The call for buildings comes loudest from the most essential places of manufacture, rather than from the retail centres, and is for low-priced dwellings. Building construction is increasing in New England, but the bulk of the construction is of factories, warehouses and stores. * * * * There is improvement in the housing situation in Southern and Pacific Coast industrial centres, with special emphasis on the erection of workmen's homes.

"In no section of the country did the investigators find sentiment in favor of government ownership of the railroads; and everywhere better transportation conditions are reported. * * * *

"It is clear that the country is on a sound economic basis, and there is generally a spirit of confidence in the future, regardless of the outcome of the election.

"The business outlook appears to be good in every section. Wholesalers and retailers view the fall and winter optimistically. The retailer is finding that the consumer is looking forward without fear to the winter, and his purchases from the wholesaler are founded upon this optimism. From the simple toiler up through the tradesman to the industry and the financier there runs the connected feeling of confidence."

Mortgage Loans

One of the most deadening influences upon building is the tight money market.

In the opinion of Senator Calder, who has been investigating the housing situation in the East, the greatest remedy that could be applied would be a revision of the excess profits law and a modification of the surtaxes so as to bring back to the building industry money that is now being put into tax exempt securities.

Exempt Mortgage Tax?

He pointed out that there are today in existence about \$14,000,000,000 worth of tax exempt securities, two and a half times

as much as before the war. He declares that if his plan of modifying the tax law is not adopted it may be necessary to exempt incomes from mortgages on dwelling houses from federal taxation.

Senator Calder called attention to the shipping law provision which exempts from the profit tax the earnings of American ships in foreign trade, provided these profits are invested in building new ships. He said that this theory, applied to houses, would greatly encourage new building.

Excess Profit Tax

On this subject Mr. Lane's report says: "The country does not like the present taxation system. The Excess Profits Tax is in bad favor everywhere. Opinion is divided, however, as to a substitute. In the East and Central West, sentiment runs strongly for a sales tax, but elsewhere, opinion as to a substitute is divided."

Prices

The Dow Service reports predict weaker prices for building materials for the next sixty days, manufacturers of many commodities making concessions under pressure or in an effort to stimulate the market. These concessions do not presage a permanent lowering of prices, but represent a genuine opportunity to the building investor.

Building Conditions in Detroit

During the last 60 days there has been a notable slowing-up in most lines of building construction in Detroit. The only kind of building that is about keeping up in volume is the institutional. Seminaries under church control, parochial schools, and church buildings are being erected in about the usual number, some big contracting companies devoting themselves entirely to this work. One contracting company is engaged on ten such enterprises.

In industrial building, old jobs, most of them taken last fall, are being completed, but little new work is being begun. A good many industrial companies have plans for new buildings and additions, but they are being held up, many of them having been put off till next spring. Commercial building is also at a decline. House building is only one-fourth of the normal, in the opinion of the Chamber of Commerce.

Building material for houses is in good supply, and lumber and brick are selling

much lower than a year ago. A great scarcity of cement is reported by nearly all the contracting companies engaged in industrial and commercial construction, this condition having retarded work since the beginning of the year. Freight increases are receiving much attention on the part of bidders on contract work, with the result that very high figures have caused the rejection of many bids. This freight increase is declared to be "a far-reaching influence hampering the building industries."

Increase in Labor Efficiency in Detroit

The falling off of construction work has naturally had the effect of greatly increasing the labor supply. Both mechanics and common laborers are walking the streets looking for work. Also, on some of the big jobs still going on, some men have been laid off and it is remarked among the workers that the men laid off have been those that were least efficient. This has resulted in a very decided change among the men at work in favor of greater efficiency. The boss is again in a position to reprimand a worker if he is not doing his work satisfactorily. Some of the bosses declare that, with them, labor efficiency has come back to where it was in 1914.

The Open and Closed Shop Struggle in Detroit

The struggle for the open shop in Detroit has been going on for seven years, and today Detroit has more construction industries, as well as other industries, operating on the open shop plan than any other large city. Recently several Detroit associations of business men have declared for the American Plan of Employment, which is regarded as a compromise between the closed shop and the open shop plans. From this declaration has gone out the report that Detroit has declared for the open shop, which is not the case. With the exception of a plumbers' strike, everything is quiet in Detroit in labor lines. The old struggle between open shop and closed shop continues, with the overwhelming sentiment of the public in favor of open shop. The biggest industrial enterprises in Detroit are conducted on the open shop plan.

(Continued on page 15)



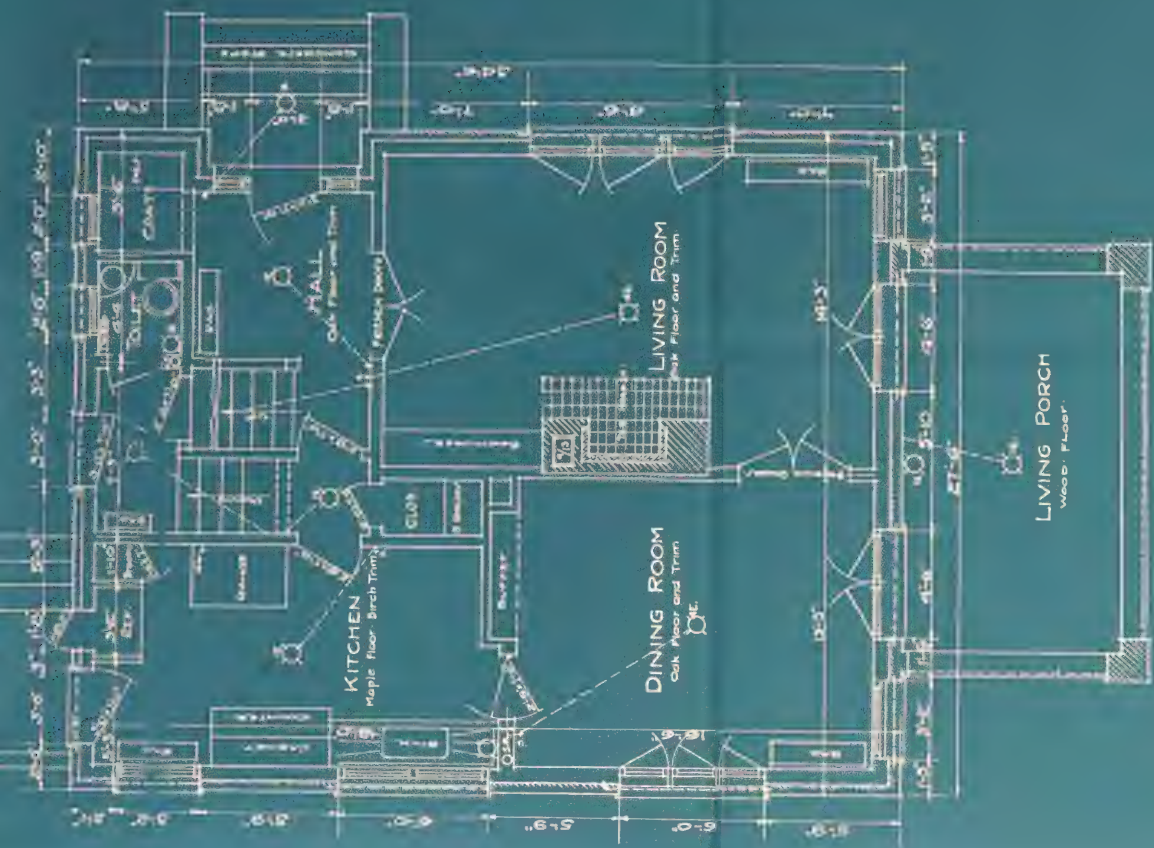
A Seven-Room Brick Veneer-Stucco Residence. C. W. Lampe, Architect

See blueprint working drawings in detachable insert in this issue and descriptive article on following page

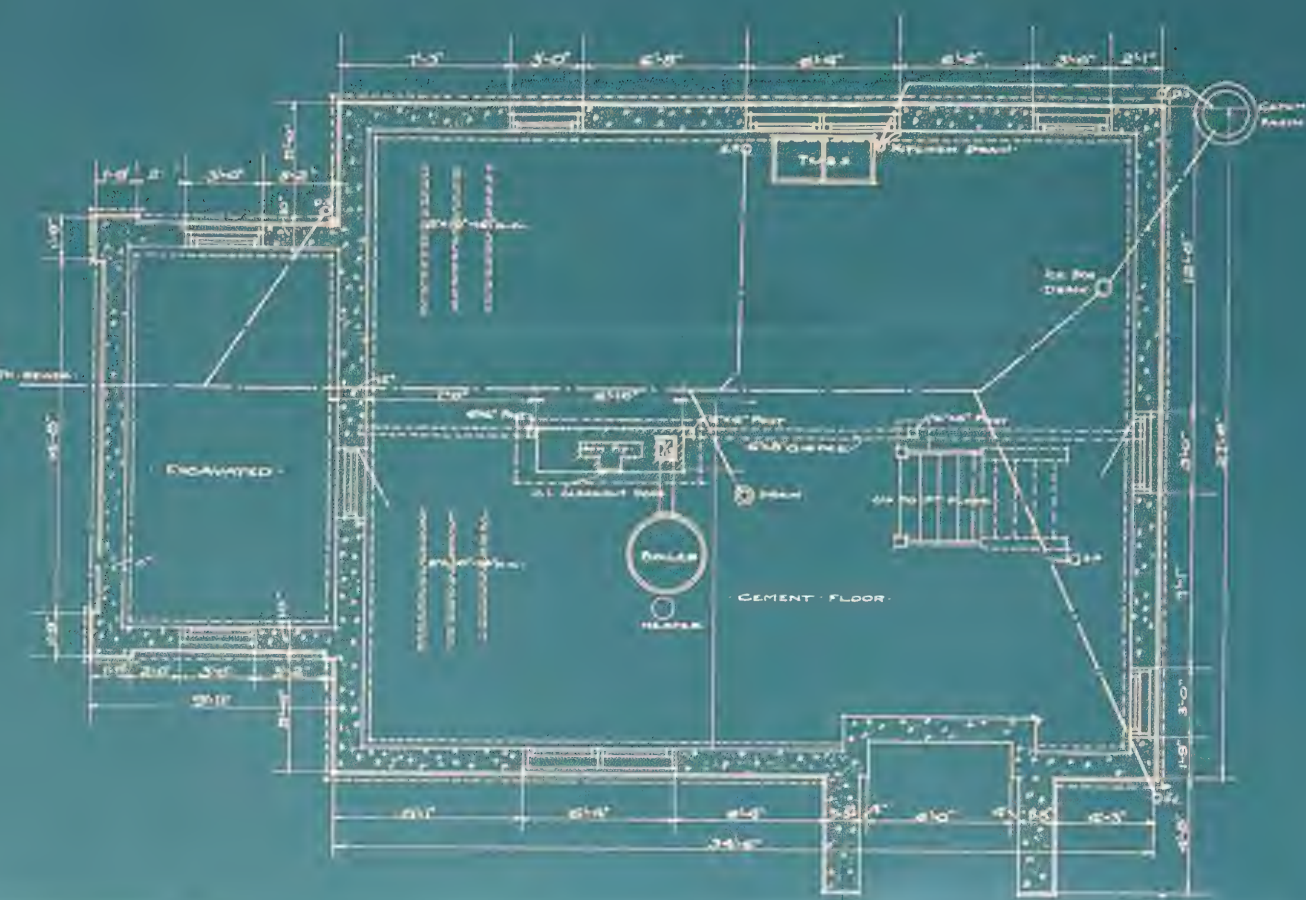
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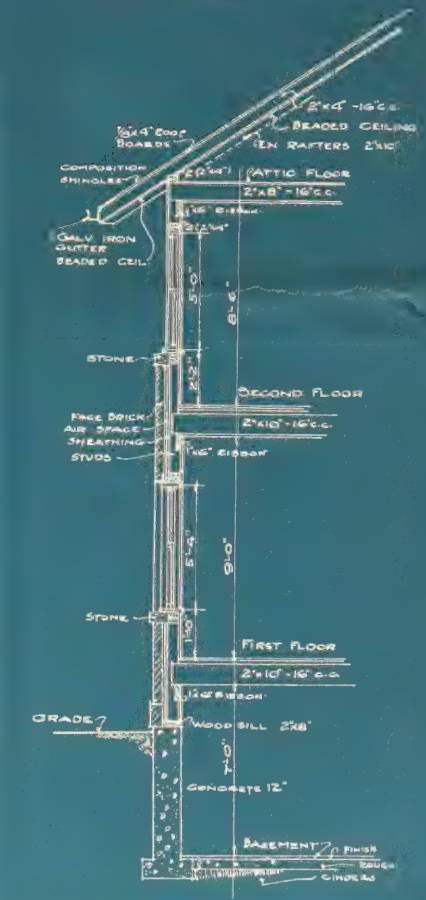
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WINDOW OPENINGS



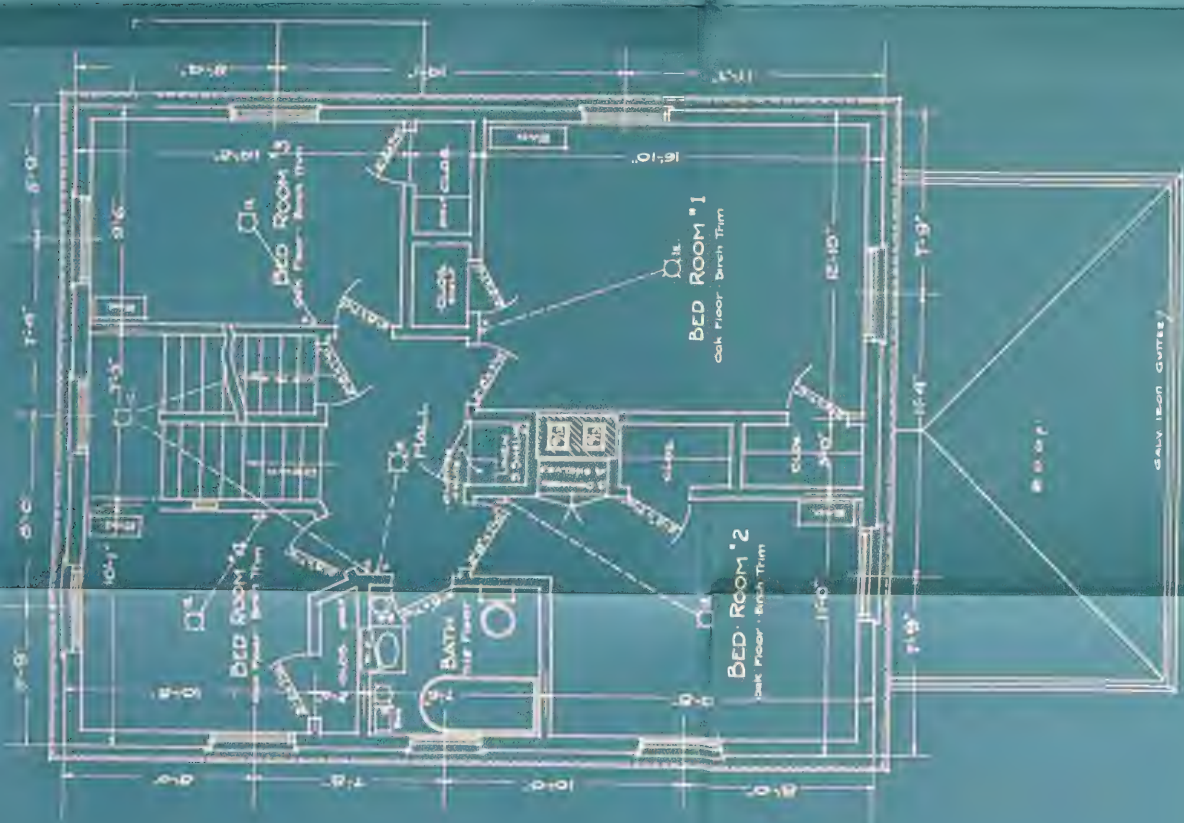
FIRST FLOOR PLAN
Scale 1/4" = 1'-0"



BASEMENT PLAN
Scale 1/4" = 1'-0"



WALL SECTION
Scale 1/4" = 1'-0"



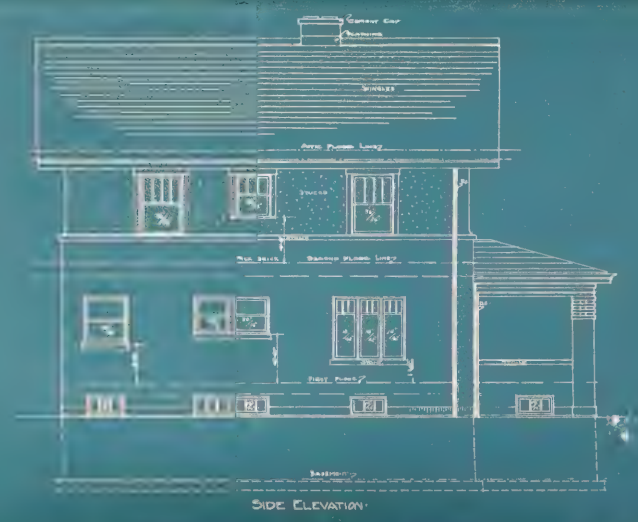
SECOND FLOOR PLAN
Scale 1/4" = 1'-0"



FRONT ELEVATION



SIDE ELEVATION



SIDE ELEVATION (EAST)

NATIONAL BUILDER

October, 1920

WORKING PLANS for a SEVEN-ROOM HOUSE

C. W. LAMPE, Architect

Scale: Floor plans, 1/4 inch equals 1 foot
Elevations: 1/16 inch equals 1 foot

See Photograph and Description in Reading Pages



SIDE ELEVATION (WEST)

Brick Veneered-Stucco Residence

Working Drawings for this House are Given in the Blueprint Detachable Insert in this Issue

THE residence shown on the preceding page with the accompanying blueprints of the working drawing was designed primarily to meet the conditions existing at the present day in respect to the high cost of materials and labor. Notwithstanding the fact that labor has been scarce and at a premium this building was completed in record time and occupied by the Owner, who has improved the site with a tasteful arrangement of shrubbery and trees.

The building is located on a corner lot, easy of approach and slightly elevated contour. This feature has been taken advantage of and presents a pleasing view from all angles. The Southwest exposure gives the living and dining rooms ideal lighting facilities and permits of pleasant living room usage during the later hours of the afternoon.

The use of face brick veneer in the first story section presents a contrast in color and provides a very excellent type of wall construction. Acting as the sill for the second story windows the stone belt course at this juncture makes for a finished appearance.

Arrangement of the rooms on the first floor is well in keeping with the general layout of the building. The simple, the refined entrance leading into the entrance vestibule is placed so that access to the various rooms is accomplished without extra cross circulation and solves the question of added steps to the busy housewife.

The living-room with its large casement windows and French doors leading to the living porch, which was glazed after the building was occupied, is spacious though not too large. Access from the kitchen to the dining room is in a straight line and with the cases placed in their respective positions, makes the performing of the ordinary household functions quite simple.

The small toilet room at grade entrance in the rear section of the first floor is very appropriately placed. As most readers can readily realize, the small amount of space occupied and the privacy obtained in connection with kitchen and basement makes this arrangement very desirable.

The disposition of the rooms of the second floor is quite simple and well planned. The bedrooms are of moderate size and well oriented so as to permit of cross air currents and complete ventilation. The chute from within the linen closet terminates at the second floor and is a feature highly appreciated by housekeepers. All the rooms are in close proximity to the bathroom, which has tiled floor and is finished in the usual fashion with tile walls five feet high and white enamel trim.

Leading up from the second floor is a flight of stairs that run to the attic. This section of the building has been finished by the owner to provide a play room for the children and as extra storage space for the numerous odds and ends of furniture, fixtures, trunks, etc. The rafters have been lined with insulating quilting which prevents the conduction of excessive heat and cold at this point.

In addition to the present building the owner plans to add a garage for one car with a sleeping porch above, connected directly to the present building on the Northwest corner. The heating will be supplied from the house and will eliminate the worry and care of a separate plant.

This little building is a substantial, economical, well designed and pleasant home for the man of moderate means.

(Continued from page 13)

Cleveland Housing Company Begins Construction

The Cleveland Housing Company is the product of the Cleveland Chamber of Commerce. Its stockholders are the manufacturers and other business men of Cleveland, who have subscribed \$1,000,000 for working capital. The money is being paid in on 25 per cent installments, as called for. At the present time payment is being made on the third call.

The work of construction has just begun, and 32 houses are in course of erection. The building program calls for the construction of 67 houses, a few of which are double, this year. The company is a permanent one, and it is proposed to go on building houses for an indefinite period.

Bainbridge Cowell, the managing director of the Cleveland Housing Company, has himself taken entire charge of the construction work, as it was found that a great saving in cost could be made in this way. Plans were made to build six months ago, but it was then found impossible to buy lumber at wholesale, as there were no lumber laden cars in transit that could be picked up. Now the situation in the lumber market is so much easier that it has been found possible to purchase large quantities of lumber at a very reasonable price. Six months ago, they had to buy at retail, if at all. Then the best they could do on ordinary sizes of yellow pine was \$75 per thousand, while now the same lumber is being secured by wholesale in transient cars at \$40 to \$45 per 1,000 feet.

The manager reports a great improvement in the efficiency of labor, which he attributes to the fact that at present in Cleveland, due largely to the strikes of the plumbers and steamfitters, a great many building mechanics and laborers are walking the streets and competing with each other for jobs. He says he can get more men than he can use to advantage and the efficiency has come back to what it was in 1914.

The houses are to cost from \$7500 to

\$8500. They are to be sold on an initial payment of 15 per cent down and one per cent a month. The first opportunity to buy will be given to the employees of the manufacturers that have subscribed to the building fund; but if the houses are not purchased by them, they will be offered to the general public.

The General Building Situation in Rochester

While house building is estimated at not more than a third of the normal, industrial building in Rochester is proceeding as fast as men and material for doing the work can be secured. One reason for this is that material for large construction is bought at wholesale prices and at much less cost comparatively than for dwelling houses.

One well-known company is planning a ten million dollar addition to its plant. Besides, there is an immense amount of repair work on big buildings going on, more than before the war.

The result on organized labor is to place it in a commanding situation. So much is this the case that in the recent industrial strike here, where the open shop was one part of the issue, several of the manufacturing companies engaged in enlarging their plants, brought in union men from out of town rather than employ contractors that had established the open shop in their business.

The open shop has won however in the struggle with the unskilled laborers, the motor repair men, and the panel board shop men. While there are some non-union men in all trades, they are working on small jobs where they do not come into contact with union men.

The Housing Problem in Rochester

Rochester claims about 300,000 population, an increase of about 35,000 over ten years ago. Elliott Frost, Director of the In-

dustrial Management Council of the Chamber of Commerce, declares that the building of houses has been declining for four years, and that today Rochester has no building program.

The excessive demands of labor, high prices for material, and the refusal of the banks to loan money for building, have brought to a standstill all house construction, except by people having the money to pay cash without the necessity for borrowing.

There are four house building projects holding public attention, all of which are now temporarily suspended. One group of business men had laid plans to finance house building on an immense scale, it being planned to construct about 3000 houses in the next few years.

Three of the plans are in connection with commercial enterprises: The Gleason Works placed large authority in the hands of William H. Gorsline, an architect of Rochester, for the carrying out of their project. He purchased a tract of land, subdivided it into 200 lots of good size and began to build houses. At the present time 33 of those houses are nearing completion. But all further building has been suspended till conditions for house construction are more favorable.

These houses are costing from \$7,000 to \$9,000 each. They will be sold to employees on a payment of 10 per cent down, a second mortgage to the Brighton Terrace Company, a sub-company of the Gleasons, for 40 per cent. This leaves 50 per cent to be provided for by a first mortgage, which can run indefinitely. The buyer will then pay one per cent a month on the second mortgage till it is paid off, and he will, of course, keep up the interest on both mortgages.

There is no "string" tied to the sale. If an employe buys a house and leaves the employment of the company, it does not affect the transaction as to the house. This attitude is for the sake of doing away with idea of building an "industrial village."

The Ingles Companies employed the same architect to supervise work of house construction for them and are planning to build 100 houses, for which the land has been purchased and is being graded.

Miss Kate Gleason, a stockholder in the Gleason Works, is building two cement houses in East Rochester and is planning to build a large number. These will cost between \$3500 and \$4000 each and will be sold to employees of the Gleason Works living in East Rochester.

Housing and Building Situations in Buffalo

Buffalo now claims a population of over 505,000. During recent years her building activities have not kept pace with the increase in population, until now a very serious housing situation exists. This is shown

by the remarkable rise in rents in the past two years. The president of a Buffalo building and loan association says that a fair gauge of the increase in rents is that of residences; an apartment that rented from \$25 to \$35 a month two years ago now rents at from \$45 to \$65.

A short time ago, the mayor appointed a committee of 150. This committee called together over 30 building and loan associations and turned the matter over to them. No further report of progress has been made public.

During the spring considerable building was going on, but there is at present a great lull, which has been very noticeable since the first of July. The figures on industrial building show well but they are based principally on the erection of two big industrial plants on the outskirts of Buffalo. Commercial building is far below normal and residence building is in still smaller proportion.

Building material for residences is in good supply, compared with the amount of building going on or likely to go on in the near future. The greatest scarcity is in brick and cement, which is felt even more in the commercial building. There is a continued complaint of the scarcity of structural steel and work on one big public high school is being held back for that reason.

There would be a good deal of speculative building going on, builders assert, were it not for the recent restriction of credits. One big real estate company that built 80 houses last year and 8 this spring has had to quit its building plans, on account of the restrictions of credit in financing sales, the president of the company tells the writer.

State of Trade in Various Communities

Harrisburg, Ill.—Building is brisk in residence and mine building construction, and repairing and remodeling. Five houses are under construction, cost about \$4000 each, and three larger houses costing about \$5000 each. Mine buildings costing about \$20,000 are under construction. Repair and remodeling for August amounted to \$25,000, and will foot up to \$20,000 for September. All available labor is employed.

Kearney, Neb.—While building is slackening and money is tight there is considerable building of all kinds going on. A \$200,000 hospital is under construction and civic buildings approximating \$150,000. Not much new residence building, but considerable remodeling and repairing.

Cadillac, Mich.—New houses, cottages and factory buildings and repairs are under way. Six houses costing from \$3,200 to \$5,500 are up and six more are under construction. Factory additions and warehouses about \$40,000. Several schools estimated at \$700 to \$35,000. Considerable repair work all the time, but difficult to estimate. Good

resort trade north and east of this all the year.

Grand Rapids, Mich.—Medium sized houses averaging about \$5,000 are under construction, also garages, and the usual repair work running to about \$1,000 per job. Some factory buildings are nearing completion. A number of large schools and churches are under construction, cost about \$200,000; also a number of theaters and small stores.

Rochester, N. Y.—Simon Fennell, fire marshal of Rochester, New York, has a plan of his own for partly solving the housing shortage. His department in the municipal government has several men making a canvass of Rochester to find out how many unused spaces there are in buildings that could be turned into apartments.

The number found is large, and many of them could be made into good apartments if certain obstacles were removed. One of the obstacles most commonly met with is the lack of front entrance, especially when the vacant space is over a store. The merchant refuses to have his window space lessened by having a front entrance cut for a flat above him.

Syracuse, N. Y.—The housing situation in Syracuse is great and growing greater, with nothing done to relieve it. Industrial building is booming, in spite of the high prices for materials and the exactions of labor. The enlargements of the foundries and factories now being made will require at least 10,000 more men.

A big contractor says that all of these manufacturing companies are "worrying" about how their future employees are to be housed.

Huntington, W. Va.—The International Nickel Company, a \$63,000,000 corporation of Bayonne, N. Y., will start work on a new plant here November 1. Estimated cost between three and five million dollars.

Ware Shoals, S. C.—Ware Shoals Manufacturing Co., of Ware Shoals, S. C., have just launched an extensive building program which will involve the expenditure of well over half a million dollars. Present incompleted plans which are now in the hands of the prospective builders, the John W. Ferguson Co., of Paterson, N. J., call for the erection of a new 3-story reinforced concrete store building to measure 60x11 feet, 30 model workmen's cottages, an additional story to the Hull building, a temporary school house, a completely modern cow barn and dairy plant, an ice house for the manufacture of artificial ice, and 80-foot reinforced concrete bridge to span the Saluda River. It is expected that this improvement and expansion work will get under way immediately. The designing for the new store building is being done by Jackson & Moreland, Engineers, Boston, Mass.

Camden, N. J.—Industrial factories amounting to about \$800,000 is about all the construction work being done.

Muncie, Ind.—A few residences are being built, but most work is in repair and remodelling, about \$10,000. Farm buildings amounting to about \$13,500 are under way, two farm houses, estimated at \$6,000 each. One school house and one children's home, about \$260,000. One hotel, about \$200,000.

Dewitt, Ark.—Building fair in residence, garages, barns, stores and factories. Residence about \$20,500; rice mill, \$250,000; farm buildings, about \$20,000; farm homes, about \$15,000; six store buildings, about \$50,000. Considerable repair work.

Culver, Ind.—One dwelling, \$5,000; farm buildings, \$20,000; high school, \$110,000; summer home, \$15,000 to \$18,000. Repair work, about \$3,000.

Keene, N. H.—Chair factories, concrete and glass; shoe factory, brick and glass—estimated cost of both, \$200,000. About thirty cottages, wood construction, cost from \$4,000 to \$5,000 each. Remodelling, about \$15,000 to \$20,000.

Paducah, Ky.—Largely additions and repairs, approximately \$150,000; residences, about \$75,000; two rural schools, \$5,000; one church, \$25,000.

Mason City, Iowa.—Very little work being done, mostly repairs and extensions. One hotel started, about \$800,000. Car situation and mortgage and loan market outstanding causes of non-building.

Pleasanton, Iowa.—Barn and house, about \$20,000; farm buildings, \$12,500; repairs, \$3,000.

Newport News, Va.—Residences, \$750,000; educational and civic buildings, and churches, about \$200,000; repairs and remodelling, about \$100,000.

Columbia, S. C.—The inability to make loans has cinched the building field to stagnation. Public building records are so poor that information could not be obtained.

Birmingham, Ala.—Big construction very slim; small residences and repair work, the latter about \$50,000; factories, about \$100,000; county schools, \$150,000.

Anaconda, Mont.—High costs of labor and material keep building quiet. Principally repairs; amounting to \$10,000 a month; a few residences, estimated cost, \$5,000 to \$60,000.

Jersey City, N. J.—Nothing of any account. One large bank building, to cost \$1,000,000. Outlook poor on account of mortgage money.

Bareville, Pa.—A few houses, three at \$6,000 each; repair work about \$2,000.

Manchester, N. H.—Very little building; three schools to be built.

Hastings, Neb.—Little less than normal; general improvements in the country. Good business buildings in city. Residences being built average \$6,500 to \$15,000 each. Factories, \$150,000; farm houses averaging about \$5,000. Much building in this town as soon as builders can get to the work, regardless of price.

Ames, Iowa.—Farm buildings, costing

from \$300 to \$1,500; residences, costing about \$5,500 each; frame college dormitory about \$8,000; not much repair work, about \$50 to \$1,000 a month.

Benham, Colo.—Very little repair work. School house, \$60,000; residences, one, \$10,000.

Wilkes Barre, Pa.—All classes of construction under way. One lot of houses, estimated at \$300,000; others at \$4,000 to \$5,000 each; silk mill, \$150,000; one school, \$300,000; one theater about completed, \$150,000; garages, about \$150,000; repairs, about \$15,000.

Tenafly, N. J.—Home building of two

classes is going on. One class represents a cost of about \$7,000 and others \$15,000; school building to cost about \$300,000 under consideration; one theater building just completed, cost about \$20,000. Building conditions quite favorable but loans are hard to secure.

Hot Springs, So. Dak.—New addition to hospital and state soldiers home; cost \$100,000. Some residential and repair work, about \$25,000. Limited amount of farm building work, about \$15,000. The cost of labor is greater than the material or the value of the work accomplished. Prospective buyers holding off.

Housing in Palestine



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This shows a native house at Beth-Shean, signifying in the Hebrew "rest" or "security." It was to this locality that Saul's body was taken. It is now the modern Beisan, and situated about 55 miles north-northeast from Jerusalem. The plans and specifications of this house are not avail-

able, but the illustration shows that when money or material or means of conveying material cannot be obtained, the standard of life sinks. This comes from a land whose history is filled with stories of vast building enterprises and whence the Masonic order received its great lessons.

The Charm of the Garden Pergola

By Charles Alma Byers

WHETHER or not there be significance by original intent in the fact that man's first home was a garden, there at least can be no questioning but that we of today live in gardens—in the great outdoors—too little. We still love gardens, it is true, and possess some of exceeding

gross handiwork." The garden, indeed, deserves to be made to comprise not only a beautiful and beautifying setting for the house, but its beauty, its planning both architecturally and in planting, also should wield an influence as irresistible as possible for bringing us into the open and keeping

and other such features. In truth, the garden that is really intended for much outdoor living deserves thoughtful attention architecturally fully as much as it does in any other respect. And it is for meeting just such requirements that the pergola is so well adapted.



charm, too; yet there are few of us, infinitesimally so, who live in them, even during our idle hours of balmy or sultry summertime, as much as we should, for either the sake of our health or the full realization of their enjoyment-giving possibilities. Instead, whilst thoughtlessly continuing to nurture the habit of spending our year-round leisure moments indoors, we create apparently for little more than the sole purpose of show. Even the fulfilling of that purpose is no doubt worthy of effort, but alone constitutes not enough. The field of rightful endeavor in gardening is much broader, embracing qualities utilitarian as well as esthetic. It was Bacon who, of gardening, said: "Indeed, it is the purest of human pleasures, it is the greatest refreshment to the spirit of man, without which buildings and palaces are but

us there as much as leisure time will permit. In fact, most important of all is this matter of endowing the garden with the ability to allure, invite, to subtly and persuasively coax us out, in spite of ourselves—coupled, of course, with the power to reward when once we are there.

Planning

In its planning, the truly well-appointed garden, always more or less governed by plot, size and neighborhood environment, must naturally receive consideration from several angles. For instance, aside from the planting—trees, shrubbery, flowers, vines, and so forth—it should afford facilities for genuine recreation, as well as be endowed with beguiling influences, in the way of cozy nooks, comfortable seats, invitingly shaded walks, flashing fountains,

Indeed, pergolas afford possibilities for the improvement of the garden quite innumerable. Also, they are adaptable to gardens of nearly all sizes, and, in some interpretation, alike to both the formal and the informal scheme. Moreover, they may be installed at any time, either when the grounds are first laid out or at some subsequent date. Differently constructed in regard to materials employed, and variously designed in respect to object of service, they, in fact, as the accompanying illustrations will help to prove, are capable of impregnating the garden with charm and beauty and equipping it with enjoyment-giving facilities to a degree probably unequaled by any other single garden accessory.

The derivation of the pergola is perhaps the portico, as it was employed in early



Though heavily covered, this pergola being electric lighted, may be used at night

Rome. It is known, at least, that as early as the fourth century something like a prototype of the modern pergola had become quite popular throughout the middle regions of Rome, and had developed itself with particular rapidity in the cities of Syria. Here it was used as a sort of partially sheltered walk, wherein protection from the glare and the heat of the sun was afforded. The pergola of Italy, even in its earliest interpretations—to which country America is doubtless indebted for the idea—was also a semi-sheltered path. This we may have substantiated by a study of the old Italian pergolas in the garden of the Villa Gori in Siena and that border the terrace of Cappucini at Amalfi.

In America, however, the pergola, of today is employed in a variety of ways. Aside from being made to serve for the same purpose as it did originally, it, for instance, is also quite frequently used for creating semi-protected piazzas and other types of outdoor lounging retreats—open-air resting places that may be either direct adjuncts of the house or located in some more or less remote part of the grounds. Sometimes, moreover, as against its comprising a garden utility, it is utilized purely as an ornament, or decorative feature, although it is to be admired and appreciated most when its service is two-fold. Yet, for whatever purpose or however employed, due to its variously handled uprights and overhead crosspieces lending themselves to enhancing coverings of greenery and blossoms, the pergola's influence upon a garden

is always of an almost inestimable worth. It is perhaps as constituting a harmonizing link between house and garden that the pergola is to be especially recommended. Whether connected or detached, it, in

actuality, anchors the house to its garden environment in a manner that for appropriateness cannot be equaled in any other way, for it is a natural combination of the architectural materials of the former and



A furnished garden retreat of the pergola type



A roomy and inviting pergola

the plant life of the latter. And to the end that it may effect this connection in all ways charmingly and harmoniously, it, in both style and materials, should, of course, be in more or less keeping with the house. This is to be accomplished in various ways—by using cement, brick or wood for the pergola columns, brick or cement for paving the space so enclosed, and through the association of other details.

Utilized as a semi-sheltered walk, as originally, the pergola is frequently designed as a sort of out-reaching arm of the house, leading away into the garden from some side or rear entrance. In other instances it is to be found, perhaps detached from the house and bordering upon a street or thoroughfare, serving as a sort of screen against the possible prying eyes of strangers, to the end that the garden may afford enjoyment in seclusion. Again, possibly located in a remote portion of the grounds, it may have no other object than to furnish a bit of vine-draped walk, wherein one may stroll whilst enjoying the garden vistas and the pure, invigorating air of the open. In any event, it may or may

not reach to some cozy and comfortably furnished nook, to a shimmering pool or water-lily pond, to a sparkling fountain or old-fashioned sun-dial, or to some other interesting spot.

The pergola-covered piazza or terrace, preferably located against either one side or the rear of the house, and the entirely disconnected garden resting retreat of the pergola type also lend themselves to many variations in designing. Invariably decorated with vines and flowers that afford grateful shelter from the fierce sunlight without interfering with the enjoyment of the breezes, places of this kind are particularly desirable, and often to be preferred to the more common porch or veranda. Naturally, to make their comforts complete, they must be in some wise furnished with seats and the other necessary conveniences; and herein is offered opportunities for the further exercise of individual tastes.

Of particular importance in the making of the pergola, whatever its type or purpose, a thing of charm and beauty and enjoyment is the matter of its drapery of

vines. Ordinarily this covering should not be heavy, although exceptions are no doubt sometimes permissible. Instead, remembering that its original object was to provide semi-shelter from the sun's glare and heat, the pergola that lets in enough sunlight to dapple the paving with sunshine and shadow, or comprises in a way—

"A living lace of blue and green

And boughs that let the gold between" will generally prove by far the more desirable, both as a garden decoration and as a garden utility. A mere tracery of vines, in fact, will often prove especially effective, from the decorative viewpoint, where the columns are of cement construction or classic design. At least, the architecture of the pergola should be by no means entirely concealed from view.

Climbing roses quite naturally are to be thought of first for the pergola's draping. Consisting of so many different varieties, they comprise a covering that, by using the necessary species, may be made to decorate some part of the pergola with either red, pink, yellow or white blossoms throughout the most of the summer. They, by careful



A pergola comprising a piazza to the house

pruning, also may be kept from becoming too heavy, and at nearly all times appear graceful, as well as particularly suited to the purpose in many other ways. Wistaria constitutes another especially satisfactory drapery for the pergola, and the same is also true of the Madeira or mignonette vine, clematis, and a number of other vining plants. If a dense and rapid-maturing screen of vines is desired, the kudzu or Dutchman's pipe may be planted—perhaps to serve temporarily while climbing roses, wistaria or other slow-growing vines are

getting started—for either of these vines will usually cover a pergola in one season.

Properly designed architecturally and suitably decorated with vines, the pergola is, indeed, a most charming and practical addition to almost any garden. Constituting either a corridor of greenery and perfuming blossoms or a restful open-air retreat, it is also bound to wield a most powerful influence for bringing us out into health-giving outdoors for every moment leisure permits, and making those moments genuinely enjoyable.



More ornamental than useful

Builders Should Protect Themselves with Compensation Insurance

Workmen's compensation insurance not only protects the workman but protects the employer as well. Builders in the various states may judge of the temper of the courts by past experiences of others, and notably by the attitude of the Industrial Commission of New York State.

"Employers who come under the Workmen's Compensation Law are warned to carry compensation insurance to cover their employes. The failure to do so," said Bernard L. Shientag, chief counsel to the State Industrial Commission, "is a misdemeanor punishable by a fine up to \$1,000, by imprisonment up to one year, or by both such fine and imprisonment." The Industrial Commission, through its counsel, will proceed vigorously against any employer who continues to disregard this important law.

"A large number of awards to injured workmen and to widows and orphans cannot be collected," said Mr. Shientag, "because employers have neglected to carry compensation insurance, and in many cases are financially unable themselves to make payment. These widows and orphans are condemned to a life of want and compelled to seek the aid of charity because employers have violated this law."

"It is not only a great injustice and social wrong, but it arouses a spirit of resentment and discontent in the hearts of these unfortunate victims of industrial accidents, who cannot understand why the humane Workmen's Compensation Law, which they counted on for protection, has completely failed them."

Any employer who is in doubt as to his duties under the Workmen's Compensation Law should apply promptly to the Industrial Commission, at its office, 124 East Twenty-Eighth Street, New York City. "If an employer continues to violate this law, he may expect very little consideration from the commission and from the courts," said Mr. Shientag. In the last year the Court of Special Sessions imposed fines ranging from \$50 to \$250 on 122 employers failing to carry compensation insurance, and one uninsured employer in whose plant a workman was seriously injured was sent to jail for 30 days.

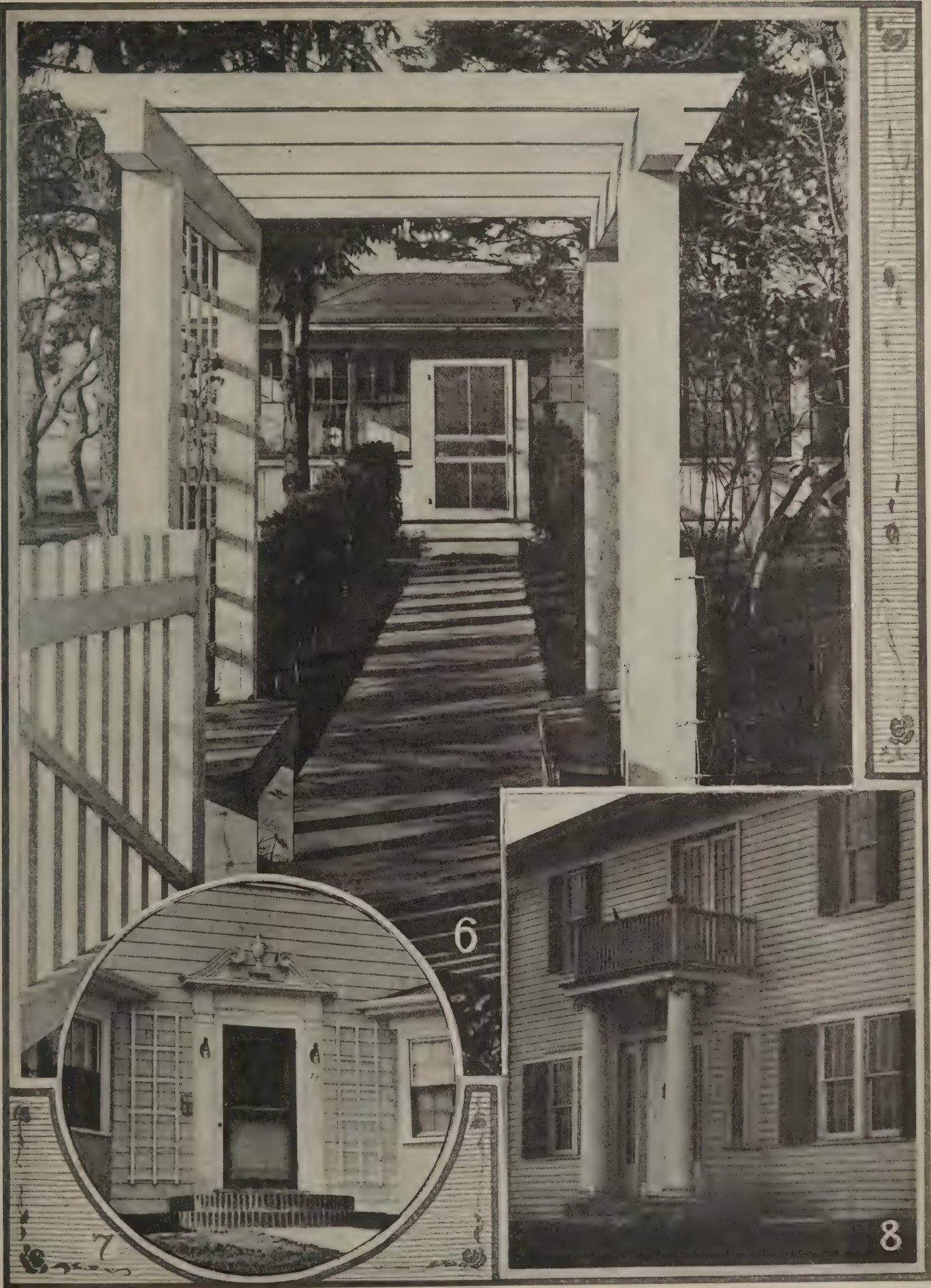
Cement for Joining Metals and Wood

Melt rosin and stir in calcined plaster until reduced to a paste, to which add boiled oil in sufficient quantity to bring to the consistency of honey; apply warm. Or, melt rosin 180 parts and stir in burnt umber 30, calcined plaster 15, and boiled oil 8 parts.

ENTRANCES



Fig. 1—A "secession art" type at Oak Park, Ill. Fig. 2—A Colonial type, with fanlight above. Figs. 3 and 5—Two entrances designed by George H. Schwan, architect, for a housing development. Fig. 4—An old Colonial entrance in Boston. Fig. 6—An entrance to a farm near Racine, Wis. Fig. 7—A Colonial type entrance with a "broken pediment." Fig. 8—An entrance to one of the houses for the employees of the Goodyear Rubber Co.



Building Watertight Basements With Concrete--By J. E. Freeman

NO ONE would prefer to live in a house with a basement or cellar that was always damp or flooded with water during the rainy seasons, for the annoyance of such conditions as well as the danger to health is recognized. Nevertheless many houses have damp or leaky basements which, by a more careful study of the location and suitable precautions when the house was built, could have been made dry and watertight.

What causes a leaky basement? There are a number of conditions or combinations of conditions. The basement wall may be porous because of masonry of poor quality imperfectly laid or because of lean or poorly mixed concrete, thus permitting a general seepage of moisture into the cellar. There may be cracks in the wall or between wall and floor through unequal settlement due to insufficient foundation. There may be mortar joints poorly made or construction joints in the concrete where proper care was not taken to secure a good bond between successive layers of concrete. Ground water may rise above the cellar floor level and by upward pressure force its way through poorly made joints or may crack a floor that is too thin and weak to resist the pressure.

Lack of proper drainage or grading outside the basement may cause surface water to flow toward the building instead of away from it.

A leaky basement can be repaired in many cases as will be explained later but an ounce of prevention is worth a pound of cure and if the basement is constructed according to the following suggestions it should not be necessary to make repairs that may be bothersome and expensive.

Masonry walls are difficult to make watertight, particularly in locations where the soil is heavy and drainage is poor or the ground water level rises above the cellar floor level during wet weather. The chief reason for this is the numerous mortar joints. Concrete is monolithic or of one mass and therefore particularly adapted to basement construction under such conditions. Furthermore it is easily mixed and placed, adaptable to irregular excavations, possesses great strength and durability and may be readily reinforced where necessary.

In the construction of a basement the walls must have sufficient strength to support the load placed upon them and to resist the pressure of the earth outside. The base or footing should be of such width that the load is evenly distributed without exceeding the safe bearing power of the

soil at any point, thus preventing unequal settlement.

Information on this subject has been made available through text books, trade publications and magazine articles, so that further discussion of the matter is not necessary here.

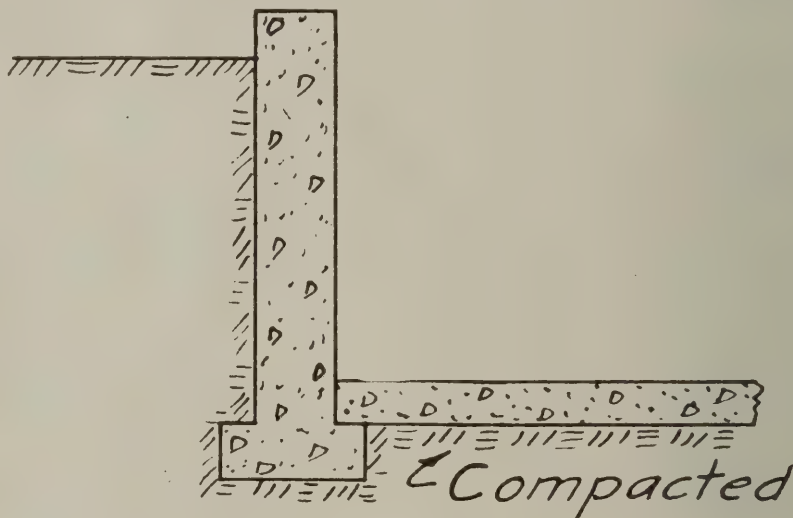
For locations where there is little rainfall, drainage is good and no ground water is encountered during wet weather, a 1:2½:5 concrete will be suitable in building the walls and floor, but if a large part of the wall is to be carried above the ground line a 1:2½:4 mixture is desir-

able because it affords a smoother surface and improves the appearance of the wall.

The joint between walls and floor can be made tight by mopping the surface of the wall with hot tar or asphaltum before laying the floor. Slabs should not be over 10 feet square and should be laid alternately, taking care to secure clean sharp edges and coating the edges of the hardened slabs with hot tar or pitch before laying the slabs between.

Proper protection of the concrete during early hardening is a very important feature. Fresh concrete must be kept moist from 7 to 10 days to gain best results, therefore it should be protected from sun and drying winds and wet down several times daily.

All down spouts from roof gutters should be connected to underground drains or else arranged so as to discharge water away from the basement wall. If down spouts are not used, a concrete gutter should be built against the basement wall at ground level and sloped to a drain leading to a dry



ORDINARY CONSTRUCTION

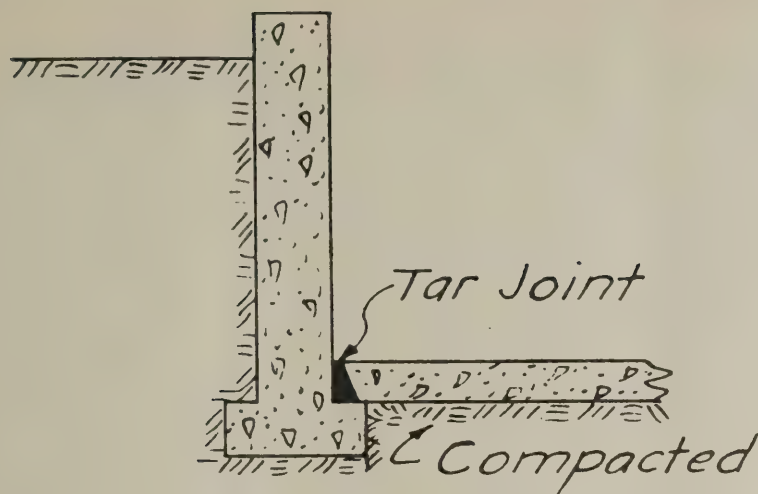
able because it affords a smoother surface and improves the appearance of the wall.

In mixing concrete for the walls, only sufficient water should be used to produce a plastic or quaky mixture; a drier concrete is apt to be porous in spots and a sloppy mixture is certain to produce a weaker wall. The concrete should be placed in the forms in as continuous an operation as possible to reduce construction joints and seams to a minimum and should be well spaded. Should it be necessary to stop work, however, the concrete should be left level and roughened on top. Vertical joints or inclined planes should be avoided. On resuming work clean the surface of all foreign material, drench it with water and immediately cover with a 1:2 mortar about one inch in thickness, following this at once with the next layer of concrete. If desired a bevelled 2 by 4 timber, narrow side down, pressed into the fresh concrete above the center line of the wall will form a

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CONSTRUCTION AGAINST SEEPAGE

well or connecting with the sewer outlet some distance from the house.

In regions of considerable rainfall or where the soil is heavy and natural drainage is poor, a richer mixture of concrete (1:2½:4) should be used for the walls and the base of the floor, in order to provide a denser concrete and prevent seepage. As an added precaution the outside surface of the wall may be plastered with a ¾ inch coat of 1:1½ mortar applied as soon as possible after the forms are removed. In some sections it is common practice to paint the surface of the wall with a mop coat of hot tar or asphaltum, but the main reliance should be placed upon the uniform density of the concrete wall secured through careful construction.

The joint between walls and floor should be a wedge-shaped groove with bottom wider than the top which is filled with tar or pitch. Strips of wood, inserted when the floor is laid and removed after the concrete has hardened, can be used to form the groove desired. If concrete walls and floor are carefully built there is little danger of water seeping through them.

Where drainage of surface water or runoff from the roof to a suitable outlet is possible, it is desirable to place a line of drain tile around the outside of the basement level with the footing. Down spouts from the roof can be connected with this line. The trench excavated for laying the tile should be backfilled with cinders or gravel to within a foot or so of the surface, finished with material taken from the trench and sodded over. Joints between tile should be wrapped with pieces of burlap or sacking to prevent any dirt or sediment filling them up and it would be best to cover the line with a layer of larger stones to a depth of about one foot before filling the trench with cinders or gravel.

Where the situation of the basement is such that the ground water level is close to the floor level and during rainy seasons

is likely to rise above it, further precautions should be taken to prevent leakage since the construction becomes similar to the building of a tank, excepting that external and not internal pressure must be overcome. Cellar floor drains should be provided with backwater traps to prevent flooding the basement. In general the thickness of wall ordinarily used will be found sufficient for the water pressure likely to be encountered, but when there is a head of water of 4 feet or more above floor level, thicker walls or reinforcement may be necessary. Such cases require special design for walls and floor and this should be made by a competent engineer who can select the proper type of floor for the particular conditions and determine the required thickness for floor and walls and the amount of reinforcement needed to resist the water pressure.

Basements of houses on low ground built close to streams or lakes are particularly exposed to changes in ground

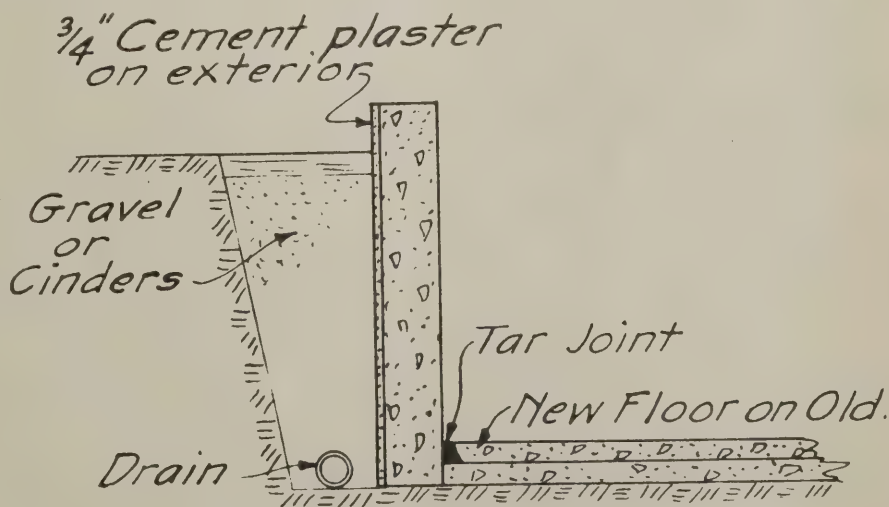
water level, producing at certain seasons a considerable water pressure. Such conditions can be met most satisfactorily by the use of concrete basement construction because of the monolithic character of the work and the consequent elimination of mortar joints that are possible sources of leakage.

For every foot that ground water rises above floor level a water pressure of 62½ pounds per square foot is developed against the outside of the walls and a similar upward pressure against the under side of the floor. While the conditions of the ground may be such that the actual pressure upon the walls and floor is less than this amount, it is customary as a factor of safety to assume that the full head of water may be exerted and design accordingly.

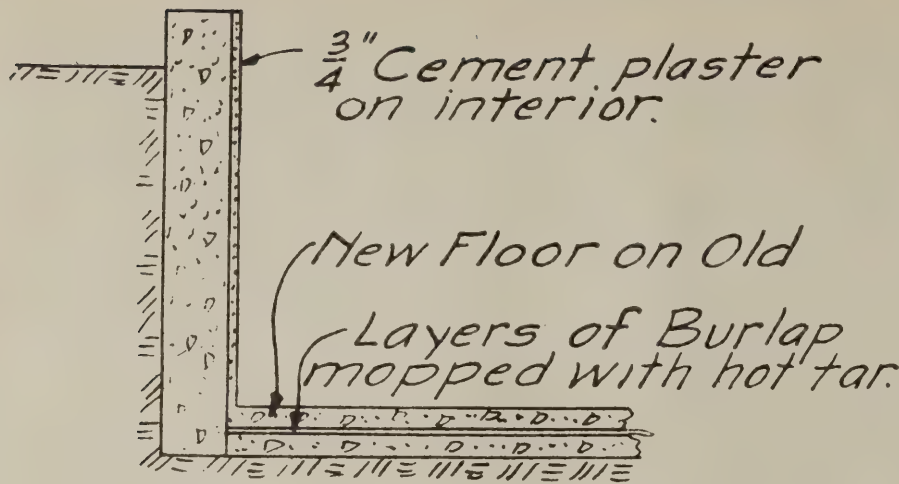
If an unreinforced floor is used it must resist by its own weight the water pressure from below. Considering that a concrete floor 12 inches thick weighs approximately 144 pounds for each square foot of surface area, the unit weight of floor becomes 12 pounds per square foot, for each inch of thickness. A five inch slab is therefore needed to resist the upward pressure of a one foot head of water. In cases where a plain slab would be excessively thick a reinforced slab anchored to the outside walls and to intermediate supports if present, would undoubtedly be more economical.

In the construction of the basement wall in such cases a 1:2½:4 concrete can be used excepting under extreme conditions of outside water pressure when a 1:2:3 mixture, commonly specified for water tank construction, should be used. The same is true for the basement floor.

In order to provide a further seal against entrance of ground water a membrane composed of several layers of burlap or tarred felt mopped with hot tar, pitch or asphaltum should be placed on the floor



REPAIRING OLD WALL AND FLOOR.



REPAIRING WALL AND FLOOR TO PREVENT ENTRANCE OF GROUND WATER.

across the footing and continued up the outside of the wall. Under such conditions the wall footing is constructed first of all, and either a line of brick embedded along the center line of the wall so as to form a ridge or break or a chamfered groove formed in the footing as a key. When the concrete has hardened a layer of burlap or prepared waterproofing felt is placed over the footing, the surface of the concrete having been mopped with hot tar or asphaltum, and if the groove is used the key should be completed by pressing down the fabric into the groove with brick well bedded in cement mortar. This strip of material should extend about three feet beyond the face of the wall on each side and should be turned up on the outside and lightly fastened to the inner face of the outside wall form.

Two inches of 1:2½:4 concrete should be laid over the entire floor area. When this has hardened sufficiently it should be mopped with tar, the inner sheet of burlap turned down on the floor and then covered temporarily in such manner that it will not be injured during the construction of the wall. The inner wall form may then be set up and the wall built to full height. After the forms are removed, clean the surface of the concrete floor, mop the floor well and cover it with several layers of burlap or tarred felt which will overlap the sheet extending out from the wall. The successive layers of burlap or felt should be placed so as to lap joints with the preceding layer. The balance of the floor should then be laid in alternate slabs, coating the joints with tar as previously mentioned.

The burlap on the outside of the wall should be mopped thoroughly with tar and the whole wall surface below ground line covered with a membrane similar to that used for the floor. In order to protect this membrane from damage the wall should

then be covered with one inch of 1:2 cement mortar applied in several coats.

If preferred, however, a wall of concrete three or four inches thick may be constructed on the outer edge of the footing first, the waterproofing membrane laid over the footing and extended up this wall and the main concrete wall then constructed, using this thinner wall as the outside form.

In all of this work it is understood that construction should be carried out when the excavation is dry. Otherwise a sump must be dug near the outside of the building from which ground water can be pumped so as to keep it away from the basement. If the concrete is deposited through water or there is seepage of water through the concrete at the time of construction the work will not be satisfactory.

Repairs to leaky basements depend upon the local conditions which make each case really a problem in itself and suggestions, therefore, on this subject are difficult to make. However, a few typical examples may serve to illustrate the general principles to be followed with modifications according to the requirements of the case. The leakage in the basement may come from any one or more of a number of sources as was pointed out at the beginning.

It is best to make repairs to a wall on the outside, that is, on the face opposed to the incoming water. When this is possible a trench wide enough to work in is dug to the bottom of the foundation and the wall surface thoroughly cleaned by brushing and washing to remove all dirt and loose material. If the construction is stone, brick or other masonry, mortar joints should be raked out to a depth of ½ inch. If there are cracks in the wall through which seepage has appeared these should be cut back to form a V-shaped groove and filled with a 1:1½ mortar

mixed to the consistency of moist earth. This should be well rammed into the crack with a calking tool or ball peen hammer.

A grout of neat cement and water mixed to the consistency of thick cream should then be applied to the surface and immediately followed with a coat of 1:2 cement mortar ¾ of an inch thick. The grout should be mixed only in small quantities that can be used within 30 minutes after mixing, and plastering must follow before the grout has commenced to harden. The first coat should be well worked with a wood float and, when hardened sufficiently so that it may be roughened without injury to the surface, it should be scratched with a saw-tooth paddle or piece of metal lath so as to provide a good key for the final coat of mortar which is also ¾ of an inch thick. The mortar should be mixed with just enough water to make a stiff plaster.

If it is possible to secure drainage to some suitable outlet a line of drain tile should be laid in the bottom of the trench and backfilling made as described in preceding paragraphs.

Should an examination of the basement in the beginning show that seepage occurs through a crack where the wall joins the floor the crack should be cut out to a depth of 1½ to 2 inches, forming a narrow groove, and the space filled with hot tar or a mixture of tar and sand. If there is seepage through cracks in the floor or through porous spots due to improper mixing or placing of the concrete, however, a new floor should be laid over the old one with a tarred joint at the walls. In severe cases it may be necessary to place over the old floor surface a layer of burlap or felt mopped with hot tar or pitch before laying the new floor. The thickness of floor should not be less than that recommended in the previous paragraphs. The slab should ordinarily have an area not greater than 100 square feet or 10 feet square and it is best to lay alternate slabs first, giving the edges of the hardened slabs a thick coat of hot tar or asphaltum before concrete for the intervening slabs is placed so that the joint is made more watertight.

If it is not possible to get at the outside of the old wall then the plaster coat must be applied on the inside following the same methods of cleaning and roughening of surface and applying the plaster. If it is impossible to carry out this work during dry weather, seepage through cracks has sometimes been relieved by inserting pipes to serve as weep holes in the wall which are plugged after the rest of the work has been completed. The plastering on the inside surfaces must be given a chance to harden properly before subjecting it to the seepage of water, otherwise the seepage would be likely to interfere seriously with the bond on the old wall surface.

Where pressure of ground water during wet weather has cracked the floor causing the basement to be flooded periodically the

floor surface must be covered with two or three layers of burlap mopped with hot tar or pitch such as were suggested for new basement construction under similar conditions and this waterproofing membrane should extend a foot or so up the inside of the basement wall. The new floor constructed on this foundation should have a thickness depending upon the amount of upward pressure which must be overcome. The plastering on the wall should be car-

ried down over membrane near the floor.

Relocation of down spouts or construction of gutters to take the run-off from the eaves will also assist in carrying the surface water away from the basement wall and if the ground outside of the basement slopes toward the wall the soil around the basement should be banked up higher. As stated in an earlier paragraph, however, an ounce of prevention is worth a pound of cure and if the basement is built in the

beginning according to the suggestions outlined, subsequent repairs that are bothersome and expensive will not be necessary.

Condensation of moisture on basement walls should not be mistaken for seepage. Proper ventilation of basements is necessary to prevent condensation of warm, moist air on the colder wall surfaces. Thus cellar windows should be kept open on cool, dry days, but closed when the air outside is sultry and the humidity is high.

A Community Garage

Structure that will Fill a Need in Many Communities and is Promotable by Local Contractors

THE automobile, although still viewed primarily as a luxury, has nevertheless assumed a permanent place in the category of economic necessities. Motor vehicles have come to stay a long time and communities will continue to require extensive permanent garage facilities of many sizes and types. Cars have advanced in price and the greater investment naturally

each car occupies a separate compartment with its own pair of doors, and is separated from adjoining compartments by walls of concrete block for a height of three feet, above which the partitions are of galvanized wire, extending to the ceiling.

The compartments average about 11 feet in width, in the clear, and about 19 feet in length, sufficiently large to accommodate

All exterior and bearing walls of these garages are of smooth face hollow concrete block, reinforced concrete pilasters being formed where required, by means of concrete and reinforcement placed in the block openings, with the block serving as forms. All of the floors are of concrete, pitched toward the doors. The floors are made 4 inches higher at the doors than the

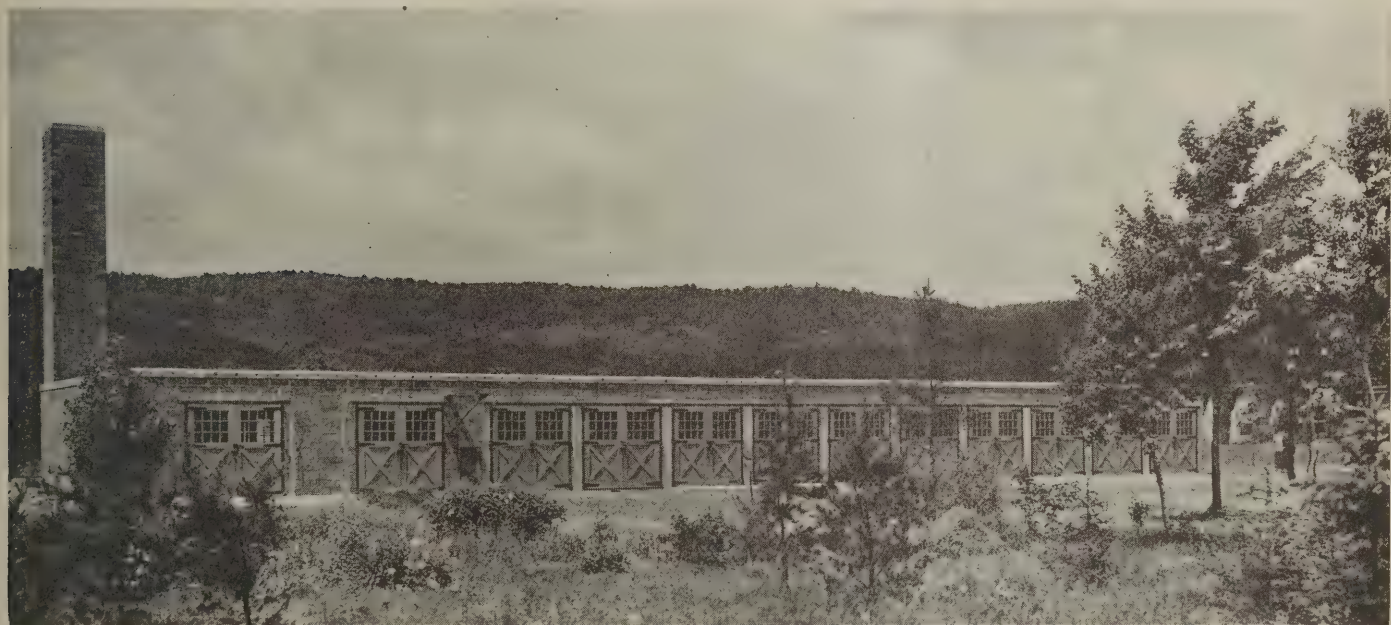


Figure 1. General view of a rectangular type community garage at Duluth, Minn. The heating plant is at the left. The opposite side of the structure contains a corresponding row of compartments

prompts owners to take better care of their cars.

A brand new wrinkle in buildings for the housing of automobiles and trucks, and one which is probably destined to become quite popular, is the community garage. The first three structures of the exact type to be described were built in one of the suburban districts of Duluth, Minnesota, from designs by John M. Davidson, general manager of the Morgan Park Company. In principle, these structures resemble multiple single car garages placed side by side, with a common heating plant;

any passenger automobile. One larger compartment is provided for dead storage and several smaller compartments for motorcycles. Space is provided in all compartments for work bench and storage of necessary supplies of lubricating oil, grease, etc. The compartments are built in groups of four, separate fire walls enclosing each group. The fire walls serve the double purpose of protection against fire and the conservation of heat, it being found that a heated garage in a very short time is completely cooled, even if only one door is left open.

outside pavement, in order to prevent snow and ice from interfering with opening and closing of the doors. To afford easy access to large vehicles, such as ambulances, the doors were made extra large, with 8x9-foot clear opening.

One of the most novel features of these buildings is the design of the roofs, sloped away from the doors and toward the center of the structure, with the drains carried down inside of the building. This construction was adopted to prevent water and melting snow from running down in front of the doors and freezing them shut,



Figure 2. Rectangular type community garage with stalls turned in, rather than out, as in the case of the garage shown in Figure 1. All of the doors of the garage open on a central court. The larger portion of the building, in the foreground, is occupied principally with heating plant and dead storage. The structure will soon be effectively concealed by attractive landscaping.

a frequent and troublesome source of difficulty in severe climates. The roof is of wood frame construction covered with metal lath and cement plaster ceiling, making reasonably good fireproofing and insulation against the dissipation of heat. The roof over the heating plant is of reinforced concrete.

Each of the three community garages

built by Mr. Davidson is equipped with a central steam heating plant of sufficient capacity to heat the stalls to a temperature of about 40 degrees above zero when the thermometer outside is 30 to 40 degrees below. The steam pipes are carried in a shallow trough passing through the inner end of the stalls and, therefore, out of the way.

As shown by the accompanying illustrations, the three community garages described above, although differing in shape, have the same general characteristics. These garages have been found highly satisfactory and an additional structure along almost identical lines is now under construction. The community type garage is well adapted to car storage use.



Figure 3. Circular community garage of concrete block, built like a round house. It occupies a small almost circular plat of ground, surrounded by a high class residence district. The structure will be entirely concealed by landscaping, making the whole space occupied by the garage appear from the residences like a beautifully wooded knoll

Private Garages

AS a part of the average household establishment, the garage has become almost as important as the kitchen. The absence of a garage on a residential

property is unusual rather than a rule. In fact, the garage is sometimes built before the house is even started. The accompanying illustrations show eight private garages, some of which it is hoped will prove suggestive for work of a similar character.

extra dollars by pointing out this fact to the owner.

Fig. 3 is a concrete garage built into a bank. The roof is of reinforced concrete



Fig. 1—Garage at Madison, Wis. John R. Law, architect

property is unusual rather than a rule. In fact, the garage is sometimes built before the house is even started.

The accompanying illustrations show eight private garages, some of which it is hoped will prove suggestive for work of a similar character.

Fig. 1 shows a stucco garage with a roof of asphalt shingles. Ordinary prepared roofing was used over the eyebrow window, resulting in a rather crude and unpleasing appearance at this point. The woodwork is stained, and the trellises make a nice effect against the white stucco walls. The stucco panel in the end wall is also effective.

Fig. 2 shows a garage constructed with stucco on hollow tile. This example is strictly utilitarian, the only attempt at



Fig. 2—Garage at Kenosha, Wis.



Fig. 3—Garage at Madison, Wis.

and some builder might easily persuade the owner that a tea house or a play room for the children would make the roof useful as well as improve the appearance of

friends rather than enemies to each other.

Fig. 6 shows a remodeling job. A stucco overcoat applied to the walls of a small barn has transformed it into a modern

detached from the house. Many people, however, object to them and as yet the attached type has not become highly popular.

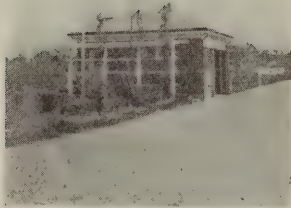


Fig. 4—Garage at St. Louis, Mo.

the building. A few vines trained on the bare walls would also contribute much to the appearance.

Fig. 4 shows a double garage of brick, with wooden trimmings painted white. The grouping of the garage with a pergola and



Fig. 5—Garage at Battle Creek, Mich.

a flag-staff forms an interesting composition. Grouping such as this offer unlimited possibilities for introducing pleasing effects into a design.

Fig. 5 shows another double garage of brickwork, but with stucco and half-timber gables to make it conform to the house to



Fig. 6—Garage at Jackson, Mich.

which it belongs. A house of one type with a garage of another gives a detached effect that is usually unpleasing. Similar materials used in both house and garage, go far toward making them appear as



Fig. 7—Garage and house at Hartford, Conn.

garage. The roof lines give it a rather quaint appearance that offer interesting possibilities for adaption. There is a lot of simple remodeling work of this character that is waiting for someone to suggest its possibilities to the owners.

Fig. 7 shows a garage attached to the house. This type unquestionably offers superior opportunities for an attractive design and its cost is less than for a garage



Fig. 8—Garage at New Orleans, La.

Fig. 8 shows a wooden garage with a flat roof covered with felt and gravel. In this the cornice is replaced by projecting brackets which have sawed ends giving an appearance similar to that of a pergola. The windows are unusual in that they are pivoted at the sides, transom style. There is a long flower box under the windows and this together with the lattice screen or fence, adds to the appearance.

The Properly Hung Door

The efficiency of an extra butt is no longer a much-mooted question. Throughout the country there is a general trend on the part of architects and builders to hang a door on three butts. In fact, to serve this growing demand manufacturers are now packing butts three to a box, constituting a set.

To say that doors are one of the hardest working parts of any building, especially public buildings, such as schools, hospitals, theaters, railroad stations, is to repeat a fact everyone knows. And, after all, it is the butts that make or mar the door. On them the stress and strain, the wear and tear, is bound to center.

Even the best butts are tested beyond capacity at times. The weight or load of the door is excessive. Green lumber, which often has to be used on the door, results in warping.

Careful analysis of the subject shows that there are many logical and practical reasons why the use of three butts to a door is true economy in the long run.

It has been demonstrated that the third or extra butt will hold the butt edge of the door in alignment and, to a great extent, will prevent the door from warping. Also, it prevents the door from striking or interfering with the door stop, if used (or the edge of the rabbet, if the door jamb is rabbeted) when the door has a tendency to bow or warp toward the door stop or the center of the door jamb.

While it may take more time to put on the extra butt and while the cost is slightly increased, the saving of the carpenter's time and expense later on to correct door

faults offsets the initial investment.

If a door is hung on two butts only, each butt carries one-half of the load or weight of the door. When a door is hung on three butts, each butt carries only about one-third of the weight, thereby decreasing the strain and wear. More screws are driven into the door jamb and the door, thus relieving the strain on screws, the wood in the door jamb and in the door, which is an important factor.

When three butts are used the top butt can be set nearer the top of the door, thereby lessening the leverage of the door pulling away from the jamb. The lower butt can be set lower, thereby preventing the door hugging the door jamb near the bottom of the door. The top edge of the door remains in line with the head jamb, and the bottom edge of the door is parallel with edges of threshold.

Getting Out Broken Posts

When a post decays it usually breaks off about the ground level. Before a new post can be set, the stump must be gotten out of the hole. If it is dug out it consumes considerable time and labor.

A quick and easy way to get out a broken post stump is to drive a hole with a pointed steel bar down alongside of it. The hole should go down a few inches beyond the end of the post. Attach a cap and a fuse to a half cartridge of any kind of dynamite and tamp the charge in the bottom of the bore hole. Shortly after the fuse is lighted, the stump hops out of the ground in a hurry.

Framing a Semi-Circular Roof

By John Y. Dunlop

A METHOD of framing a semi-circular roof such as is frequently encountered over the apex of church buildings is here described.

In the semi-circular part of the roof the nailers on to which the sheathing is fixed are set very much the same way as purlins only they are simply cut in between the rafters and nailed in place instead of being checked into the rafter.

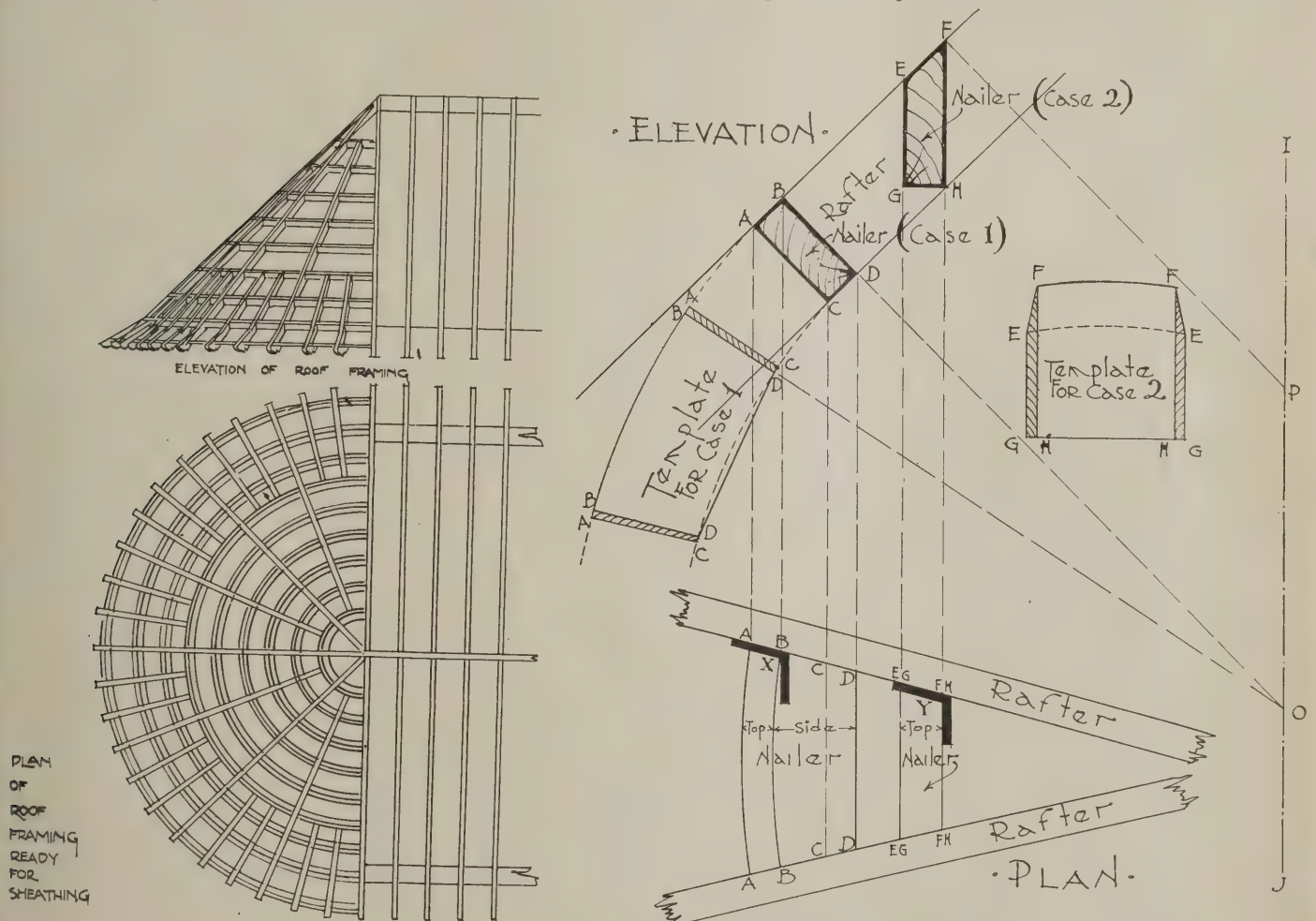
In the line of the ridge one of the ordinary rafters of the circular part forms the line of slope at the end. This rafter

number, are fitted onto the purlins and the wall plate.

In each of the spaces which have now been formed in the semi-circular roof, a number of purlins are set off to meet the requirements. Five purlins have been added to that part of the roof in this case, and the lowest purlin receives the three short rafters which form the eave projection similar to that of the main roof.

In working out a roof of this type the first thing is to lay out the roof to a convenient scale as shown in the plan. From

cone which is the true shape of the roof. To make a template for laying out the nailer, produce one side of A B C D to meet the line I J at O. With O as a center and a radius O B, describe an arc, and with O as a center and radius O D describe another arc. From any convenient point B on the upper arc, draw the line B O cutting the lower arc at D. Make the arc B B equal to B B as taken from the plan. Also make A A, C C, and D D similar in length to their corresponding lines in the plan. Draw the lines A C and B D which



together with the two rafters fitted between it and the last rafter of the main roof are the same length as the common rafters of the main roof, so that there are but three full length rafters in the semi-circular part of the roof.

The next part of the work is the laying out of the purlins or nailers which are shown curved in plan. These members are generally placed at the same centers as the rafters of the straight part of the roof. The top purlins are then set in position and on the intermediate rafters, which are four in

this decide on the number of nailers or purlins and the arrangement of the rafters. Then lay out at full size, a plan and elevation of one section of the framing which in this case is shown at the right of the drawing.

Now to decide on the position of the nailer in relation to the rafter. The nailers may be arranged at right angles to the pitch as in case 1, or they may be arranged in a vertical position as in case 2.

First, we will consider case 1. The vertical dotted line I J is the axis of the semi-

give the end down-cuts on the template. The check or bevel cuts can be taken directly from the plan as at X. In practice, the under edges of the nailers are made straight unless the inside roof surface is to form an architectural feature in the interior of the building.

This method of setting out is followed with each line of nailers from the apex to the eaves, so that each template is drawn to a different radius and therefore has a different length.

When the nailers are vertical as in case 2,

the top edge is beveled to correspond to the slope of the roof. These nailers, as well as those just described, are put in with straight sides which makes it necessary that, over and above being beveled, their top edges should also be curved, so that all points of the upper edge of the nailer will coincide with the curve of the roof. The amount of this curvature is determined by producing the line FP at right angles to the slope of the rafter, and then proceeding exactly as was described for case 1.

In case 2 the down-cuts on the sides of the nailers are always vertical and the end bevels are obtained in the same way as for case 1.

The sheathing for the roof is cut tapered.

With tongued and grooved sheathing six inches wide, the boards may be ripped diagonally from corner to corner and the sheathing laid with tongued and grooved joints alternating with plain ones.

Getting the Saws Sharp

When a saw is to be filed it should be placed in a vise or saw-clamp. When a vise is used, it is well to place a thin board on each side of the saw to keep the vise from damaging the saw.

In filing, hold the file as nearly horizontal as possible. If it is held horizontally and at right angles to the blade of the tooth which is being filed, and the tooth is filed straight across, a perfect chisel edge suitable for the rip saw will be produced. In filing teeth to a chisel edge, if the teeth are all filed from one side, a wire edge will be produced on the opposite side, which will make the saw run crooked. Hence it is best to file the teeth from alternate sides, filing half from one side first.

It is also necessary to joint a saw before setting or filing it. This is done by putting a flat file in a clamp so that it will be held perfectly level, and running this over the points of the saw-teeth. Continue this jointing until all the saw-teeth are dressed down to the same length. Circular saws are jointed by holding a file stationary and turning the saw with its mandrel. A clamp for holding files, or a "jointer" as it is called, may be purchased.

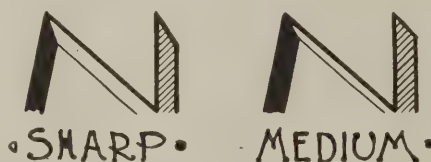
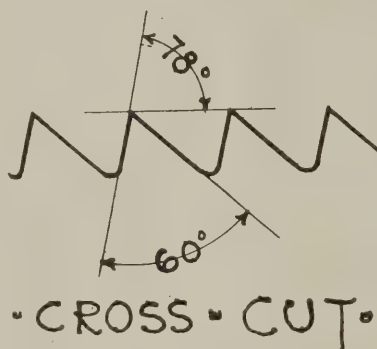
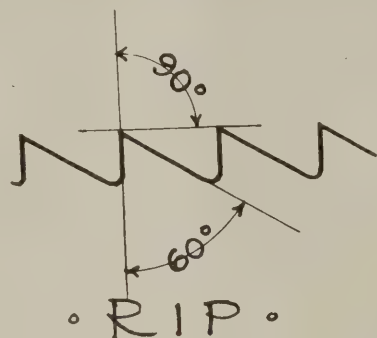
Rip-saw teeth are chisel shaped, as these teeth cut a log or board lengthwise with the fiber. They should be filed across the saw at an angle of 90° with the edge. The front of a rip-saw tooth is perpendicular and the back is inclined at an angle of 60° from the perpendicular front of the tooth. Rip-saw teeth should be set slightly to insure easy and smooth work. Soft wood requires larger teeth and more set to prevent binding.

A cross-cut saw that is to cut soft wood, such as basswood, redwood, butternut or pine, should be very sharp—similar to the tooth marked "sharp" in the diagram. The bevel or fleam on both the front and back of this tooth is very wide and therefore gives a sharp, weak tooth. This will insure fast

cutting in soft wood, but in hard wood will cause the saw to buck or bang up. A tooth filed similar to the one marked "medium" is suitable for moderately hard wood. It has a moderate bevel at front and back.

A tooth similar to the one marked "blunt" is suitable for very hard woods. It has a narrow bevel in front and none at the back. A saw filed in this way will stay sharp even when used in very hard woods.

To set a saw, the teeth are turned alternately to the right and left. This causes the saw to cut a slot wider than the blade of the saw, and thus prevents



the wood from binding. A considerably greater set is required for saws to be used in soft, green wood than for those to be used in dry, hard wood. Do not try to set the entire tooth but only the point, as indicated by the two drawings. This setting should be done with one of the many tools made for this purpose, and every tooth should be set at the same angle. Irregularity of set is bad.

When a saw has been filed, it should be side dressed by laying it flat upon a bench and rubbing once or twice over the teeth

with an oil stone. If you are to saw soft or green wood, side dressing is unnecessary; but if you are to saw hard wood considerable side dressing will be of advantage, as it will insure a very smooth cut; in fact, smoother than one can plane the end grain with a block-plane.—F. H. Sweet.

Correct Use of Metal Lath

Some of the violations of good practice in the use of metal lath and its related materials are so flagrant that they require special comment, says *Metal Lath News*.

1. Lath must be so applied that the strands dip down and away from the workman putting on the first coat.

2. When the studding is on 16-inch centers, the lath is seldom fastened by tie wires between supports.

3. Then, again, because of failure of the workman to start nailing or stapling at the center and working out to the four edges of the sheet, a chance buckling of the lath gives trouble and causes waste of plaster which could easily have been avoided.

4. Exterior plasters containing high percentages of lime are often used. When rained upon, the stucco weakens, and gives poor results. While lime plaster gives good service on interior work, it should never be used where likely to be exposed to weather. Ten per cent lime in Portland cement is the correct proportion.

5. Not enough care is taken to protect stucco, otherwise properly placed, from the weather. Where down spouts are installed, the section of wall back of them should be thoroughly waterproofed with down spouts at least 2 in. from face of finish.

6. Eaves often do not project out far enough to shed water from the side walls.

7. Stucco should not be run to grade. Not only because of danger from frost, but also to avoid staining from dirt and moisture.

8. Special attention should be given to flashings and drips to prevent unsightly discoloration and possibly more serious defects.

9. Skimped coats of plaster, while cheaper originally, are expensive in the long run. Three-coat work should always be used with metal lath.

10. Metal lath after it is received on the job is often allowed to lie for months, fully exposed to the severest weather. While the protective coating provided is as good as scientific research can make it, metal lath cannot give best results if it is misused before being imbedded in plaster.

11. Proper furring for exterior metal lath is often omitted because of lack of knowledge concerning the part the furring plays. Pencil rods, crimped furring or self-furring lath are recommended because their use will eliminate the evil effect of swelling or warping of the lumber under stucco.

12. Sheathing should be eliminated and metal lath back-plastered.

The Community Sales Barn

By Ivan D. Wood

THE value of the community sales barn has been overlooked in many communities. Nearly every county in the corn belt states now has breeders of pure bred live stock. These breeders have

The sale ring should be at least 20-ft.-0-in.x20-ft.-0-in. The typical floor plan shows a convenient arrangement for getting stock to the ring and back to the stalls. The auctioneer's stand is at the end of the

that all seats must rise rapidly in a stair-step fashion as shown. Theatre seats can be installed as in a balcony provided that each tier rises from 12-in. to 14-in. above the one in front of it.

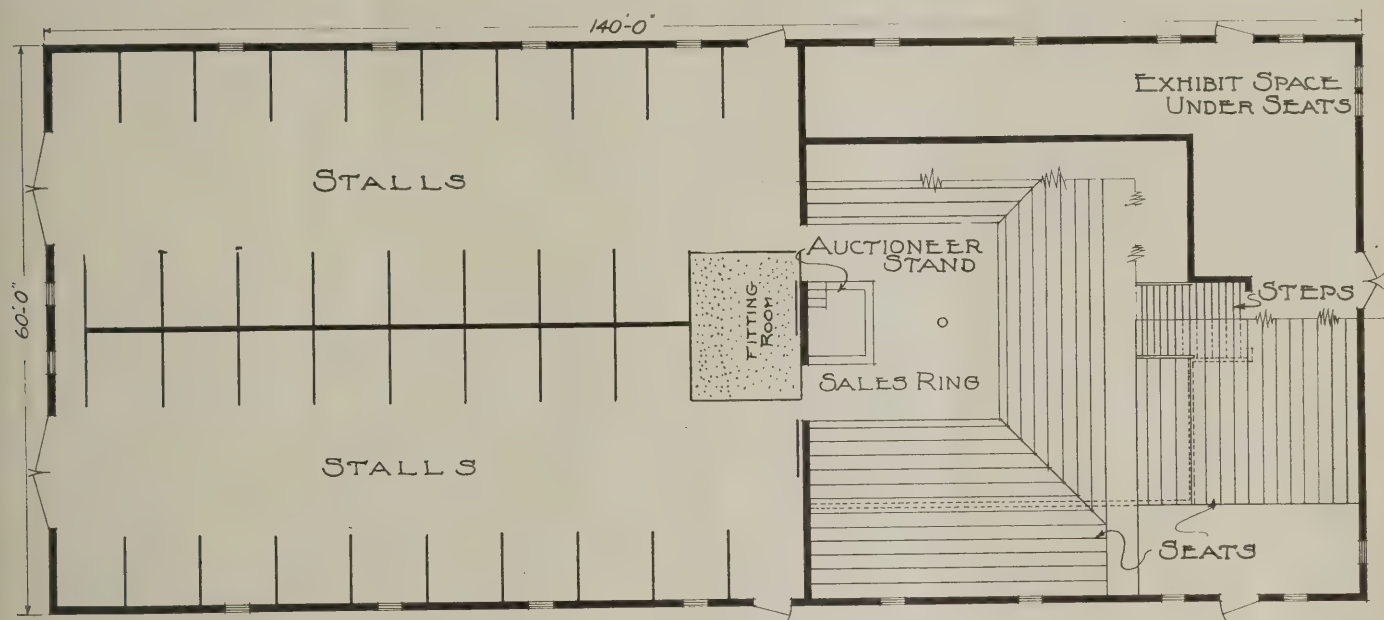


Fig. 1—First floor plan of a large sales pavilion

gone to considerable time and expense in building up a herd. When they hold the annual or semi-annual sale, it is sometimes necessary to ship the stock a hundred miles or more to a point where an adequate sales barn can be had. This means more expense and also means that some other community gets credit for the sale and some other town accommodates the buyers.

A good sales pavilion should contain stall room for about 100 head of cattle or horses. These stalls are often so constructed that by lowering a gate suspended on pulleys from above, each stall can be transformed into a pen for hogs. A space should be provided where animals can be fitted for the sale ring. This space or "fitting room" as it is called should be floored with concrete sloping to a drain. Water should be provided at a convenient place for hose connection for washing animals. The floor plan, Figure 1, shows a typical arrangement of the stall space and "fitting rooms." Stalls of an 8-ft.-0-in. width will be found convenient and managers may be provided as in an ordinary barn if desired. Storage room above the stall space is provided for baled hay and feed. Wide doors, 8-ft.-0-in. or more, are necessary to permit of driving to any part for cleaning out manure and hauling in bedding.

ring in plain view from all seats. Figure 3 shows a method of seat framing which is convenient and economical. During a sale it is necessary to have the buyers as close to the ring as possible. Seats have been arranged as in an ordinary theatre, but this arrangement never meets with success since buyer and auctioneer cannot see each other. Then the animal being sold must be in plain view of the buyers. This means

Some large and expensive pavilions have met with partial failure due to one apparent detail being over-looked. The entrance way to the seats is this detail. People should never be conducted to seats past the ring or through it. There are tense moments during a sale of blooded stock. Often the entry of several men from a point close to the ring has spoiled the sale of an animal. The attention of the buyer is de-



Fig. 2—One popular type of sales pavilion. Sales ring in center; stall space in the wings

tracted, the view of the ring shut off and the crowd is in a turmoil while the newcomers find seats. No architect would design a theatre and have the entrance to the seats lead from the orchestra pit or the

that anyone has to sell. Chickens, hogs, furniture, farm machinery and all sorts of miscellaneous articles go through the ring at the bi-weekly combination sale and from 2% to 5% is charged by the Association

stringer can be computed by computing the weight of the lumber plus the live load. It is safe to figure 18-inch seat room for each person and 150 pounds per person. The design of beams has been thoroly covered in this magazine and will not be discussed here.

Figure I shows the under side of the seats in a round sales pavilion. The stringers are 2 feet by 12 inches by 16 feet, spaced about at the back and 4 feet at the side of the sales ring. These stringers are bolted to the 4-inch by 6-inch supports with $\frac{5}{8}$ -inch by 8-inch bolts, as shown. It is always a mistake to put the upright supports into the ground as they soon rot off and are hard to replace. A good concrete pier should be constructed and the upright set upon it as shown in Figure 2. A $\frac{3}{4}$ -inch by 10-inch iron pin set in the green concrete serves to keep the strut centered. The size of the pier will vary with the load-bearing qualities of the ground and the load to be carried. For ordinary conditions a pier 6 inches by 6 inches at the top and 12 inches by 12 inches at the bottom, set 18 inches deep will more than carry the weight.

The dimensions of the seats are important. Where each seat must also serve as a foot rest for the fellow behind, a width of 18 inches is not too great, and a rise of 14 inches will be found about right for sales pavilions and bleachers. The material used should never be less than 2 inches thick. A 2-inch by 12-inch and a 2-inch by 6-inch will make up the 18-inch seat nicely. Figure II shows just how the framing is accomplished for a round pavilion. The seat material in this case must be joined at each stringer as each length makes up one segment of the circle. The short 2-inch by 6-inch uprights should be well toenailed to the 2-inch by 12-inch stronger.

In sales pavilion construction it is often desirable to board the seats up tight, since the space beneath is used for stall space and the noise of the stock disturbs the sale. Entrance to the seats in a sales pavilion

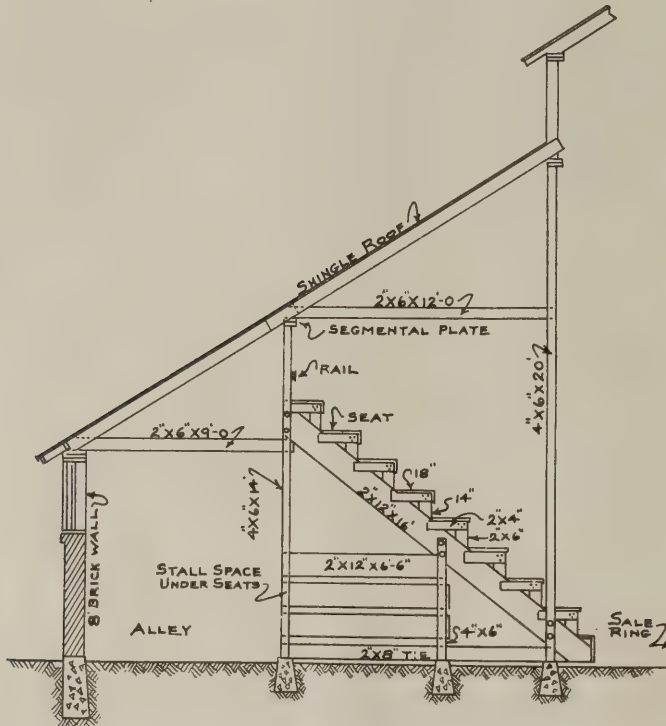


Fig. 3—Convenient and economical seat framing for a round sales pavilion

stage, and yet I have visited several pavilions where conditions equally bad existed. The entrance should be from the rear. A wide flight of steps should lead up from the doors to a point where the crowd fill the seats by walking forward and down toward the ring. In case of fire part of the occupants may discharge across the ring and out the wide doors to the stall space. Other emergency exits can be provided in the large building.

The County Fair is scarcely ever provided with adequate buildings. In many cases the community sales pavilion could be erected on the fair grounds and all of the space used for exhibit purposes. This has been done in Nebraska and other places with success. The stall space is utilized for a show barn, the area under the seats is all suitable for showing agricultural products. The seats can also be used for this purpose. The County Fair Board are always willing to assist in financing such an institution. There are various ways of financing this building venture. One very successful pavilion in Nebraska was financed by forming a Sales Pavilion Association. Stock was sold in \$50.00 and \$100.00 allotments to business men and farmers. A president, a secretary and board of directors were elected. A pavilion was erected and a fixed charge made for selling through the ring. Soon it was found that a combination sale held every two weeks was a profitable thing. The secretary lists and advertises everything

for selling the article. One Nebraska pavilion paid a dividend of 10% on all stock in 1918.

Framing Pavilion Seats

The framing of seats for sales pavilions and bleachers calls for rigid construction. Two years ago I witnessed the collapse of a poorly constructed grandstand and it seemed a miracle that many were not injured. This incident impressed upon me the fact that all such structures should be well constructed. The weight upon any



Fig. 1—Under seats in round sales pavilion

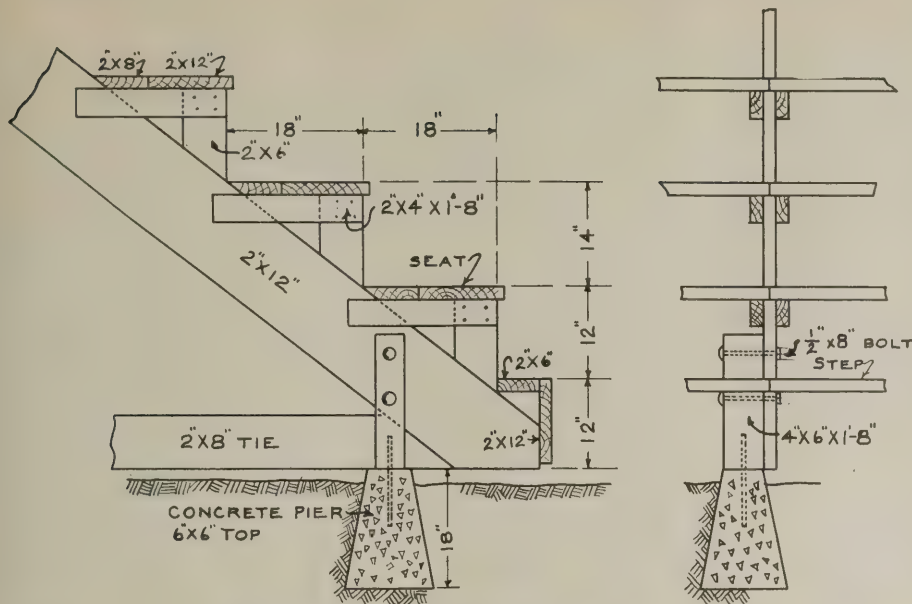
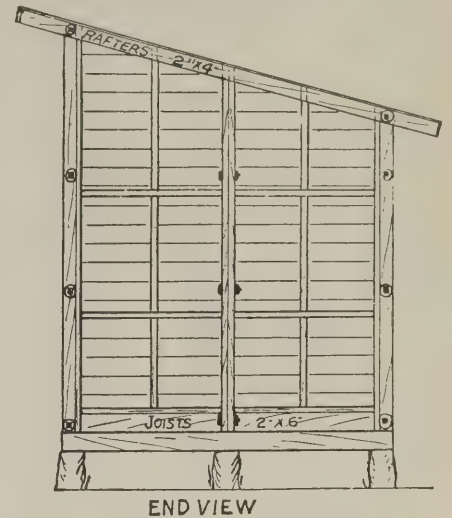


Fig. 2—Upright supports on concrete piers

Another use for a building of this kind will be found in communities where vegetables, fruit, and other perishable farm products are shipped during short seasons.



END VIEW



Fig. 3—Rear stairway to pavilion seats

should always be from the rear and never from the ring side. Figure III shows a stairway used in one pavilion for conduct-

ing people to seats from the rear where their entrance will not disturb the sale.—*Ivan D. Wood, Lincoln, Neb.*

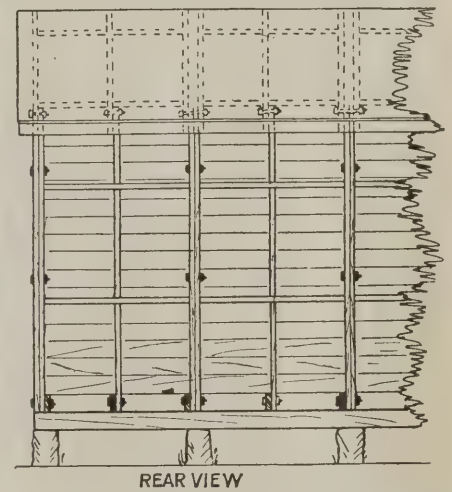
A Grain Bin of Short Lengths

This portable building was designed to supply the demand for grain storage room during harvest time, and to provide low cost buildings for storing grain on the farms until conditions make hauling possible.

The rear sections shown in the cut are four feet wide. Roof panels are of the same construction and the same width except the end panels. Square edge boards may be used there, if desirable, on account of price or availability. Frames are of 2x4 and the siding or lining may be 4, 6 or 8-inch tongued and grooved, or shiplap boards. Grooves or laps to be placed so that no water can enter. The front sections are also four feet wide. They are

not shown in the cut, but plans give full details, including the door sections, which allows for shoveling from the wagon to the top of the bin and into the wagon or sacker from the bottom of the bin.

Built in sections, this building can be erected rapidly by ordinary workmen, no skilled labor being necessary. A building of this kind may be used to great advantage during threshing time when teams and labor are scarce, to house the grain right in the field or where the thresher stands. The same building may be used for many other purposes when not in use as a grain storage building. Being portable it can be moved by sections from one place on a farm to another, according to the needs at the time.



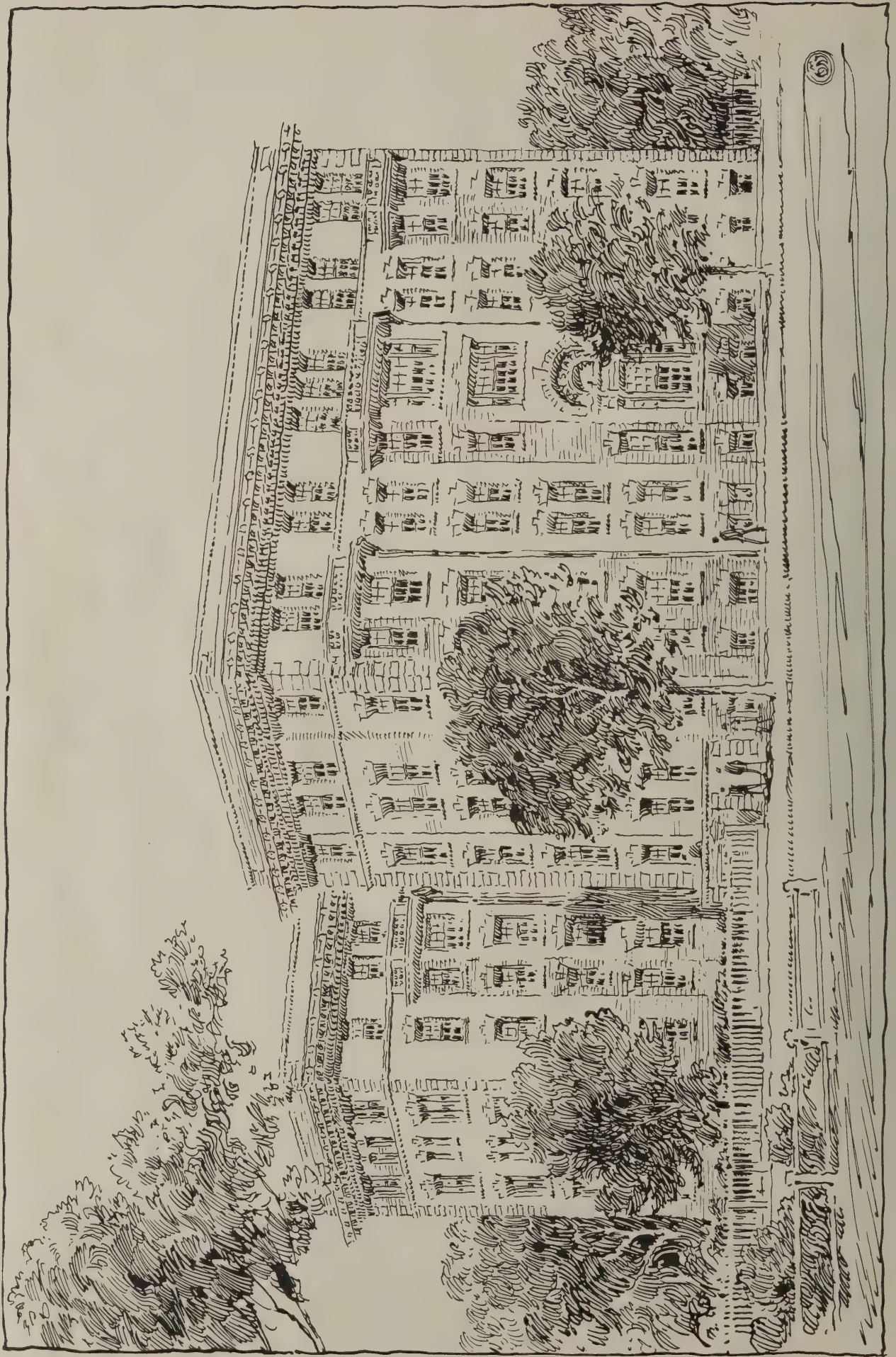
REAR VIEW

Packing sheds, sorting, grading and shipping sheds could be erected where and when needed without loss of time.

Blue prints and complete working plans for the above grain bin can be purchased from Southern Pine Association, New Orleans, for \$1.50.

The Percentage Basis of Contracting

M. W. Lorenz, of Portland, Oregon, addressing the Northwest Master Builders' Association in annual convention last February, said: "The very nature of the building business makes us dependent almost entirely on superior efficiency, being, as a rule, barred from profits that arise from skillful bargaining, price fluctuations, etc. This being true, the owner contemplating building is justified in adopting some method of reaping the result of the greatest efficiency. A contractor may be allowed to erect a building on the percentage basis, but not until he has proven his efficiency and established a reputation for honesty."



Bay State Apartments, Boston, Mass. Henry A. Mears, architect

The Bay State Apartments

THE Bay State apartments are located in Cambridge, Mass., within sight of Harvard Square and only a few minutes ride from the downtown section of Boston. The building is representative of high-class

apartment house design in the East, its architect, Mr. Henry A. Mears, having had wide experience in this class of work.

The building is of the steel skeleton type of construction with exterior walls of

rough textured red brickwork laid in Flemish bond and trimmed with terra cotta.

Particular attention was given to fire resisting features. The basement is equipped with an automatic sprinkler sys-



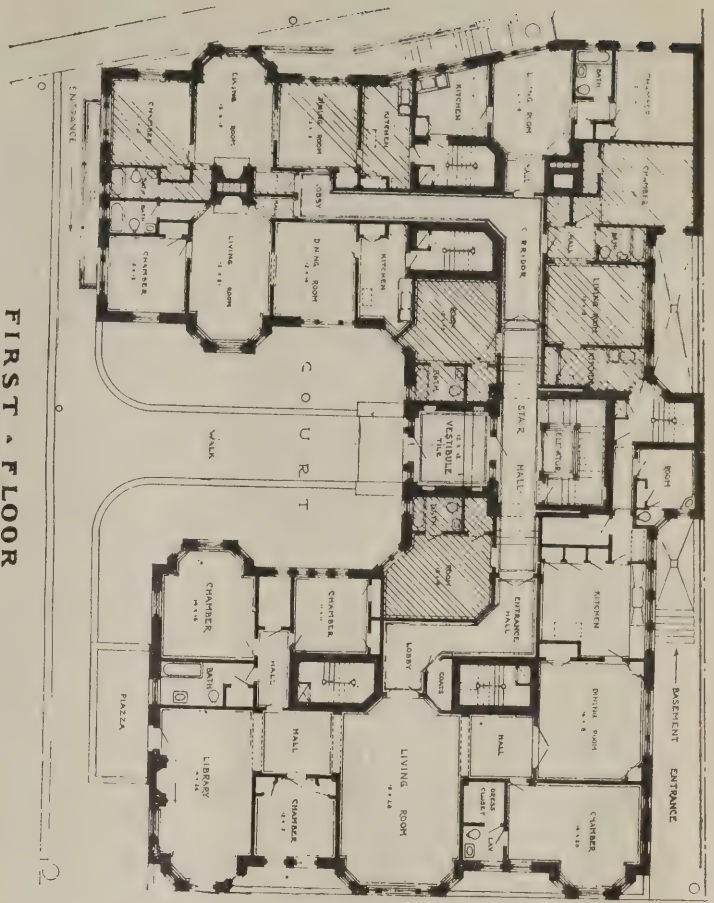
Fig. 2—The colored tile entrance adds distinction to this modern apartment building

tem and each section is separated from the others by fireproof walls. All stairs are enclosed by brick walls running from the basement to the roof. The ceilings over

the boiler and machinery rooms are of throughout the halls and two sidewalk reinforced concrete. All other ceilings hydrants are located at the sides of the throughout are of plaster on metal lath. A building. special pipe line gives fire protection There are forty suites in the building



Fig. 3—The entrance vestibule is clean and inviting



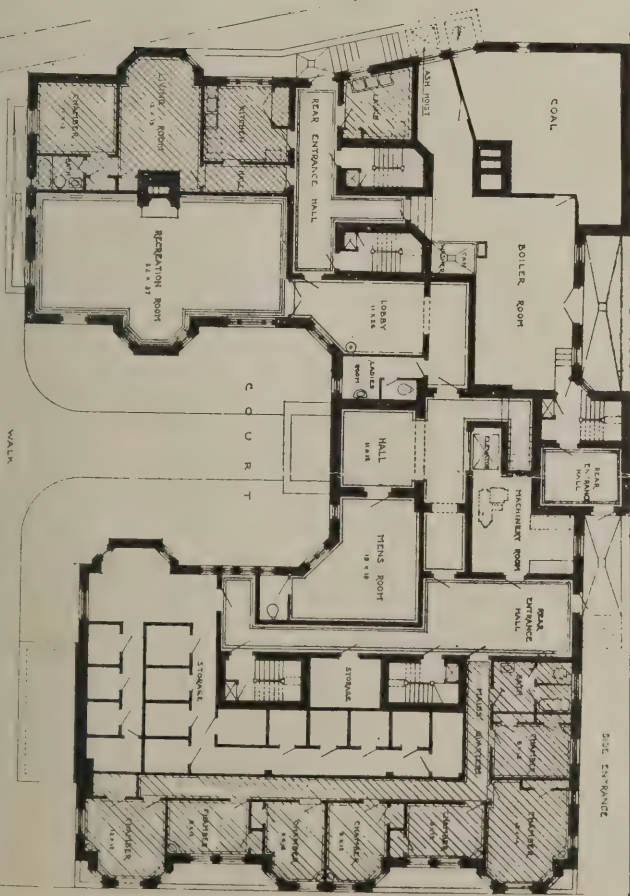
FIRST FLOOR



SECOND FLOOR



THIRD AND FOURTH FLOORS



BASEMENT

ranging from two to six rooms in size. All suites are exterior and have hardwood floors excepting the bath rooms which are tiled. The principal suites have one or more fireplaces, and all have hardware of brass, finished antique. Interior partition sash have leaded glass and all suites have awnings and copper screens. The kitchens contain built-in cabinets, refrigerators, porcelain sinks and tubs, and electric and gas fireless-cooker ranges. Each kitchen opens onto a rear stair case.

The use of ornamental tile is a pleasing feature of the design. The main entrance and the vestibule as well as the large window in the owner's suite are of this mate-

rial. The faience tile panels in the arches are especially attractive.

The owner's suite occupies the right hand side of the first floor. A feature of this suite is the large living room which extends through two stories.

The basement has been well utilized and is a good example of the completeness of the service offered by high-class apartment buildings. It contains a large recreation room, for dances, holiday parties and other gatherings. There is a ladies' rest room, a men's room and a large lobby. There is a janitor's suite of three rooms and a bath, and extra rooms for the families who keep maids. The basement also contains storage rooms for the use of tenants. The heating

and vacuum cleaning plants, ash hoist, and so forth, are located at the rear.

An automatic electric elevator connects the main halls of each floor, and the rear staircase shafts contain dumb-waiters of a size sufficient to carry a large trunk.

No general provisions for a laundry in the basement were made, as each kitchen contains a combination sink and laundry tub. Drying space is provided in the back yard and on the porch.

A photograph of the exterior is not which accompanies this article was redrawn by M. Weary from a reprint of one of the last works of the late D. A. Gregg, one of the foremost architectural renderers of America.

Concrete Brick

Concrete Brick is Now Manufactured and Used Successfully and is Another Indication of the Developments that Are Making New Processes for Building Materials Available

ATTEMPTS that have hitherto been made to make a satisfactory brick of concrete have not been successful for a number of reasons, among them being that most concrete brick is so smooth and non-absorbent that it will not lie up like clay brick.

construction contractor in Portland, Ore. Concrete brick has been successfully de-

veloped, however, by a former concrete gon, and buildings constructed from his product are shown in this article by the courtesy of the editor of *Rock Products*, the source from which these notes are taken.

Inventing a process for coloring concrete surfaces with mineral pigments, in which a mixture of neat cement and coloring ma-

terial is applied to the surface of the concrete in such a way that it becomes an integral part of the concrete and forms a practically waterproof surface, the manufacturer extended his investigations and experiments to the production of concrete brick.

His salesrooms in Portland, Ore., exhibit panels, fireplaces, and mantels with all the



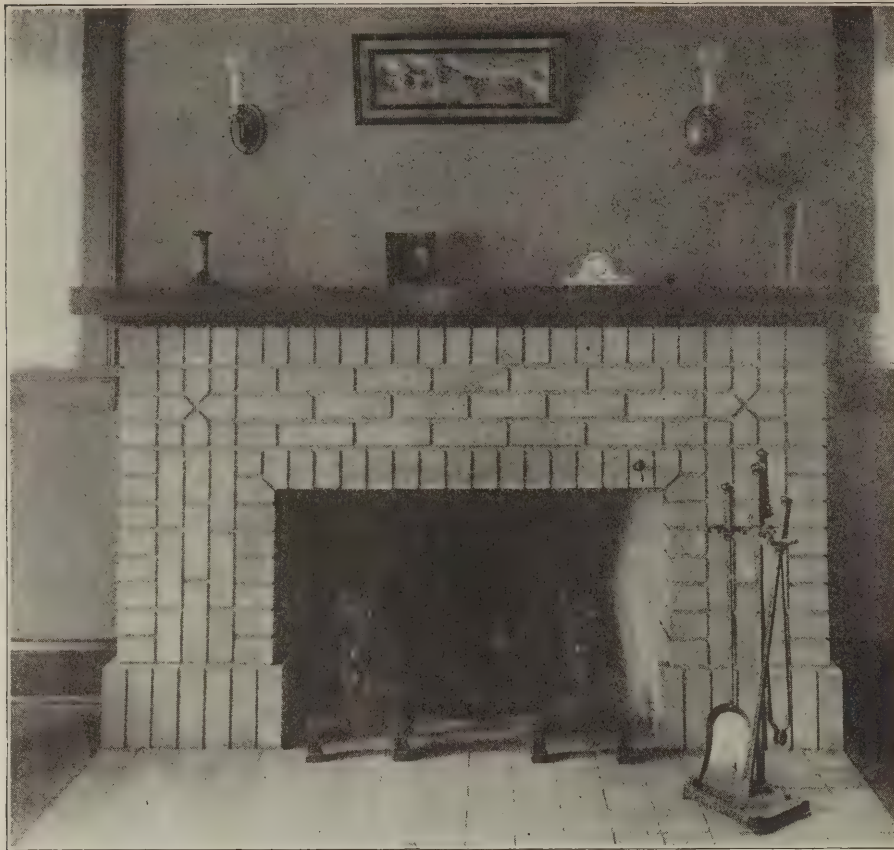
Apartment building at Portland, Ore., with ordinary cement face brick, buff colored



Residence at Portland, Ore., showing decorative effects with cement brick



Bungalow of tapestry cement brick, Portland, Ore.



Fireplace of tapestry cement brick

beauty of first-class tapestry clay-brick of various hues, tints and textures.

Concentrating on quality, appearance and artistic effects no attempt has been made to compare with clay brick on a basis of

cheapness, yet it is stated that not less than 85% of all the brick used in the city of Portland is cement brick made by this process.

An even greater variety of colors and

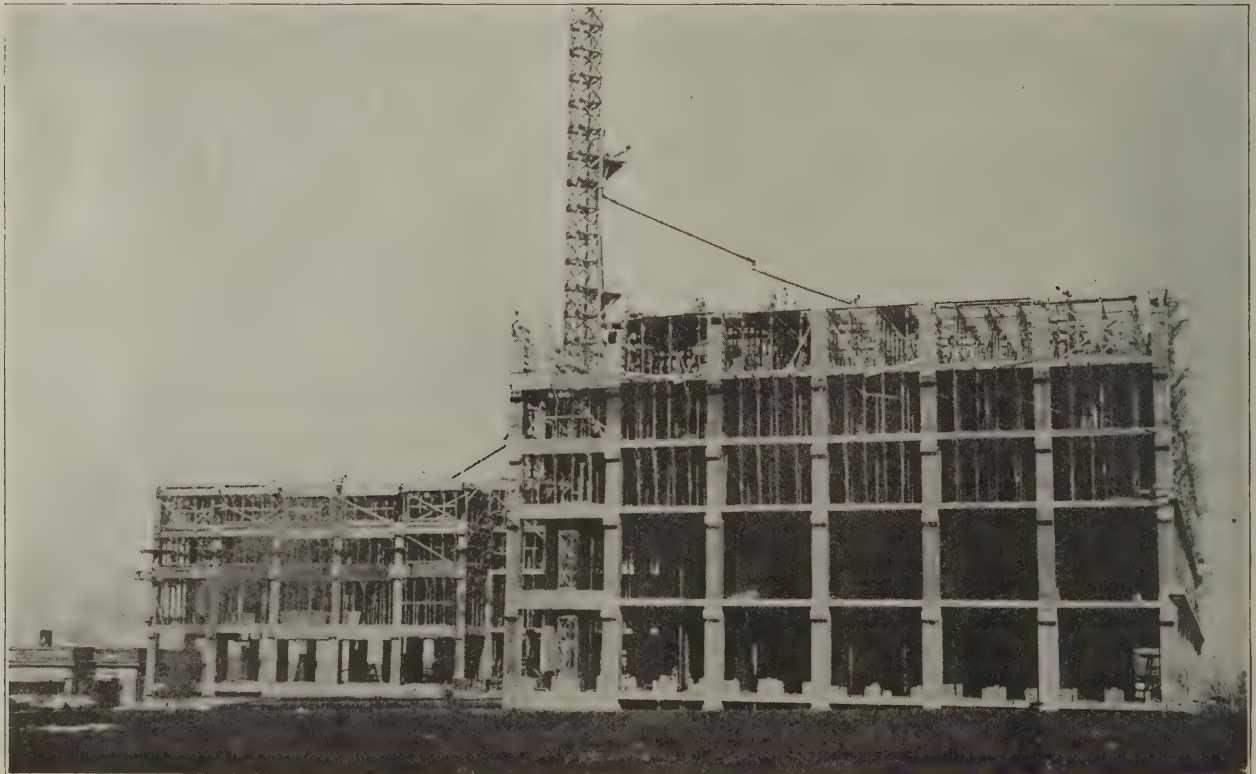
shades may be produced by the process than is possible with clay brick, and an absolute uniformity of shade or color is obtained. They are made by ordinary workmen in hand-operated tamping machines. The only power is a small motor to operate the concrete mixer and some elevators.

The difficulty experienced because of masons' objection to laying concrete brick on account of its slickness has been overcome by determining the amount of water used and the amount of tamping, so that the bricks now made have as good a surface for the mortar as any clay brick, and have a practically waterproof surface and will test as strong or stronger than the average clay brick.

With white cement and white sand a white-surfaced brick is made which competes with enameled clay brick, and a method has been devised to produce a cast surface as smooth as a polished surface.

An interesting side-light on labor conditions in Portland attaches to the construction of the new West Coast Warehouse of Montgomery Ward & Co., shown under construction in the illustrations to this article. An advance of wages was made by the union after the contract was let. Appreciating the fact of their inter-responsibility for contracts the union members voted to tax themselves for the increase until the contract was fulfilled.

The Northwest Master Builders Association has appointed a committee to draft bills to be presented to the various legislatures to establish a licensing system for building contractors.



New Portland, Ore., warehouse of Montgomery Ward Co., built of red-faced cement brick

How to Estimate by the Square

By I. P. Hicks

IT has long been the desire of carpenters and contractors to find some practical short way of estimating that would do away with the laborious job of making out bills of material in detail.

Along with the many articles we have submitted from time to time on estimating we will now show how to make combinations in a safe and practical way which can be used to save a large amount of the ordinary figuring. It is useless for us to make prices because of the constant changing of the prices of material and labor, for different localities and different materials. We have arranged the items so that carpenters and contractors can fill in the prices and make the combinations to suit the job which they have on hand. We are showing the method to follow, the prices are to be made to suit the material used and the price of labor. The combinations are to be made to fit the job. For example the outside walls of a house may have the outside walls sided, shingled or stuccoed. Each would have to be figured at a different rate per square; consequently the different items must be combined to fit the job. The same is true with the floors, some kinds of flooring may cost much more than others both in regards to material and labor. So in every case it is necessary to consider the kind of material and labor that goes into every part of the job. What will do for one job may not answer at all for another and it always will be necessary for the contractor to use discriminating judgment in making estimates no matter how it is done or by what system. A good record of estimates showing the actual cost of work from time to time soon gives the contractor a knowledge of costs which he can rely upon. Keep a record of your work, follow the system given, watch it closely and you will soon be able to establish a rate per square, per lineal foot and per piece that you can depend upon. By this system you can shorten the work of estimating to a large extent without the usual dangerous results from short cuts in estimating. It is no guess work, you simply combine such parts of the work as you can consistently and figure them together in a lump sum. Things that can not be figured in combination, you can figure separately and add them to your estimate just the same. The combinations as given will enable one to figure the cost of the bulk of the material and labor above the foundation without making out itemized lists of material and labor.

Such items as excavating, masonry, plastering, painting, electric wiring, tin work,

heating and plumbing should be figured separately and added to make the complete estimate. It is the lumber, millwork and carpenter labor mostly that the carpenter contractor seeks for a reliable and easy way out in the matter of estimating. The following is our form and system of estimating the cost of building:

Floor Cost Per Square

Floor joists, size...set...centers....	\$.....
Rough floor .....	.....
Finish floor .....	.....
Carpenter labor framing.....	.....
Carpenter labor laying rough floor .....	.....
Carpenter labor laying finish floor .....	.....
Carpenter labor scraping finish floor .....	.....
Nails for framing.....	.....
Nails for rough floor.....	.....
Nails for finish floor.....	.....
Floor deadening .....	.....

Total per square..... \$.....

The above form shows how you can arrive at a correct price per square in a lump sum. In making your total you can figure according to your job. For example all floors may not have the same size joists, they may be spaced different, the finish floor and the rough floor may be different on different jobs. Some floors may not have to be deadened or scraped. In getting the total omit such parts as are not required and fill in the items such as are called for on the job you are to figure. The quantities of dimension for different size joists and the quantities of rough and finish floors for the different kinds of flooring we have given in former articles.

Outside Wall Cost Per Square

Outside studding, size...set.....	.....
inch centers	\$.....
Outside sheathing .....	.....
Siding .....	.....
Shingles .....	.....
Stucco material .....	.....
Building paper .....	.....
Labor framing .....	.....
Labor sheathing .....	.....
Labor siding .....	.....
Labor shingling outside walls.....	.....
Labor applying stucco.....	.....
Nails for framing.....	.....
Nails for sheathing.....	.....
Nails for siding.....	.....
Nails for shingling.....	.....
Nails for applying stucco board or lath .....	.....

Total per square..... \$.....

Not all of the above items will be likely to be required on any one job, in reaching a

total combine such items as will be required on the job you are estimating.

Partition Cost Per Square

Studding, size...set...inch centers \$.....	.....
Labor, framing .....	.....
Nails .....	.....

Total per square..... \$.....

Ceiling Cost Per Square

Joists, size...set...inch centers \$.....	.....
Labor, framing .....	.....
Nails .....	.....

Total per square..... \$.....

Roof Cost Per Square

Rafters, size...set...inch centers \$.....	.....
Sheathing .....	.....
Shingles .....	.....
Asbestos shingles .....	.....
Slate roof .....	.....
Tile roof .....	.....
Tar and gravel roof.....	.....
Textile shingles .....	.....
Rubberoid roof .....	.....
Canvas roofing .....	.....
Tin roof .....	.....
Labor framing .....	.....
Labor sheathing .....	.....
Labor shingling .....	.....
Labor asbestos shingles.....	.....
Labor slate roof.....	.....
Labor tile roof.....	.....
Labor tar and gravel roof.....	.....
Labor textile roof.....	.....
Labor rubberoid roof.....	.....
Labor canvas roof.....	.....
Labor tin roof.....	.....
Nails, framing .....	.....
Nails sheathing .....	.....
Nails shingling .....	.....
Nails for other roofings.....	.....

Total per square..... \$.....

Make the combinations and total according to kind of roofing used and to fit the job.

Porch Floor Cost Per Square

Joists size...set...inch centers \$.....	.....
Flooring .....	.....
Labor framing .....	.....
Labor flooring .....	.....
Nails framing .....	.....
Nails flooring .....	.....

Total cost per square..... \$.....

Porch Ceiling Cost Per Square

Ceiling joists, size...set.....	.....
inch centers	\$.....
Ceiling .....	.....
Labor, framing .....	.....
Putting on ceiling.....	.....

Nails, framing	
Nails ceiling	

Total cost per square..... \$

Cornice Cost Per Lineal Foot

Material, Frieze	\$
Plancer	
Fascia	
Verge boards	
Crown mold	
Bed mold	
Labor, Frieze	
Plancer	
Fascia	
Verge boards	
Crown mold	
Bed mold	
Nails	

Total cost per lineal foot... \$

In making totals figure only such items as apply to the job you are estimating.

Add for gable brackets..... \$

Labor for setting the same.....

Total for brackets..... \$

Window Cost Complete in House

Frame, cost, material and labor, size	\$
Sash, glazed	
Inside trim for finish.....	
Labor cost, setting frame.....	
Fitting sash	
Inside finishing of, casing, etc.	
Nails, hardware, weights, etc.	

Total cost per frame..... \$

Add for outside or inside blinds

Labor for same

For storm sash.....

Labor fitting and hanging same

Screens for windows.....

Labor fitting and hanging

Hardware

Totals

Make totals according to requirements.

Cost Outside Doors Complete in House, Cased One Side

Frame material and labor, etc.....	
Cost of door.....	
Casings for finishing.....	
Storm door	
Screen door	
Labor setting door frame.....	
Fitting and hanging door.....	
Casing and finishing.....	
Fitting and hanging storm door	
Fitting and hanging screen door	
Nails and hardware.....	

Totals

Cost Interior Doors Complete in House, Cased Two Sides

Cost of jambs, material and labor, size	\$
---	----

Cost of door.....	
Cost casings, cased two sides, steps included	
Labor, cost setting jambs.....	
Fitting and hanging door.....	
Casing and finishing.....	
Nails and hardware.....	

Total cost per door.....

Cost of Sliding Doors Complete

	Single.	Double.
Cost of jambs, size.....	\$	\$
Cost of doors.....		
Cost of casings, two sides and steps		
Labor, setting jambs.....		
Fitting and hanging doors		
Casing and finishing.....		
Nails and hardware.....		

Totals

Cost of Folding Doors Complete in House

Cost of jambs, size.....	\$
Cost of casings, two sides including steps	
Doors	
Nails and hardware.....	
Labor, setting jambs.....	
Hanging doors	
Casing and finishing.....	

Total cost..... \$

Cost Per Lineal Foot

Inside base lineal foot.....	\$
Floor mold	
Nails	
Labor	

Total cost..... \$

Cost of Picture Molding Per Foot

Picture mold	\$
Nails	
Labor	

Total cost..... \$

Cost of Room Cornice Per Lineal Foot

Material per foot.....	\$
Nails	
Labor	

Total cost..... \$

Beam Ceiling Cost Per Lineal Foot

Material per foot.....	\$
Nails	
Labor	

Total cost..... \$

Plate Rail Cost Per Lineal Foot

Material per foot.....	\$
Nails	
Labor	

Total cost..... \$

Getting Full Service from Equipment



Getting full services from equipment

An excavator may serve not only for digging excavations, but is equally valuable for grading and backfilling.

The one shown here is at work on the Chicago Housing Associations' development.

A House for a Hot Climate



All of the rooms of this New Orleans house have windows on three sides. Sam Stone, Jr., Architect

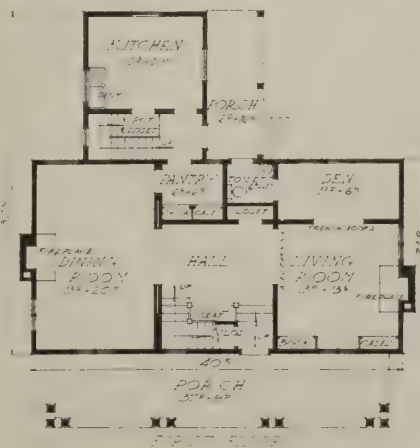
THE title of this story is somewhat misleading inasmuch as it implies that the house to be described is suitable for a hot climate only. But, as the summer temperatures of the northernmost portions of our country practically equal those of the Southern States for months at a time, there seems to be no reason why a house planned especially for hot weather comfort should not be suitable for use in almost any locality. This is especially true in view of the efficiency of modern methods of heating during cold weather, and also from the fact that Northerners more frequently complain of excessive summer heat than do the residents of the South.

The house which illustrates this article is located in New Orleans, and was designed by Sam Stone, Jr., architect.

The exterior is charmingly simple and

expresses comfort and good taste. The delicate treatment of the front porch; the upper stair window, and the other exterior

trimmings is appropriate and well handled. Note the interesting shadow cast by the trelliswork of the porch.



The construction is stucco on wood frame. The porch floor and the foundation are of concrete. The chimneys are of red brick, and the roof is of slate trimmed with red tile on the hips and the ridge.

No basement is provided, as local subsoil conditions and custom are against their use. It would, however, be a simple matter to include a basement if desired.

The plan is an adaptation of the "Tee" shape, and is remarkable from the fact that every room has windows on three sides, and, with the exception of the kitchen, the arrangement of the doors is such that by leaving certain doors open each room may receive air from the fourth side; thus assuring the benefit of a breeze from any quarter from which it may blow. Casement windows are used throughout.

The front porch extends entirely across the front of the house and opens through a French door into the stair hall. The space around the front door is lower than the remainder of the hall floor level to provide headroom under the main stair which rises from the front of the hall. A coat closet is provided in the space under the stair and a seat is built in the angle formed by the stair. An additional closet opens from the hall near the toilet. At the right is a wide cased opening leading to the living room which contains a fireplace and built-in

Between the kitchen and the pantry is a small hall which opens onto the rear porch and forms a rear entry to the house. In this hall is the back stair under which is a large pot closet opening into the kitchen.

The second floor contains three bedrooms and a bath. Each of the two front bedrooms opens directly from the front hall and is provided with a fireplace. The generous use of fireplaces in this house is explained by the moderate winters of the locality which permit heating plants to be

omitted, provided that the use of fireplaces or stoves is planned for, so that occasional chilly days may be made comfortable.

At the rear of the main hall is a passage leading to the bathroom, the back stair and the bedroom over the kitchen. This bedroom is well suited for the use of a maid, and an additional bath for her use could be placed over a portion of the rear porch. All of the bedrooms have large closets, the one for the rear bedroom being located in the passage. A linen closet opens from the bathroom.

Prevent Spread of Flames With Fire Stops and Metal Lathing

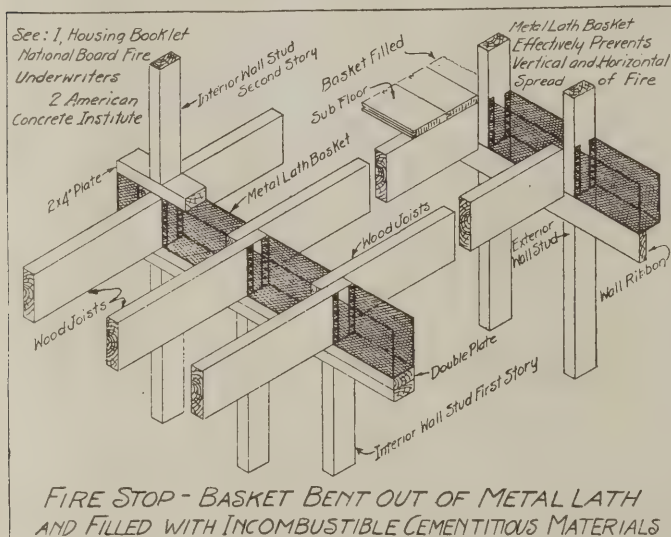
TOO much stress cannot be laid on the vital importance of the fire stop, says the *Metal Lath News*. Often neglected in frame construction, this necessary adjunct to the safety of the home is gradually coming into its own, the high cost of materials bringing the necessity for protecting frame structural members in building squarely to the mind of architect and builder.

Without fire-stopping the interior of the walls in the homes become veritable flues

tion's Committee on Treatment of Concrete Surfaces has the following to say concerning the fire stop:

"Fire protection is an important feature in buildings with frame walls and some form of fire stop is necessary. Probably the best method is to form a basket of metal lath to occupy the spaces between the studs at the juncture of floor joists and walls."

Metal lathing and fire-stopping will eliminate the two most vulnerable points



bookcases. Immediately behind the living room is a den which opens into a toilet room. The toilet also opens onto the rear porch, making it convenient to the kitchen. By some it might be considered more satisfactory to omit the closet and make the toilet room directly accessible from the hall instead of through the den.

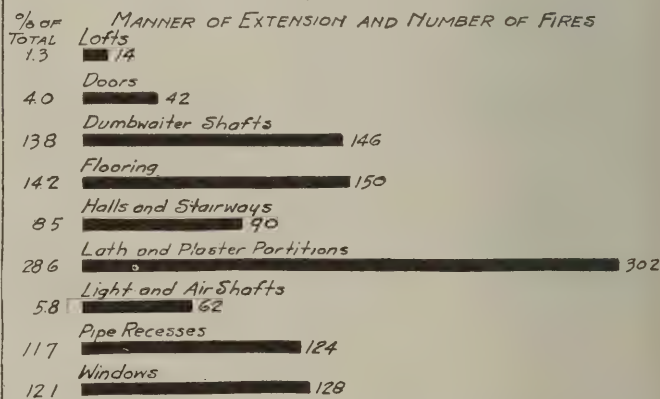
At the left of the hall are wide, sliding doors leading to the dining room. As the living room is rather small, so is the dining room unusually long, and many people would doubtless prefer to relocate the den, probably placing it across the front of the dining room. The dining room also contains a fireplace and opens into the pantry which contains a built-in cabinet.

for the flames. With metal lath on both sides of a partition there is no lath to burn and the fire has great difficulty igniting the flat face of the studs, but even here fire-stopping is valuable.

Despite the fact that the architect in good faith specifies fire-stopping, actual installation is often passed over either willfully or unintentionally. Perhaps the surest method is to place special emphasis on it and include a clause in the lather's contract.

The American Concrete Institute recognizes the prime importance of effectual fire-stopping, especially at this time when no stone should be left unturned to conserve materials from fire. This organiza-

HOW FIRES SPREAD IN HOUSES New York City



(From figures in "Fire Protection," June, 1920)

and prevent the spread of 43% of the total fires, as seen by the conditions uncovered by the New York Fire Department.

Positions That Require Metal Lath

1. All bearing partitions and stud exterior walls, including a basket to hold incombustible material as a fire stop.
2. Ceilings under inhabited floors, especially over heating plants and coal bins.
3. At chimney breasts, around flues and back of kitchen ranges.
4. Stair-wells and under stairs.
5. As a base and reinforcement for exterior stucco.

Use on ceilings of prominent rooms and in corners to prevent cracking.

Bricklaying

By William Carver, Architect, and Andrew Pentland, Mason Contractor
The Necessity of an Adequate, Skilled Craftsmanship Supply is as Important as an Adequate Material Supply—How Contractors Can Aid in Making Skilled Mechanics

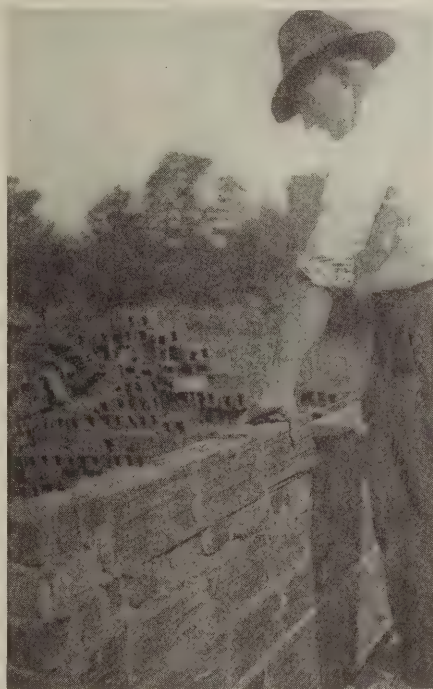
SCARCITY of building materials, while indicating a healthy demand for building is a state of affairs which is not looked upon with much favor by the average contractor. Scarcity of material means interruption to the steady flow of business, resulting from competition for the limited supply available; with a jumpy market, rising prices, and in some cases financial loss to the contractor and disappointment to the owner. If it were definitely known that contractors had it in their power to assure a bountiful supply of material think how much they would be willing to do to bring it about.

Yet material constitutes but one-half (or even less) of the total cost of any given building operation, the remaining half being spent for labor. It is just as essential to have an ample supply of skilled labor as of material, and one is useless without the other. But there is this difference, that while the supply of material is not in any way under the influence of the contractor, he can if he wishes assure himself enough skilled labor for the future and make his path that much smoother in the years to come; and especially is this true in the case of the bricklayers.

In the past a considerable proportion of the bricklayers in this country were men who learned the trade in their native countries of England and Scotland. Every year a great number came across the Atlantic; and in this way Great Britain acted to a degree as a training school and supply warehouse for bricklayers here. Thus the reluctance of contractors in this country to take apprentices was offset to some extent.

When the war began a great many of the youngest and most capable of these men went to fight the common enemy. A great proportion can never return. During the long years of the war the outside supply of bricklayers was shut off, and during America's active part in the struggle no apprentices were taken on here. It is not surprising, therefore, to find that although there seems to be enough bricklayers at the present time to take care of the usual proportion of buildings now built of brick, the impending increase of that proportion demands that some action be taken now to train a much greater number of boys here than ever before to make sure of a proper supply of bricklayers in the future.

We can no longer depend on being supplied with ready trained bricklayers from Europe. Not alone in America is there a shortage of buildings, but in Great Britain and the rest of the civilized world the situation is even more acute. Building in Europe was stopped for almost five years. The great demand for buildings there, and the higher wages now paid, will



Apprentice backing up brick facing with hollow tile

largely shut off the former supply of bricklayers from the older countries for some time to come at least, and will force us to train our own men.

The average contractor is, of course, in business to stay, and is willing to look ahead as far as possible and act now if need be to make it easier to do business in the future. More bricklayers will be needed than before for two great reasons.

E. T. Meredith, Secretary of Agriculture, says "That three-fifths of the original timber of the United States is gone and that we are using timber four times as fast as we are growing it. The forests remaining are so localized as greatly to reduce their national utility. The bulk of the population and manufacturing industries of the United States are dependent upon distant supplies of timber as the result of the

depletion of the principal forest areas east of the Great Plains."

Sooner or later we must call a halt and begin to practice lumber conservation. The hundreds of thousands of dollars being spent every year by the clay associations to teach people the advantages of brick homes will help along this movement, and it may be safely said that the day is coming when the house with exterior wooden walls will be the exception rather than the rule. Now bricklayers cannot be produced in a month or in six months. They may quite conceivably be trained in less than the four years prescribed by the union (and of this more later), but the making of a bricklayer is a comparatively long process. The number of apprentices trained every year is governed by two things—the disposition of the contractor to take apprentices and the rules of the union (where such apply). Apart from questions arising between the contractors and the unions, it would appear to be a far-sighted and wise policy for all concerned to have as many apprentices trained as possible. The unions state that they restrict the number of apprentices allowed to each contractor in order to assure the boys of a reasonable chance of steady work. They point out that it would not be fair to a boy to allow him to be apprenticed to a contractor who did not have the volume of business necessary to keep him busy all or most of the time. The contractors, on the other hand, object that the present arrangement is inequitable, since the larger contractors and construction companies are allowed an absurdly small number of apprentices in comparison with the number of jobs they have. The national convention of the bricklayers union will be held this month in Cleveland, and this question should certainly be taken up and the present rules amended.

But, in the meantime, there are not enough bricklayers' apprentices to care for the coming demand. The secretary of the Mason Contractors' Association of a large mid-west city informed the authors that only a small fraction of the apprentices allowed by the union were actually indentured to contractors in that city. We cannot believe that contractors generally are alive to the situation or they would act to train more men.

In the face of rising wages the average age of bricklayers will increase if more apprentices are not trained. We all know

that young men are more active than older ones. Would not the contractor prefer the advantage of having the younger, more alert, and more productive men on his job? Moreover, scarcer labor means even higher wages, labor following, in this respect, the law of supply and demand.

Not only the future demand for more bricklayers, arising from the increased number of brick homes which will be required, but the immediate self interest of the contractor would seem to indicate the desirability and the profit of employing apprentices. While, for the first few weeks, the boy may not do any more than earn his salt—if he does that—in a short time he will be doing journeyman's work at one-quarter to one-third the cost, if the foreman takes an interest in him and gives

proved itself to be an excellent material. It is a staple product and its use means bread and butter for the contractor as well as for the material man and the bricklayer. The increased demand for brick is assured, the production guaranteed by the thousands of plants dotted all over the country, but for the future supply of bricklayers to lay the brick will be made possible only by contractors taking on more bricklayers' apprentices than they do at present.

The bricklayers trade is one of the oldest of all the building crafts, and not only will it profit the contractor financially, but it will be his privilege to pass along to another generation some of the skill and knowledge that have come down from ancient times; especially when, in the case of the bricklayer, such skill and knowledge

will result in better buildings and homes for the people in succeeding years.

QUESTIONS

Readers may find it interesting to test their knowledge of the bricklaying craft by answering the following questions, addressing their replies to this department. They may also ask some questions on their own account.

1. A specification states that the walls may be grouted instead of using a shoved joint. What do both terms mean?

2. What is meant by 1:1:6 mortar?

3. What is meant when the bricklayer speaks of a trig and what is it used for?

4. Please give me the name of a good textbook on brick estimating and construction.

APPLICATION OF APPRENTICE

Cleveland, Ohio, _____ 19____

TO BRICKLAYERS' AND MASONS' UNION, No. 5, OHIO:

I, the undersigned, wishing to learn the art of bricklaying, hereby make application to enter the employ of _____, Mason Contractor, for THIRTY DAYS' TRIAL as an apprentice.

At the end of said thirty days I agree to be indentured as an apprentice in the regular manner should I still desire to continue to learn the trade, and my employer desires to indenture me as an apprentice.

Name _____

Address _____

him a chance to learn. The boy's first job will be, of course, to fill the inside of walls and to lay backing. After a while he will be able to do this rough work almost as expertly as a higher priced man. He will also be learning face work, and the contractor can afford to let him spend some time on this and still be money ahead. In the olden days boys were required to carry a hod and do laborers' work for the first six months or so of their apprenticeship. This was a mistake in many ways. Boys who would have made good bricklayers were not strong enough to do laborers' work, and moreover it was found that the sooner a boy was put on the wall the sooner he would be on a paying basis. The long period of apprenticeship—4 years—is undoubtedly due, to some extent, to the former practice of making laborers of the boys for part of the time. The period of apprenticeship may in the future be materially shortened if the boy is methodically taught his trade instead of being allowed to shift for himself and to pick up his knowledge the best way he can.

It would appear to be good business to put on all the apprentices allowable. Brick, by its thousands of years of use, has

Money Needed for Industry and Building

In the course of an address on "Our Taxation System," delivered before the chamber of commerce of Dayton, Sept. 22, Otto H. Kahn of Kuhn, Loeb & Co., bankers of New York, said in part:

"Excessive surtaxes accomplish double harm. They greatly diminish the incentive to thrift, and they appropriate to an undue extent the means which ought to be available for industry and enterprise. And those means are more than ever needed at present, first because the world is urgently in need of increased production after nearly five years of underproduction during the war, and, secondly, because merely to do the same volume of business as before the war a great deal more capital is required nowadays, owing to the largely increased cost of labor and materials.

"Perhaps the most conspicuous example of the effect of our taxation in stifling enterprise and preventing capital from accomplishing its normal and necessary function is seen in the acute housing situation throughout the country.

"Urgent and nationwide demand has now arisen for a remedy and for relief from

that serious situation. The great majority of those who have testified on the subject before the senate committee on reconstruction and production and before local bodies advocate what? The freeing of mortgages for the construction of private dwellings from the state and federal income tax.

"By rearranging it we can vastly lighten the pressure of the load upon the backs of the people and particularly of the so-called middle classes, on whom it now rests with especial and regrettable heaviness."

Tiled Effects

There is a simple and economical way of obtaining tiled effects as a substitute for real tiles. The walls are plastered in the ordinary way so far as rough coat is concerned, but at the time the white coat is applied, the plasterer scores the walls to imitate tiles. Wall board, if that material is used, may be obtained already scored in this manner.

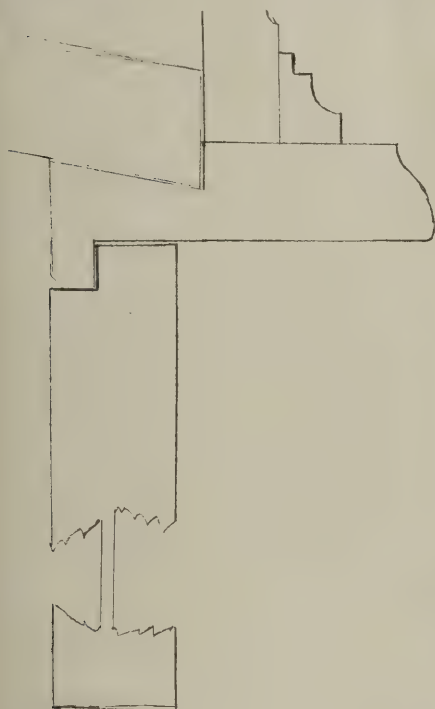
The wall is then finished by first applying a coat of wall primer followed by three coats of enamel undercoat and two coats of white enamel.

Questions and Answers

Architects and Builders are Invited to Contribute to this Department Either by Asking Questions or Answering Them. National Builder Will Pay for Answers to Questions Asked and for Better Answers from Wider Experience

Detail of Inside Hung Casement Window

In reply to F. B. of Colorado in September BUILDER I am enclosing detail of inside hung casement windows much used in this section. It can be top, side or



bottom hung. I trust the sketch may help a brother reader.

In line with Mr. Pelton's statements on page 14 I think many of your readers would like sketches and articles on cheaper homes—not *cheap*, but plain—eliminating elaborate details and designs so as to get the maximum of convenience with the minimum of material and labor.

Am very much pleased with NATIONAL BUILDER.—John L. Eggiman, Bellaire, Ohio.

Insulating Sticky Chair Leather

Question:—Is there anything that will prevent leather covering of chairs from sticking to the clothing when a person sits in the chair?—W. L.

Answer:—Take white shellac varnish and thin it quite thin with denatured alcohol, and apply one coat to the leather. Sometimes white of egg, well rubbed on, answers very well. Might try it first.

If the leather is dark, then use orange shellac.—A. Ashmun Kelly.

The Wheelbarrow

Costs of moving material are minimized by a careful selection of the means best fitted for the work. The wheelbarrow and the shovel will always have a place in equipment and these in turn include a variety of forms and sizes adapted to the particular kind of work they are designed to do. Any kind of a wheelbarrow may be used to convey almost any kind of material, of course, but an accumulating loss surely results from the wasted energy and wasted time caused by using a misfit wheelbarrow or tool of any kind.

There are fifteen to twenty kinds and sizes of wheelbarrows varying in shape of

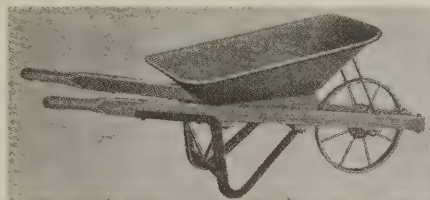


Fig. 1—Ordinary concrete barrow

the tray and in the kind of frame or handles. The barrow illustrated in Fig. 1 is the type in most common use, and known as the concrete barrow. Fig. 2 shows a

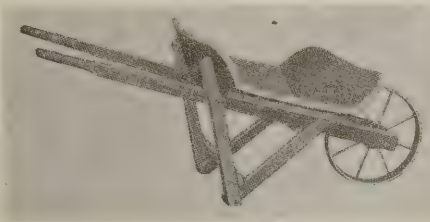


Fig. 2—Railroad wheelbarrow

railroad or canal barrow for dirt handling and general use. It is light and well-balanced,—not suited for handling concrete it allows a quick side dump of earth or



Fig. 3—Stone or mason's barrow

such material. Fig. 1 is much used for dirt, sand and crushed stone, as well as concrete.

Fig. 3 illustrates a stone or mason's barrow. A similar barrow of lower build



Fig. 4—Brick and tile barrow

makes the loading and handling of stone much cheaper.

Fig. 4 shows a brick wheelbarrow, for handling brick, laths, shingles, slate, lumber, radiators, plumbing, fixtures, crates and boxes of goods and other large and bulky things.



Fig. 5—Farm or general utility barrow

Fig. 5 shows the well-known garden or farm barrow. It has its uses around buildings as of general utility. A concrete buggy is shown in Fig. 6, used for handling wet concrete. It is more economical than the ordinary wheelbarrow as it carries a

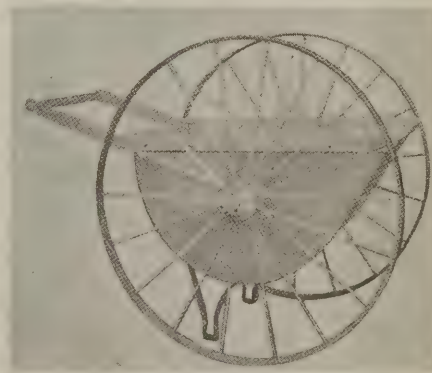


Fig. 6—Concrete cart or buggy



Fig. 7—Concrete charging barrow

much larger load without the chance of spilling it. The same is true of the charging barrow shown in Fig. 7. The flat top allows of striking off an even measure as in the self-measuring concrete barrow shown in Fig. 8. Fig. 9 shows a recent form of charging barrow that has obvious advantages.



Fig. 8—Self-measuring concrete barrow

Methods of operating the wheelbarrows in which one man will load while the man who pushes and dumps the barrow waits, and the loader in turn waits for another barrow to fill, is bad engineering but one which some workmen endeavor to establish. Loaders can be used economically only where the distance and the character of the work keeps a succession of barrow pushers working close to each other.

In operating barrows, runways should always be laid. Much time can be saved by doing so. Boards laid loosely on the ground are bad, as they are always getting

out of place, and barrows run off the side and spill. A saving will be effected by laying boards down properly and fastening them where necessary. A wide plank, or better yet, two wide planks laid side by side for a double runway. A concrete buggy requires a double runway or a wide platform built. Elevated runways must be wide enough for a man to walk on them with ease.

Wheelbarrows can be used as hoisting buckets in connection with a derrick. A sling or three-way line is equipped with two rings and one hook. The hook is fastened to the wheel and the rings are slipped over the handles. The barrow can then be swung up to the necessary level, is easily detached from the slings, wheeled to the dumping place, and returned.

No matter what contrivances are devised for transporting materials, builders will always find uses for the wheelbarrow and an exercise of judgment in what type to use and how to have it used.—Daniel J. Hauer, C. E.

Good White Paint for Plastered Walls

Question:—I would like to know how to mix and apply a good white paint for bare plastered walls.—W. L.

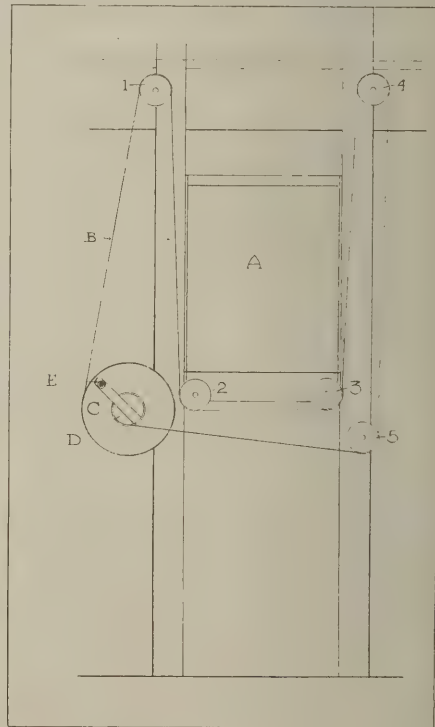
Answer:—Apply a glue size to the bare walls, and when this is dry apply two or three coats of white paint, made as follows: Take keg lead and thin it with raw linseed oil, adding a little japan drier, say a tablespoonful to eight pounds of lead. It is not well to have the first coat dry too quick, but let it have time, so that the oil may sink in where it can, though if the glue sizing has been done thoroughly none can sink in. The next coat of lead may be thinned with equal parts of raw oil and turpentine, with driers enough to dry the paint over night. The third (and it should have at least three coats) coat should be mostly turpentine for

thinning with. In fact, no oil should be added to the last coat, if you want the white to remain white. Zinc white will give you a better white color than lead. Equal parts of lead and zinc will do well. If you use zinc, either entire or in part with lead, add plenty of driers, because zinc white is a very poor self-drier; in fact it is not a drier at all, depending upon the presence of driers and oil to make it dry. Also it scales or cracks sometimes, and hence caution.

There is what is called flat wall paint that might suit you; it comes in pure white and different tints and colors. It is a paint composed of both water and oil. It might be easier for you to manage than white lead and turpentine paint.—A. Ashmun Kelly.

A Hand Hoist

Every carpenter realizes, when he builds a hand-operated wood hoist to be lifted by a rope wound on a single drum, that he is making a machine which can kick as hard when one cranks it as ever a Ford did. If he does not realize this there are thousands of other people who do. The accompanying drawing illustrates a method of construction which eliminates this danger and makes the wood hoist so easy of operation that a woman can get up the wood.



In the drawing "A" represents the receptacle or carrier for the wood; "B" is the rope which is used to operate the hoist; "C" and "D" are the large and small drums, respectively, which are mounted on the same shaft; one end of the rope is fastened to the large drum and the other end to the small drum, and both drums are turned at the same time by the crank "E."



Fig. 9—New style charging barrow

After one end of the rope "B" is fastened to the large drum "C" the rope is passed up over the sheave 1, then down under 2, across under 3, up over 4, down under 5, and across to the small drum "D" where it is fastened after being wound around it a sufficient number of times to allow proper play for the carrier to rise to the right level.

These drums may be of convenient size, but since the amount of power required to lift the load and the speed with which it will be lifted depends upon the relative size of the drums, they should be regulated to suit the load. The mechanism naturally works faster with the greater difference in size between the two drums, but it requires more power to operate it; the reverse is the case when the drums are nearer the same size. If the large drum is 12 inches in diameter and the small one 4 inches, as the rope is wound off of the small drum and on to the large one the receptacle will rise one foot for each revolution; and when the motion is reversed the receptacle will be lowered at the same rate, as each revolution will count for one foot of rope on the small drum and three feet of rope on the large one.

The principle involved in this method is similar to that in the ordinary chain block, and the hoist will stand at whatever point it is when the winding ceases.—W. S. Richards, Albany, Oregon.

Staining Interior Trim

Question:—I would like some information about staining interior trim, such as mahogany stain on gum, etc., and greenish weathered oak on pine, etc.—F. J. J.

Answer:—A mahogany stain may be made by dissolving two ounces of Bismark brown in one gallon of boiling water, and adding one-half ounce of eosene G aniline and one-half pint of vinegar. Darken or lighten as desired, by varying the proportions.

Or make up a stain with one part of burnt sienna, three parts of rose lake, and one part of the best brown japan. To make it darker add a little of the best asphaltum varnish. The addition of red lake will enrich the color. Make the stain thin, so that it will sink into the wood well.

Weathered oak stain may be made by infusing green copperas (sulphate of iron) in water, equal parts by weight. Or, take of ivory black and vandyke brown, both in dry form, and saturate with alcohol; mix to a thin paste with shellac varnish, then thin with alcohol to the proper consistency—the stain always should be thin. Or, to aniline Nigrosene B add a little Bismark brown and dissolve in alcohol, or dilute with water to form the stain. Alcohol stains don't raise the grain of the wood as water stains do. The shellac acts as a binder. It also gives a rather dead or lus-

terless finish, without further treatment.—A. Ashmun Kelly.

A Round-the-Table Department

Mr. Oliver C. Wilkes, constructing architect, Buffalo, New York, writes, "The suggestion I would make for a possibly interesting department occurred to me owing to various clever ideas that are sometimes only realized in the originator's house and oftentimes copied in a neighborhood, or further. Like, for instance, some having a kitchen cupboard on an outside wall have had a sliding ventilator as a cooler (for cold weather time). I have found a simple packing of some mineral wool under window sills, etc., before lathing helped the warmth of a house at slight cost. Inexpensive strips of deadening felt tacked on upper side of floor joists before placing them muffles the floor above or interrupts the sound carrying, or may be in addition to regular complete covering between sub and regular floor. The country is so big and ideas are so different that such a department might interest where it didn't help."

It is just such ideas interchanged by readers that are helpful. NATIONAL BUILDER will be glad to receive these "kinks" and has a standing offer of payment for all that are published. What have you done that you think is new, or that you have seen done in a better way than ordinary? Join in the round-the-table talk and make it worth while. NATIONAL BUILDER will make it worth while to you.

Combination Electric Dish-washer and Sink

Electric washers are solving the clothes washing problem so satisfactorily that inventors are now giving their immediate attention to the dish washing problem in the home. Machines are available for washing the dishes, but they are separate from the sink, where dishes have always been washed.

Now comes a clever combination of electric dishwasher and sink in which the dishwasher has been incorporated as part of the sink and placed on the market by a Chicago company. Two perpendicular revolving paddles throw the water between the dishes which remain stationary, thus eliminating breakage.

This domestic size outfit is operated by a ¼ h.p. motor with an attachment cord that fits any lamp socket. The motor can be used for making ice cream by replacing the dish frame with a special freezing can. This combination is also made in large size for use in hotels, restaurants and hospitals.

Presenting Employees With Life Insurance

Among both large and small manufacturing concerns a method of encouraging personal thrift, a better morale and an identity of interest between the wage earner and the industry has taken the form of presenting employees with life insurance. Among these organizations the Blaw-Knox Company is distinguished by a more than ordinary comprehensive plan, arranged on a graduated scale.

The employees recently received a very pleasant surprise when announcement was made that they had been provided with life insurance as an evidence of the company's appreciation of the value of loyalty, cooperation and continued service.

All employees with not less than three months' service are insured for \$500; those with the Company from six months to one year, \$750; from one to two years, \$1,000; thereafter with each additional year's service the insurance is increased by \$250, until a maximum of \$2,000 is reached. New employees are entitled to participate in the benefits of the plan after three months' continuous employment.

The insurance remains in force as long as the employee continues with the company, although he may continue it at his own expense should he for any reason leave the concern. It is without expense of any kind to the individual covered, the entire cost being borne by the Blaw-Knox Company and this in addition to whatever other benefits may be provided by the State Workmen's Compensation Act.

One of the novel features of this plan is that no medical examination is required. The employee names his beneficiary in the same manner as he would under an ordinary policy, and has the privilege of changing this person from time to time as circumstances may demand.

The plan provides benefits in case of not only death, but also total permanent disability. In the event that an employee becomes totally and permanently disabled before reaching the age of sixty, he will receive the full amount of his insurance certificate in either annual or monthly installments, according to any one of several plans which he may choose. If death should occur during this period, the remaining installments will be paid to his beneficiary.

Another valuable feature of this plan is the Health Literature to which the employees of this Company are now entitled. The Metropolitan Life Insurance Company have had prepared by some of the greatest experts in this country a number of booklets, attractively arranged and illustrated, dealing with matters of health conservation and disease prevention. These, together with a number of small pamphlets on special diseases, will be distributed periodically among the employees of this concern.

NATIONAL

Garage Hardware

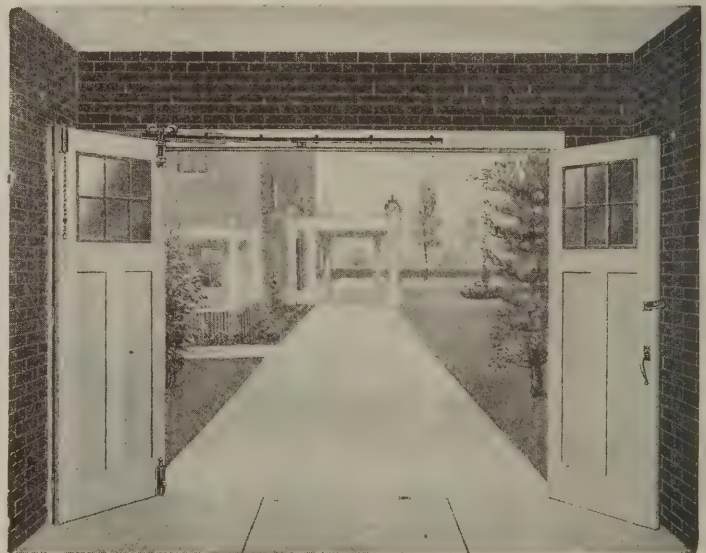


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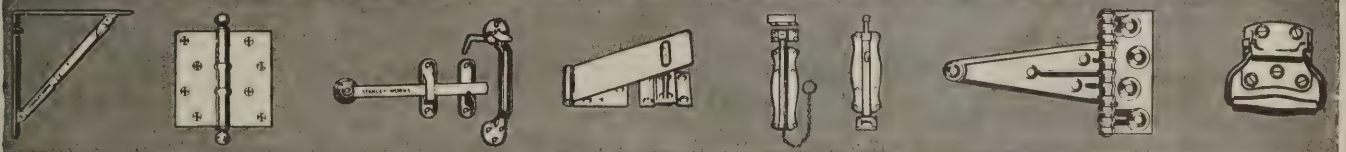
With the first chill of winter your customers will look to their storm windows.

Suggest to them the real comfort of having storm windows hung on dependable hangers and fasteners; Hardware that is void of rattles and noise; Hardware that is easy for you or them to apply.

Storm windows correctly hung are not a luxury but a positive necessity in winter. Have your customers prepare before the season, install The Stanley Storm Sash Hardware now.

A book (N10) shows other styles of fasteners and hangers

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Publications and Announcements

Tin, Sheet - Iron and Copper - Plate Workers, by Leroy J. Blinn; Henry Carey Baird & Co., Inc., 2 West 45th Street, New York, publishers. Cloth binding; 207 illustrations; 334 pages; \$3.00. Gives rules for describing patterns; practical geometry; mensuration of surfaces, solids and capacities of bodies; tables of weights; miscellaneous cements; metallic alloys; strength of materials; tables of strength of materials. A complete reference index is given to the contents.

The Griscom - Russell Company, 90 West Street, New York, announce the addition to their line of oil heaters a new oil heater unit of the straight tube type supplementing their coil heater line. It is known as the G-R oil heater.

The Star Line Catalogue No. 77, issued by Hunt, Helm, Ferris & Co., of Harvard, Ill., is a handsomely printed work of 356 pages. It is not only informing about the specialties manufactured by the company, but has a vast amount of practical information for the builder. The equipments illustrated and described include stalls, stanchions, stock pens, litter, feed and milk can carriers, hay carriers, barn and garage door hangers, stock tank heaters, wire stretchers, hoists, coaster wagons and hardware specialties. A valuable section describes barns and how to build them, with full detail drawings and floor plans and elevations. Ventilation and ventilation systems are also fully illustrated and described.

Practical Business Methods for Contractors, by Frank R. Walker; Frank R. Walker Company, publishers, 2209 Archer Avenue, Chicago. In the methods described all red tape has been eliminated, and the builder obtains a complete system simplified by a practical builder.

Only two sizes of forms are used. Forms are usually of many different sizes and types, to be filed in loose leaf binders, card index files, book files, etc., all belonging to the same system. Forms usually designed by accountants who are not familiar with building conditions, they attempt to apply shop and factory conditions to the building business, which is of a more complex nature because of the variety of types of construction.

All forms that are designed for use on the job are of pocket size ($4\frac{1}{4} \times 6\frac{3}{4}$ inches). All office forms are of a standard size ($9\frac{1}{4} \times 12$ inches), for loose leaf binders, to be carried in a loose leaf ring book and permanently filed in a loose leaf binder or card index. Forty different forms allow latitude in choosing forms for any particular requirements. A \$25 contract requires as much bookkeeping as a \$250,000

one. The forms simplify the rendering of income tax reports.

The Building Estimator's Reference Book, by Frank R. Walker; Frank R. Walker, publishers, 2209 Archer Avenue, Chicago. This is the third edition of one of the most valuable works in the library of an architect, builder and contractor. It comprises in its pages the items of cost in constructing all classes of modern buildings, giving the actual labor costs and methods employed in the erection of some of our present-day structures, together with all the necessary material and labor quantities entering into the construction of all classes of building. Flexible covers; 2831 pages; price \$10.

Louden Overhead Carrying System, for factories, garages, foundries, machine shops, etc. Catalogue No. 5, issued by the Louden Machinery Co., Fairfield, Iowa. This is a valuable reference work which, while showing the specialties manufactured by the company adapted to an almost unlimited field of operations where conveying is required, gives construction detail drawings and other data full of suggestion to the builder wherever located.

National Giant Farm Elevators is the title of an informing and well illustrated catalogue issued by the Portable Elevator Manufacturing Company, Bloomington, Ill., as elevator catalogue, No. 21. An appreciation of present-day farmer's harvesting problems is set out in a discussion of the scarcity of farm help and how the elevator system designed by the company is prepared to meet it. Various types of portable and fixed elevators are shown and their peculiar advantages discussed, and a great variety of devices and mechanisms to conserve labor and time are shown. A supplementary catalogue of Modern Crib Plans is enclosed with the preceding. Construction details and quantities are given in this catalogue of wood and concrete and square or round cribs and granaries. A list of testimonials from users is given.

"The James Way" is the significant title of "a book showing how to build and equip a practical up-to-date dairy barn," issued by the James Manufacturing Co., Fort Atkinson, Wis. This work contains no less than 34 blueprints of barn construction and construction details, is fully illustrated, and gives a great quantity of informing data on barn and barn ventilation. It contains 334 pages, is bound in boards, and has a complete reference index.

The Jamesway Hog Barn Book, issued as catalogue No. 28 by the James Manufacturing Co., Fort Atkinson, Wis.; Elmira, N. Y.; Fort Dodge, Iowa; Minneapolis, Minn.; Philadelphia, Pa.; Chicago, Ill.;

New York, N. Y., is a fully illustrated work of 81 pages, giving construction details and data regarding the proper housing of hogs, construction details and the various accessories incident to hog raising.

The C. H. & E. Manufacturing Co., Inc., Milwaukee, Wis., manufacturers of contractors' equipment and gasoline engines, have added to their plant a 150 by 140 erecting and assembling factory wherein the various models manufactured by them will be run through in lots in the modern style of automobile assembling. The new addition has concrete floors, brick walls and saw-tooth roofs, and gives the company's entire plant a space of a full city block 500 feet long by 140 feet wide.

How to Build and Operate a Sawmill, by L. L. Shertzer, president Chickasaw Lumber Co., Demopolis, Ala. This pamphlet is made up of articles which appeared in the "American Lumberman." It is freely illustrated and three loose charts of sawmill layouts accompany the text. It is one of the most interesting digests of the risks and responsibilities of lumbering and lumber manufacturing published, and has a decided value in its descriptions of the various methods of cuts in sawing lumber. Price \$1.

The Pitless Automobile Turntable catalogue, issued by the Canton Foundry & Machine Company, Canton, Ohio, describes and illustrates automobile turntables of easy installation, and which make available spaces for garages that otherwise could not be so utilized, and in other ways adding immensely to the convenience and time saving, as well as the avoidance of accidents and damage to machines either in the garage or at the garage front.

Portable Floor Cranes and Hoists, a catalogue issued by the Canton Foundry & Machine Co., Canton, Ohio, illustrates and describes an extensive line of labor saving devices in the line of portable cranes and hoists.

House Wiring, by Thomas W. Poppe, electrical engineer; The Norman W. Henley Publishing Co., 2 West 45th street, New York. This is the third edition of this work revised and enlarged. It gives the information needed for successful wiring of houses in accordance with the rulings of the National Board of Fire Underwriters. 200 pages fully illustrated. Price \$1.00.

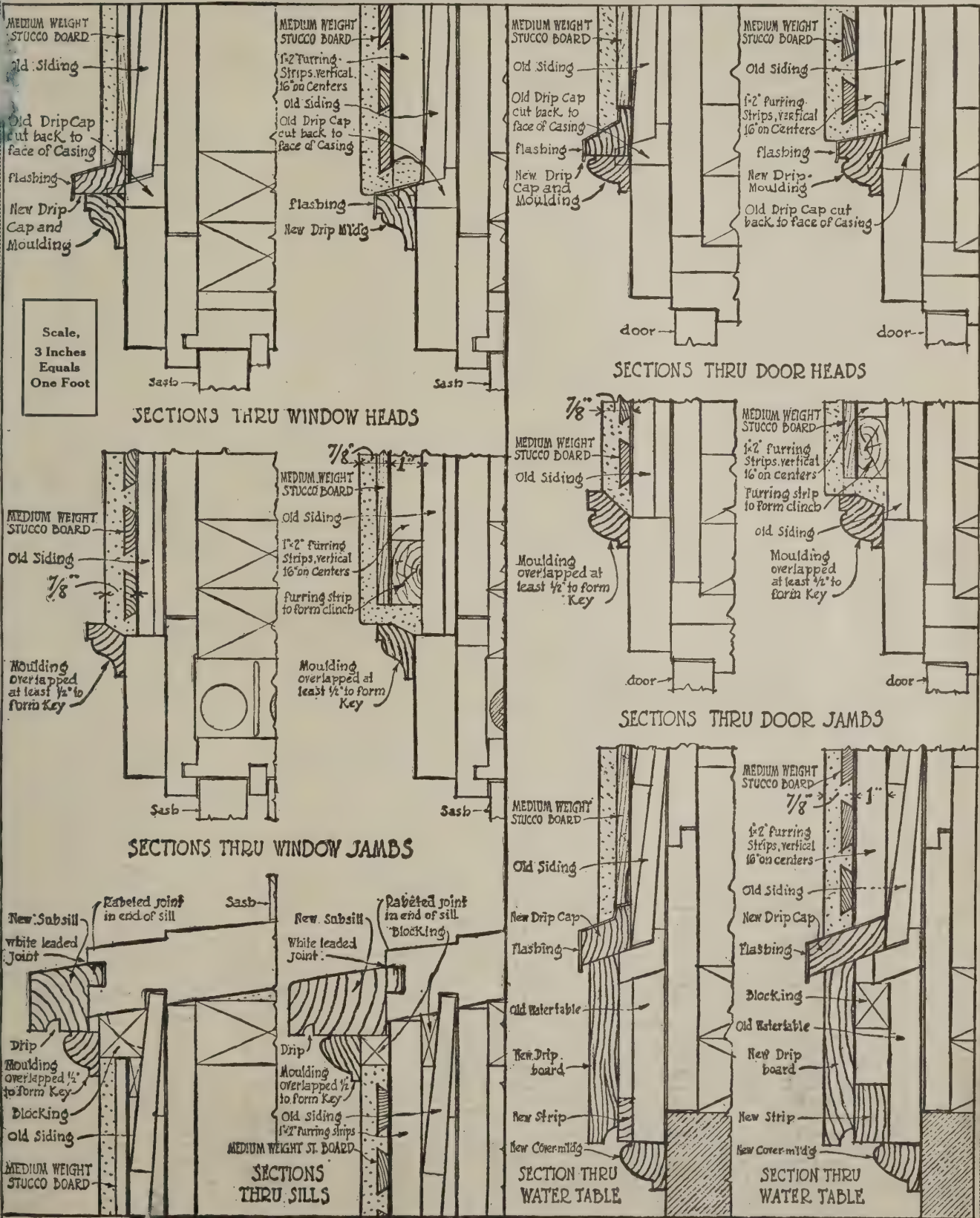
The Real Estate Educator, by F. M. Payne; T. J. Carey & Co., publishers, 143 West 96th street, New York. 208 pages, price \$2.00. Gives Torren's system revised to date; Federal farm loan system; how to advertise real estate; law of real estate; how to appraise property and farms; people who make a farm "go," etc.



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Bird & Son, Inc.	4	Nice, Eugene E.	102
Bishopric Mfg. Co.	1	Noble Machine Co.	103
Black Rock Wall Board Co.	95	Northern Hemlock & Hardwood Mfrs. Ass'n	105
Blaw-Knox Co.	90	North Bros. Mfg. Co.	79
Bovee Furnace Works	101	Northwestern Expanded Metal Co.	82
Brasco Mfg. Co.	81		
Brown Co.	Back cover	Oshkosh Mfg. Co.	5
Caldwell Mfg. Co.	100	Parks Ball Bearing Mach. Co.	75
Campbell Heating Co.	101	Pearson Mfg. Co.	103
Central Commercial Co.	86	Peerless Blue Print Co., The	95
Chappell & Co., Wayvell	102	Porter Co., J. E.	102
Chicago Technical College	63	Pullman Ventilator	100
Colonial Fireplace Co.	101		
Common Brick Mfrs. Ass'n.	105	Rayl, T. B.	91
Compo-Board Co.	95		
Corrugated Bar Co., Inc.	73	Sager Lock Co.	7
Cortright Metal Roofing Co.	100	Samson Cordage Co.	100
Creo-Dipt. Co.	99	Sandusky Cement Co.	72
Crescent Machine Co.	91	Sand & Sons, J.	93
Crex Patent Column Co.	89	Sanitary Chemical Closet Co.	96
Crown Point Spar Co.	88	Sargent & Co.	78
Curtis Companies	67	Sasgen Derrick Co.	104
		Schlueter, M. L.	102
Detroit Show Case Co.	84	Sedgwick Machine Works	94
Diamond Metal Weatherstrip Co.	70	Shapiro & Aronson	106
Dietzgen Co., Eugene	94	Sheldon Mfg. Co.	89
Disston & Sons, Henry	80	Shinn, W. C.	98
Donley Bros. Co., The	99	Sidney Machine Tool Co.	76
		Silver Mfg. Co.	90
Edwards Mfg. Co.	98	Southern Cypress Mfrs. Ass'n	95
Elite Mfg. Co.	93	Speidel, J. G.	104
		S. P. Stone Co., The	89
Fairbanks, Morse & Co.	91	Standard Scale & Supply Co.	88
Flintkote Co.	98	Stanley Rule & Level Co.	92
Fox Supply Co.	102	Stanley Works	57
Fuller, N. T.	103	Star Expansion Bolt Co.	102
		Starrett Co., L. S.	77
General Fireproofing Co.	64	Sta-So Company	86
General Service Corp.	8	Stillwell & Co., E. W.	105
Gilbert & Bennett Mfg. Co.	100	Stowell Mfg. Co.	99
Griffin Mfg. Co.	81	Swan Co., James	92
		Sykes Metal Lath & Roofing Co.	65
Hardin-Lavin Co.	112		
Helm Brick Machine Co.	87	Thompson Lightning Rod Co., George E.	98
Henry Airtight Weather Strip Co., The	80		
Heppes Roofing Division	66	United States Mineral Wool Co.	105
Herrick Refrigerator Co.	97	Universal Cement Mold Co., The	104
Hollow Building Tile Ass'n, The	62	Utility Hoist & Mfg. Co.	104
Home Furnace Co.	96		
Huther Bros. Saw Mfg. Co.	78	Van Guilder Double Wall Co.	104
		Vaughan & Bushnell	93
Ideal Concrete Mch. Co.	83	Vendor Slate Co.	84
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International Steel & Iron Co.	82	Wallace & Co., J. D.	91
		Walter Concretile, Inside front cover	
Jaeger Machine Co.	88	Warren-Knight Co.	101
Johns-Manville Co.	71	Waterloo Construction Machy. Co.	85
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		Weyerhaeuser Forest Products Co.	10
		Whitney Window Corp'n	96
		White Co., Inc., David	101
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		Woodworker Mfg. Co.	90

NATIONAL BUILDER

Volume 63

Chicago, November, 1920

Number 11

The Situation

THE "big market for buildings" is growing steadily while those who must ultimately supply its demands are adjusting themselves to meet present conditions and still be in readiness to respond effectively when the break comes.

The month of September showed an average 40 per cent recession in building activity in 203 cities compared with the same period last year. In some of the smaller towns building is brisk, in others comparatively quiet.

Money will be obtainable to promote building, according to authorities, when the war emergency income tax system is modified and the tax on buildings is adjusted so that returns on such investment will be reasonably attractive to investors.

Legislation which has attempted to remedy the evil of rent profiteering has made matters worse by frightening capital away from building investments, notably in New York, where builders are being investigated on the charge of collusion to fix prices.

The price of lumber has been reduced to figures which the lumber interests declare cannot be long maintained. These cuts some have fondly hoped would lead the building material markets to a lower level, and to thus stimulate building activity. Response to this challenge is declared to be impossible partly owing to orders of the Interstate Commerce Commission still further limiting the use of open top cars for commodities other than coal, the consequence being that limestone, and other materials necessary are made more difficult to obtain, with the element of uncertainty added. The coal situation is further complicated by a possibly excessive demand from Great Britain owing to the miners' strike.

The usual waiting to fix things "after election" is upon us, but there is a gathering of the elements for a better condition of things after that national spasm has subsided.

Senator Calder, chairman of the Senate committee investigating housing conditions throughout the United States, declared before the community councils of the City of New York on Oct. 2 that when he returns to Washington in December he will urge complete revision of income and excess profits taxes.

"I am not doing this to help the rich people of the country," he said, "but in

hope that the removal or reduction of these taxes may serve to attract investments back into mortgages and home building."

He also announced he would advocate a bill to forbid the issuance of further tax-exempt securities and introduce a bill to prevent exportation of coal in large quantities.

Joseph H. Defrees, president of the Chamber of Commerce of the United States, told the American Bankers Association that much of the unrest in this country is due to the belief that business is getting too much profit. This was accepted by the bankers as possibly so, but when John Skelton Williams, Comptroller of the Currency of the United States Treasury, made public his report regarding his investigations of the high money rates of the New York banks, the bankers did not agree with him at all.

When builders strive to avoid waste of effort and time and establish a quantity survey, exchange experiences, and agree on practices, they are getting close to the danger line of making their association work as elaborate as Mr. Williams declares the bankers' association work to be. Regarding these practices, he says:

"It appears that every business day a coterie of brokers, members of the New York Stock Exchange, get together for consultation on the floor of the exchange, or by telephone, and determine what, in its view, is the proper rate for the renewal of all street or brokers' call loans for that day. As soon as the rate is agreed on, the president of the stock exchange is notified and the rate is posted on the floor of the stock exchange. This rate is then sent over the ticker to all banks in New York City and these banks thereupon mark up or down, as the case may be the rate of interest upon practically all their Wall street or so-called brokers' loans. Some banks take the precaution to notify their customers by card, sent by mail or otherwise, of the change in the rate, while others do not."

Of course the report of the comptroller was denounced on the floor of the convention of the bankers. Richard S. Hawes, president of the association, made the statement in his opening address that steps would be taken to prove the report unfounded on facts.

Meantime contractors in New York are being held up to the public gaze as con-

spirators. It is therefore timely that a contractor should have the opportunity to free his mind and let the public see how he visualizes the house-hunter.

The Troubles of a Builder

Let the builder be heard! Here a builder in New Jersey expresses himself. So freely in fact that we have suppressed both the name of the town as well as his own rather than mar the vigor of the writer's expressions:

New Jersey, September 26th, 1920.

NATIONAL BUILDER, Chicago, Ill.—"In reply to your letter, will say that we are disgusted in the building business which we are going to quit after following for years. It's nothing but a dog's life, where the builder has only the privilege of working for the mortgagee and the material men. And on paying his bills has to be abused and insulted. He has got to go down on his knees to get workmen to work who walk away any time they see fit. The drivers for material yards will not unload their wagons, and the result is if you ask your carpenters, plumbers, masons to do it for you they tell you to go to hell. So the boss has to unload the wagons himself while the niggers sit on the seat and sleep.

"This is in the hold-up town of ———, where we were held up three or four weeks to get a permit while we paid taxes to support a stalling building inspector who was playing a game of bluff or the goat of a fat typical politician of a town attorney who said he would not provide us with a building permit because we made the plans for our own building corporation, saying it was against the law.

"We went to the State Board of Architects and they handed us a copy of the law which showed he was a dirty liar. With mighty bad grace he gave us our last two permits with the warning not to come back again for more. We told him as taxpayers and builders we would come back for as many as we wanted, as it was our business —builders. Now in the meantime we had bought the lots and signed up mortgages and the interest on the money was still climbing up. This delay so hampered us that we were unable to get our jobs done for fall market and we lost the sale of the two houses. We wonder if you can tell us if we haven't the opportunity to start suit against the town for damages.

"Added to this there is a building code that if your chimney is not up you can't lath, even if the chimney is on the outside of the house and your plumbing and wiring is all in.

"Labor wants \$7.00 a day to dig ditches and it is hard to keep them at work at this price. Brick has been \$32 and \$38 per thousand. Cash with order, and if not means a longer wait. For a time it couldn't be found at any price. There is no mortgage loans to be had at any price nor do the money lenders who have made mortgage loans seem any too willing to make payments when due.

"Masons were all busy and we waited three months to get one chimney up and haven't got the privilege to lath the house yet from the inspector. The cry everywhere is for homes. Yet homes built by builders in this town are without purchasers having stood 18 months, and others in one location are to be auctioned off for lack of purchasers. Yet the town has hundreds looking for homes, crying what are they to do, that they can't find homes. While there are dozens to sell, but the home seekers will not pay the price. They claim prices will drop in houses, that houses built now are cheap material, cheap labor and lord knows what else they claim. They call you a profiteer even if you can't pay your bills on the price you get, or seem to try to get. All the material men of the county are combined in a conspiracy to defeat a lower price for material, and meet several times a month to uniform the prices that none would sell for less than another. Every one of them should be sent to jail for manner of trying to control prices.

"Many builders are quitting. The only builders making money are the cost plus builders.

"Under conditions we are explaining many builders are going to quit, and we are also. We are done as soon as we complete the six we have going. As soon as you start a house in * * * * the builder is conspired against from the building department down to the purchaser. Even the brokers are against the builder, advising purchasers to buy old houses and not the new, saying that they are better built, yet the old homes have been mostly bought up by the brokers who are profiteering in the houses making more on an old house than a builder ever made on several new ones.

"But as dear old Ben Franklin said, 'Experience is a dear school, but fools will learn in no other.' And that applies to the home purchaser. We also sell real estate. We have talked to hundreds a month and the arguments they will give you would set any sane man dizzy if he took it seriously. The houses you build are too large for them or too small. Build a hundred in a row and every one will be at fault. Rooms too small or too large. The house just right; the price too high. Or if everything

is satisfactory they say that they have only four thousand to spend, but don't want to have a mortgage on a place. We tell them to buy it on air then. They tell us they are paying \$124 a month for four rooms and if they could buy a place at not over \$60 a month they would take it, if it had a two car garage, half acre of land, ten rooms and three baths, three minutes from the station, not over \$10,000 and they have \$2,000 to pay down but would not buy at any price if the place had a mortgage. Now what can you do with such fools as those. We have this same argument a thousands times put to us, and in most cases they only wanted to pay the \$60 a month in buying a place with no payment down, and yet at the same time and every moment be paying over twice that amount in rent, and floating a swell auto.

"If you have material coming over any distance by freight and it is delayed, it also delays your job from completion, the result is it scares the mortgagee who wants to foreclose, or call their mortgage, or the lawyer who represents them don't want to make further payments. There is no other business so honorable as a builder of homes, but so little appreciated. It's nothing but hell from beginning to end. We are going to quit. We know other builders that use stronger language than we do. They are going to quit. Yes, we are done as soon as we get the present jobs completed we advise any one thinking of coming to a hold-up town like ——— to keep away from it. The town is full of foreflushers who like to cut a flash, to keep in step with a few rich fellows, the main population living on their nerve, by bluff. Everything is put in the way of a builder to make it hard for him, in spite of the fact that it is mainly due to the builder that increases the taxes by developing unimproved land.

"The town is a town of snubbs. It's like a comic opera to see the British there and air bubble Americans, and a lot of other trash from all parts of the universe give each other those blank stares, snubbs, as though they were all the shining stars. So it's better to bank on a town of every day life than a swell town. We write you this because we have been asked by you to give you our expression of the present time.

"As there is more money with less effort, that is appreciated in other lines we have picked one out for ourselves, and we are living in expectations of following it. This is our opinion and it will not differ a great deal from many other builders in Jersey."

Building & Construction Co.

Why Build Now?

Some builders hold the belief that it is not desirable to build now, and so advise inquirers; but it is obvious that so long as labor cost remains at a high level the cost of building will not be materially reduced.

Even though some items may be lower this will be compensated for in the higher cost of others directly, or indirectly in the loss of time in obtaining them. Stocks are comparatively low, but there is sufficient to meet demands and labor is in good supply, besides showing a disposition to greater efficiency.

Means are being worked out for a better understanding and a closer co-operation all along the line. One of the problems that is looming up is how to avoid what is called a "runaway market" in the spring. The tremendous amount of building that must be done promises to flood the market with orders and shoot prices as high or higher than ever before. Under all considerations Build Now should be the established advice.

Educating the Public

NATIONAL BUILDER in May, 1919, published the result of one of the most successful and well managed "Own Your Home" expositions in a comparatively small community—that of Oak Park, Ill. It was taken as a basis for a campaign of building expositions throughout the United States. Two successful "Own Your Home" expositions were held in New York, and the third, under the same director will be held in Chicago early in April and after two weeks moved to New York City.

The opportunity such expositions give for bringing the buying public, architects and builders together and establishing an understanding and appreciation of their mutual services and responsibilities is made effective by the various models of different designs and construction materials whereby the material units exhibited are visualized strongly in the terms of houses and homes rather than in brick, lime, wood, stone or plaster.

One of the models, exhibited by the West Coast Lumbermen's Association at the New York Expositions, is shown herewith. It is built to scale and in sections, so that it can be taken down and set up with little difficulty.

The lesson in all this lies in the fact that what can be done in a small community like Oak Park, Ill., is being done in a large way as a commercial enterprise in the largest cities in the country. Contractors and architects are organizing for a larger understanding among themselves and a better understanding of their several duties and responsibilities. Their task in common, so far as it affects their own welfare, is a larger education of the public regarding building—home building, and it is not too much to expect that nearly every community of a size sufficient to justify the work will have building expositions at least once a year in the not distant future.

The Chicago exposition plans are well under way. A committee of architects, representing the Architectural League and the Federated Arts Clubs of New York, and the Illinois Chapter of the American

Institute of Architects and the Illinois Society of Architects, have completed the entire floor plan and installation of the exposition which will be used at the Coliseum and moved to New York later.

It is the idea to inaugurate a prize competition among architects for artistic and economical plans for small houses, as one of the eminently practical features of the show. The winners of these prizes will have their designs published in book form which will be available at the expositions. In addition to this, the winners will furnish plans and specifications at a nominal

Your Home" spirit. The following is a list of the chairmen of the various committees, now at work: Americanization, Mrs. Lucian Charles Eprague; Architectural, Henry K. Holsman, President of the Illinois Chapter of American Institute of Architects; Building Material, Charles P. Thompson, President of the Chicago Building Material Exchange; City Planning, Edward H. Bennett, Consulting Architect; Clay Products, W. P. Varney, Manager Hydraulic Press Brick Co.; Concrete House and Cement Products, A. J. R. Curtis, Secretary, National Conference on

Building & Loan, Savings & Thrift, Mark D. Rider, ex-president United States League of Illinois; Publicity, Horace H. Herr, Editor, American Contractor; Executive, A. J. R. Curtis, Bartholomew O'Toole, Henry K. Holsman, Charles P. Thompson, Dr. Wilson Compton and Thomas F. Hanley.

Reconstruction and Production

The senate committee appointed under the resolution by Senator Calder (S. Res.



VISUALIZING THE ATTRACTIONS OF A HOME

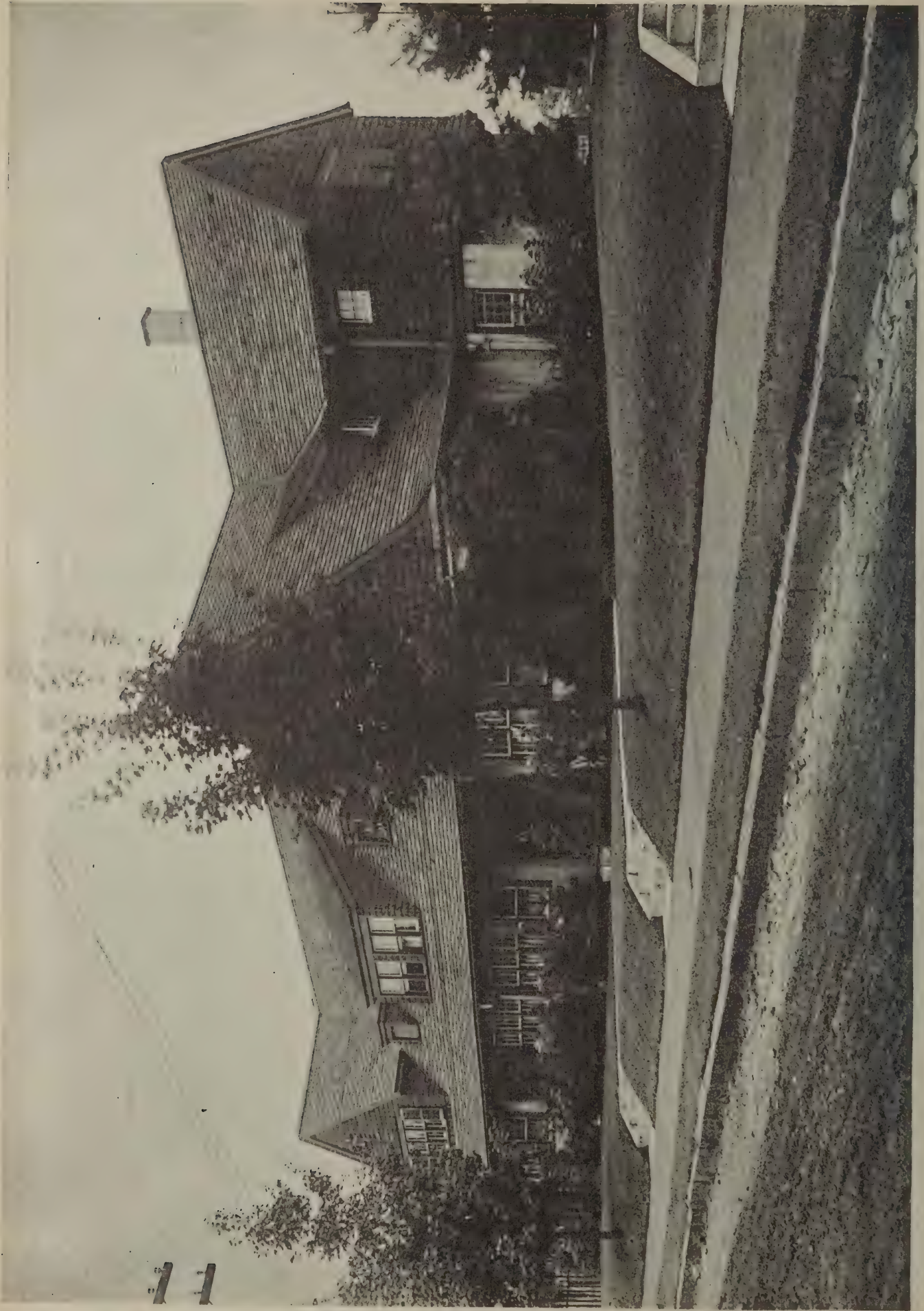
Model house exhibited by the West Coast Lumbermen's Association

price, so that prospective builders will be able to have the benefit of architecturally correct plans, as well as ideas for economical building.

It is planned to have the exposition complete in every detail from the finished model of the prize houses, with grounds laid out, down to the smallest detail of furniture and interior decorating. Every branch of the building industry will be represented, and all affiliated branches will also have representation. The Lee Lash Studios are now at work on an elaborate scenic background which will visualize the "Own

Concrete House" Construction; Household Economics, Mrs. Jean Prescott Adams, Director, Department of Food Economics, Armour & Company; Houses and Home Sites, Bartholomew O'Toole, former Re-Section, Department of Labor; Interior Decoration, Lionel Robertson, Art Director Tobey Furniture Company; Landscape, F. A. Cushing, Smith, Landscape Architect; Lumber and Wood Products, L. R. Putman, Directing Manager American Wholesale Lumber Association; Paints, Varnish, Glass and Allied Industries, W. R. Hyde, President, Paint Oil and Varnish Club;

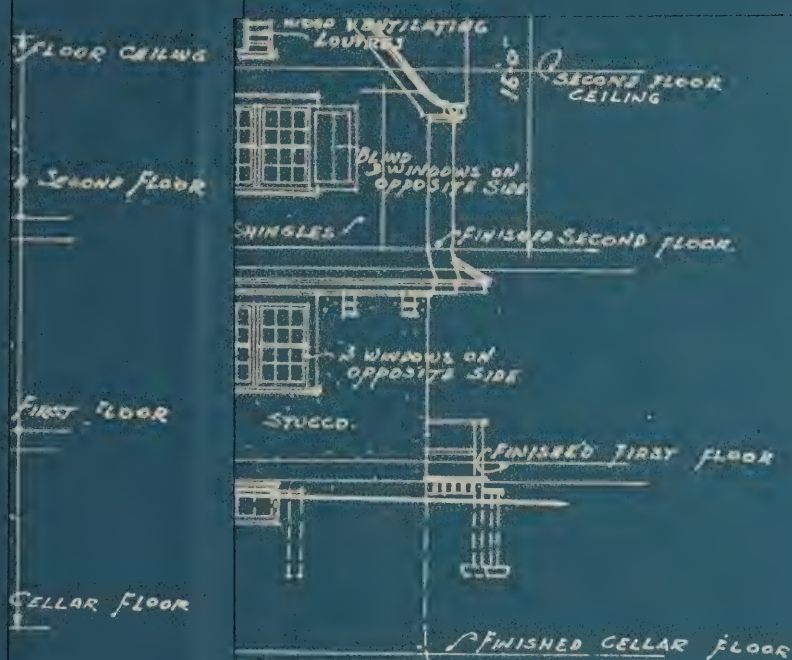
350) to inquire into the general building situation, in compliance with the terms of the resolution, is to report its findings before December 1, 1920. The committee will report such measures as may stimulate and foster development of construction work in all its forms. The work of this committee has been actively prosecuted, and upon its report depends the adjustments that will bring warring practices into constructive order. Senator Calder's committee will visit the Middle West in November after election. Data is being collected by local committees in preparation for the conference.



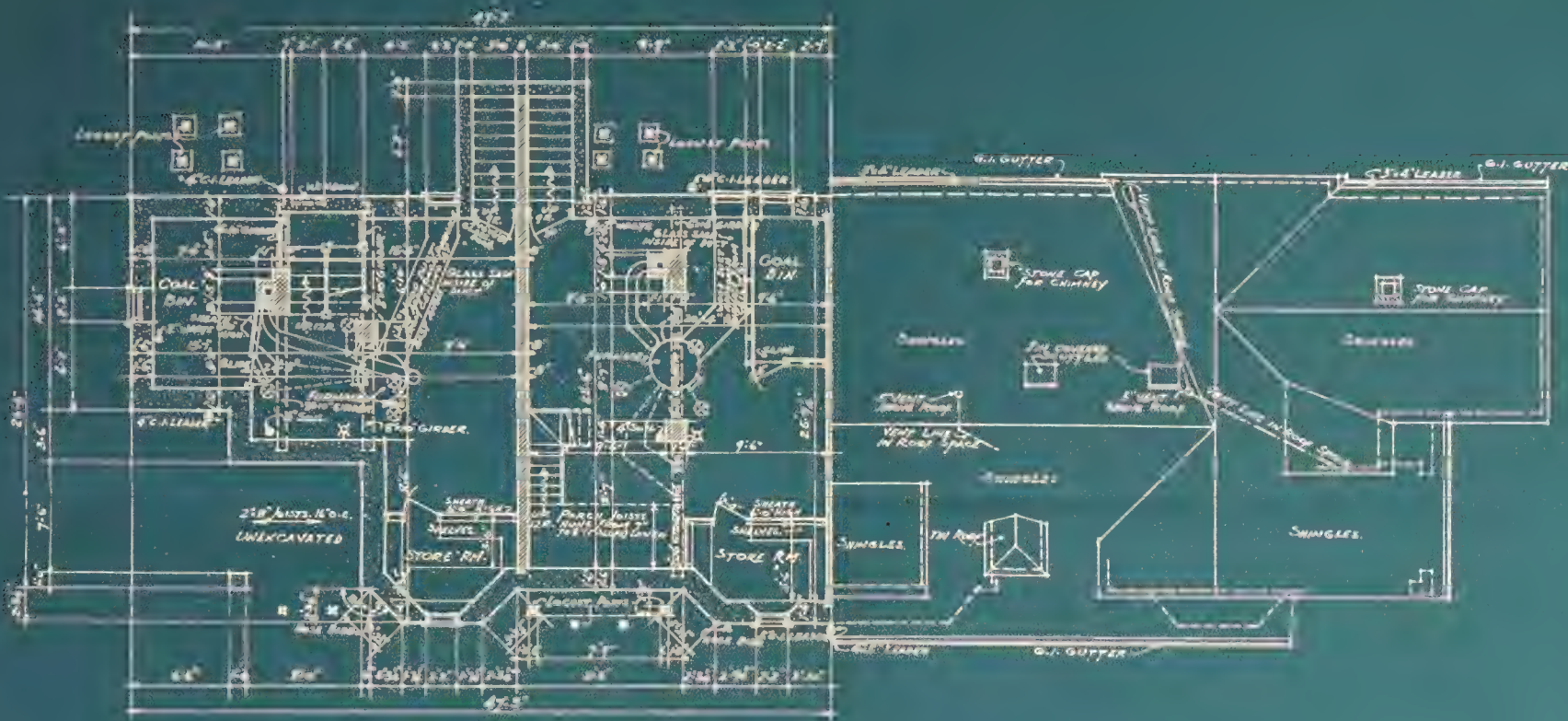
A Four-Family House of Six Rooms in a Small Housing Development

Murphy and Dana, Architects

Blueprint working plans in detachable form are shown in this issue

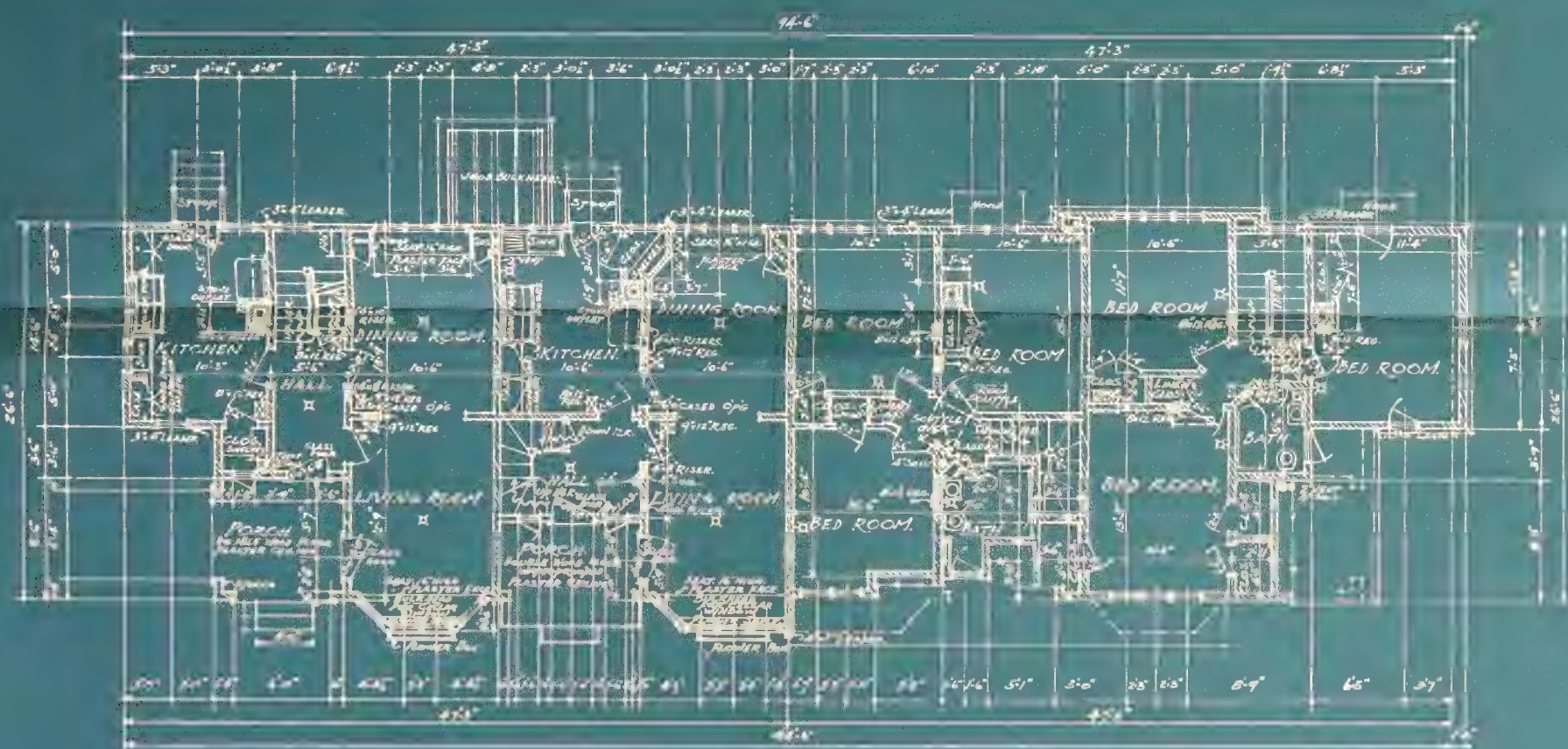


TION.
BUT REVERSED.



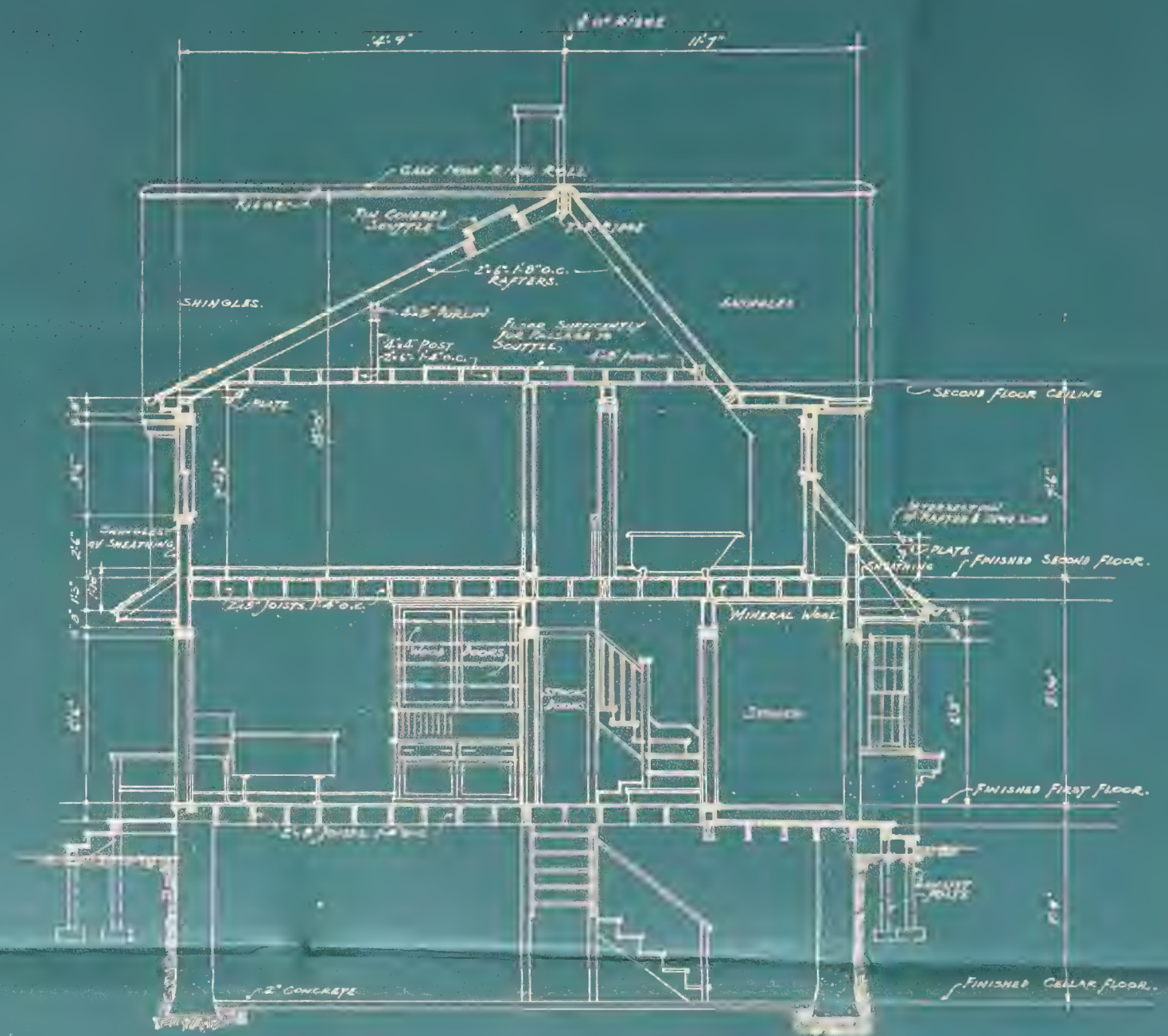
1/2 BASEMENT PLAN

1/2 R.OOF PLAN

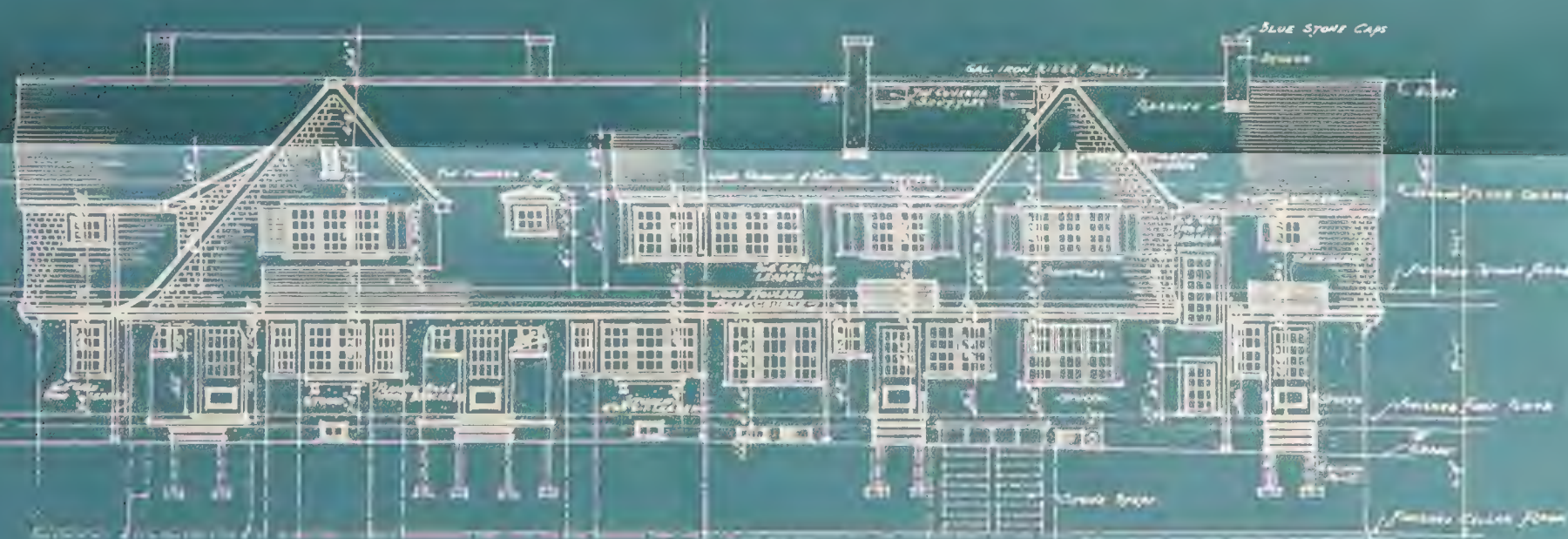


1/2 FIRST FLOOR PLAN

1/2 SECOND FLOOR PLAN



CROSS SECTION



1/2 FRONT ELEVATION

1/2 REAR ELEVATION



NATIONAL BUILDER

November, 1920

WORKING PLANS

of a

FOUR-FAMILY HOUSE of SIX ROOMS EACH

Murphy and Dana, Architects

Scale: Cross section, 1/4 inch to 1 foot
Elevations and plans, 1/8 inch to 1 foot

See Photographs and Description in Reading Pages



SIDE ELEVATION
OPPOSITE SIDE SIMILAR BUT REVERSED

A Small Housing Development

See Blueprint Working Drawings of the Four-Family House in this Development in this Issue

THE houses designed by Murphy & Dana, architects, for Miss Frances E. Osborne at Derby, Connecticut, are unusually interesting not only on account of the excellence of the design, but also because of the unselfish nature of the motive underlying the development.

That is, the apparent desire of the owner is not to capitalize the predicament of those

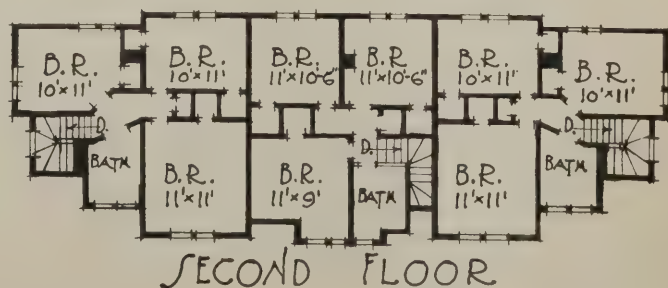
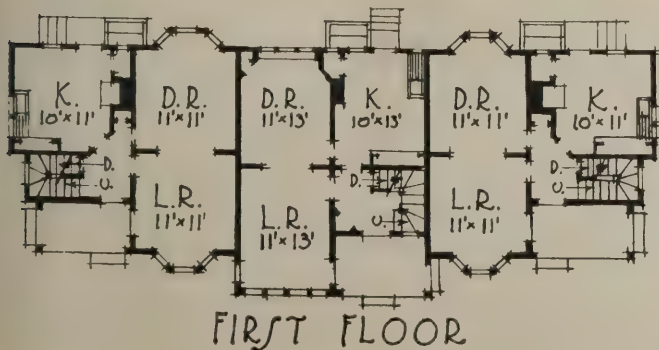
who are unfortunate in not owning a place to live, but is rather due to a constructive effort to remedy this condition by providing homelike tenant houses at an extremely moderate rental. That the motive is sincere and is not a mere pose is evidenced by the fact that we are informed that the rents for the houses with six rooms, bath and cellar, range from 16 to 18 dollars per

month; while the four room houses with bath and cellar, rent for 10 and 12 dollars per month. In view of such evidence it seems that any investigation regarding profiteering would, in this instance, be more properly directed toward the tenants rather than the owner.

Another feature of interest is that all of the houses were not built at one operation,



Type 2 house. Three family. Stucco walls and stained trim





Type 3 house. Three family. Gray stained shingles and white trim

but that one type was built each year for a period of six years. Thus, the development may be termed a progressive one, giving adequate time to judge the needs of individual tenants, and at the same time serve the community to the best advantage.

The houses are of the row type consisting of two, three or four dwellings placed under one roof. The economies of such types are well known and their appearance is usually superior to that of small detached houses offering the same accommodations.

The attractiveness of the houses under discussion is so clearly expressed by the photographs that comment along this line is unnecessary. All of the houses have rubble stone foundations with concrete floors in the basements. The construction above grade is of wood frame covered with painted clapboards, stained shingles, or stucco. The chimneys are of red brick and the roofs are shingled. The floors throughout are of pine, laid single thickness. Doors and interior trim are also of pine and all floors, doors and trim are stained. Interior plaster is two-coat work. Each dwelling contains a modern, three-fixture bath room, and has a sink and laundry tubs in the kitchen. Also a separate hot-air furnace is provided for heating each dwelling. Gas is provided for use as kitchen fuel and for lighting.

All except the number six type houses contain six rooms and bath. The number six type houses have four rooms and bath. None of the houses are more than two rooms deep, thus insuring good lighting and ventilation for each room. All houses have separate porches and entrances for each family.

Houses number one and six are two-family houses for which plans and photographs are not available.

House number two is a three-family house with stucco walls and stained trim. The plans of the end dwelling of this type are exactly alike, but reversed. A porch opens into the living room and also into the stair hall. The living room and dining room are separated by a wide, cased opening, and each of these rooms have bay windows. The rear of the stair hall is narrowed and forms a passage between the dining room and kitchen. The kitchen has cross ventilation and contains a sink, wash tubs, a small pantry and a built-in cabinet, and the range is recessed into the chimney. A coat closet is located at the rear of the stair hall. All first floor rooms open directly into the hall. Bulkhead stairs lead to the basement from the exterior, and an interior basement stair is located under the main stair in the hall. The second floor contains three bedrooms, all of which contain ample closets. A compact hall opens

into a linen closet and into the bath room and bedrooms of the second floor.

The middle dwelling of type 2 is quite similar to the arrangement of the end ones. The first floor rooms, however, are made larger, and the passage between the kitchen and the dining room is omitted, as are the bay windows of the end houses. The second floor bedrooms are somewhat smaller.

Type 3 is also a three-family house, but its walls are of gray stained shingles with white trim. The binding of the roof to the remainder of the house is responsible for much of the charm of this composition. The plan of type 3 is almost exactly the same as for type 2. Only slight differences are made in the shapes of the porches, bay windows, bath rooms and other minor features. The plans of this house are therefore omitted.

Type number 4 forms this month's supplement, and its complete plans will be found elsewhere in this issue. The photograph of this house shows an exterior that is exceptionally attractive. The first story is of rough surfaced stucco with stained trim. The second story is of stained shingles blending with those of the roof. The roof is,—speaking figuratively as well as literally,—the crowning feature of the house. Its long and sweeping lines coupled with the pleasing proportions of its

dormers and gables, form an example of successful roof treatment well worthy of study.

The house contains four dwellings of six rooms each. The end houses are alike in plan, but are of course reversed. The porch opens into both the living room and the stair hall, and the main stair is located at the end of the hall with a basement stair under. The living room has a large bay and window seat across the front and is separated from the dining room by a wide, cased opening. The dining room also has a window seat flanked by built-in china

cases. The relation of the dining room and kitchen is unusual for an American house, in that the front hall is used as a passage between the two rooms. This scheme is a common one in England, however, and is there used as a matter of course even in large houses, when conditions seem to require it. The kitchen is quite large and contains a sink, wash tubs, a built-in cabinet and a small pantry.

The second floor contains three bedrooms and a bathroom, all connected by a compact hall. The bedrooms have closets,—the front one having three,—and a linen

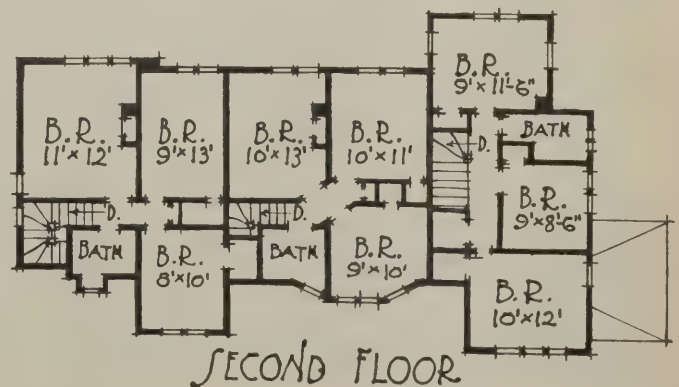
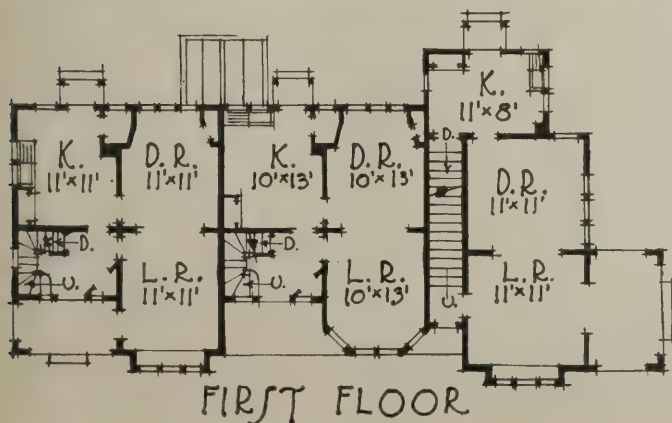
closet opens from the hall. The end bedroom has windows on three sides.

The inner dwellings of type 4 are almost identical in plan with the middle dwellings of types 2 and 3 already discussed. The second story hall arrangement, however, is very slightly different.

Type 5 has shingled walls with stucco and half-timbered treatment in the gables. This house differs from the others in that a balanced rather than a symmetrical effect is expressed. The two front gables differ in size, and the ends of the house are entirely different.



Type 5 house. Three family. Shingled walls with stucco and half-timbered treatment in gables



The Gothic Window and Its Tracery

By John Y. Dunlop

ONE of the earliest examples of the pointed arch which we still have is to be seen at Lynchmere, Sussex, Fig. 1, which was built in 1220. In it the two windows are placed close together and are included under a wide outer arch, with

the solid head between them pierced by a plain circle.

This idea of a complete group was followed by more ornamental treatment such as that of Fig. 2, which is an example of a grouped lancet light built in 1230. This is

a composition of lofty and moulded arches suitable for building into a gable. The windows in this style are always long, narrow and have pointed heads resembling the blade of a lancet. The glass is generally placed near the outside face of the wall and the sides of the openings are deeply splayed on the inner edges. A common arrangement in such groups is to make the central light the highest and to graduate the heights of the others as shown in the drawing.

After a time it became customary to add pointed projections called cusps to the openings; by these the shape of the head of the window was turned into a form resembling a trefoil leaf. This is shown at the three light and the two light windows which were built at Oxford in 1240, Fig. 3 and Fig. 4.

After this time windows began to be further ornamented with mouldings and enrichments and the jambs had sometimes a series of small columns, each of which was intended to carry a portion of the grouping of mouldings in the arch. Fig. 5 shows a window of this type in which the arches are decorated with dog-tooth ornament.

Thus the grouping of several windows (which are often termed lights) under one arch, forms the basis for the system of ornamentation known as tracery.

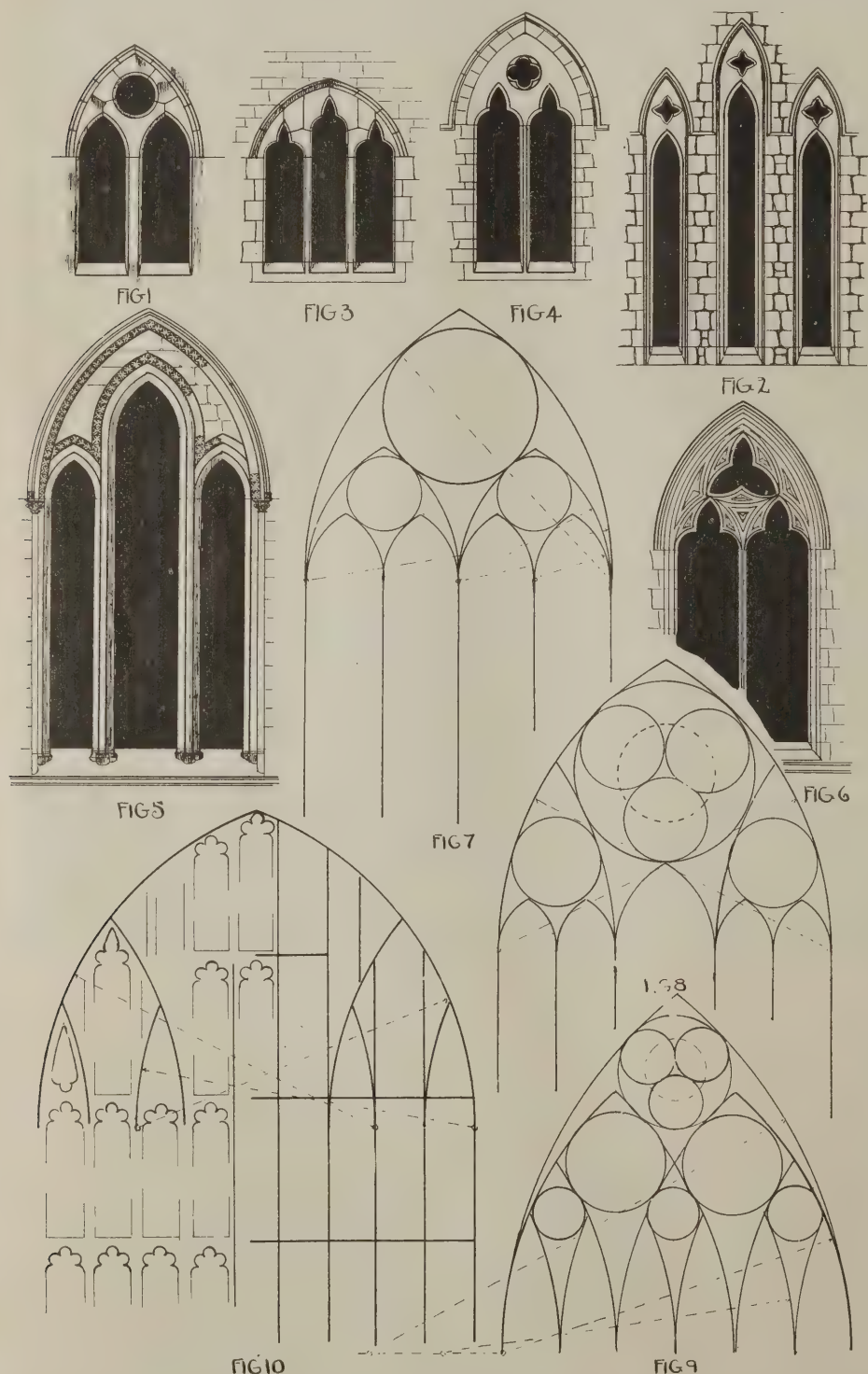
So long as tracery has the simple character of merely piercing through the flat stone forming the window head, it is known as plate tracery.

The ornamentation of the blank spaces of the window heads went on, and by and by the cutting away reached a stage that caused the plain surfaces to resemble bars of stone bent into curved forms. This is called bar tracery and one of its earliest forms is shown at Fig. 6, which was built at Dorchester, Oxford, in 1300.

In the thirteenth and fourteenth century numerous Abbeys and Cathedrals were erected all over England and Scotland, in which the tracery windows are of the most extensive variety both in design and form.

In the latter part of the thirteenth century, when the style is known as "Geometrical Decorated," the windows were large and divided by mullions into two or more lights, the tracery being of a strictly geometrical design, while in the fourteenth century the tracery was more of a flowing form, and was known as "Curvilinear Decorated."

In the fifteenth century window spaces of enormous size were filled with mullions and tracery. Horizontal bars called transoms were then introduced and together



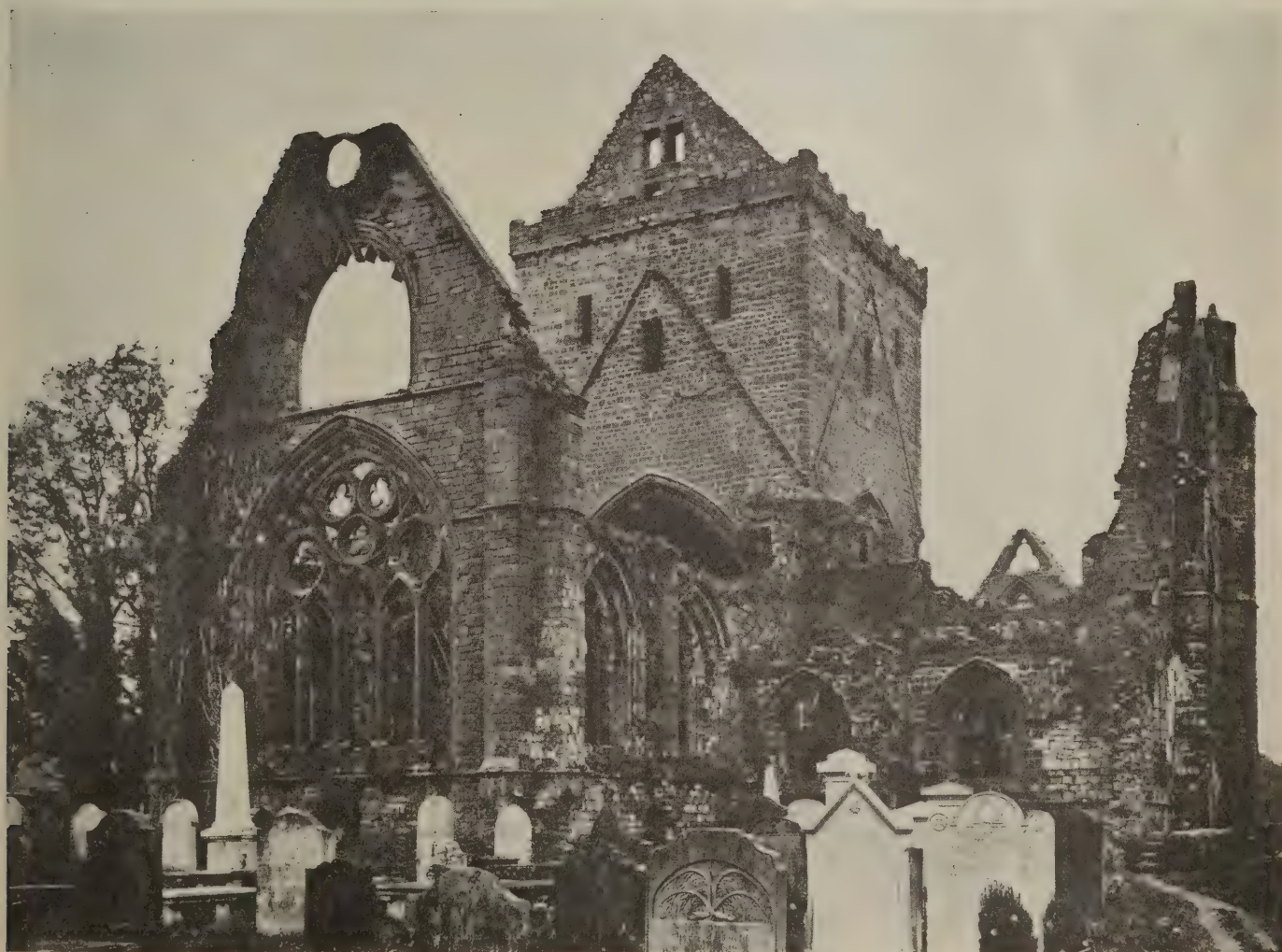
Developments of the Gothic window



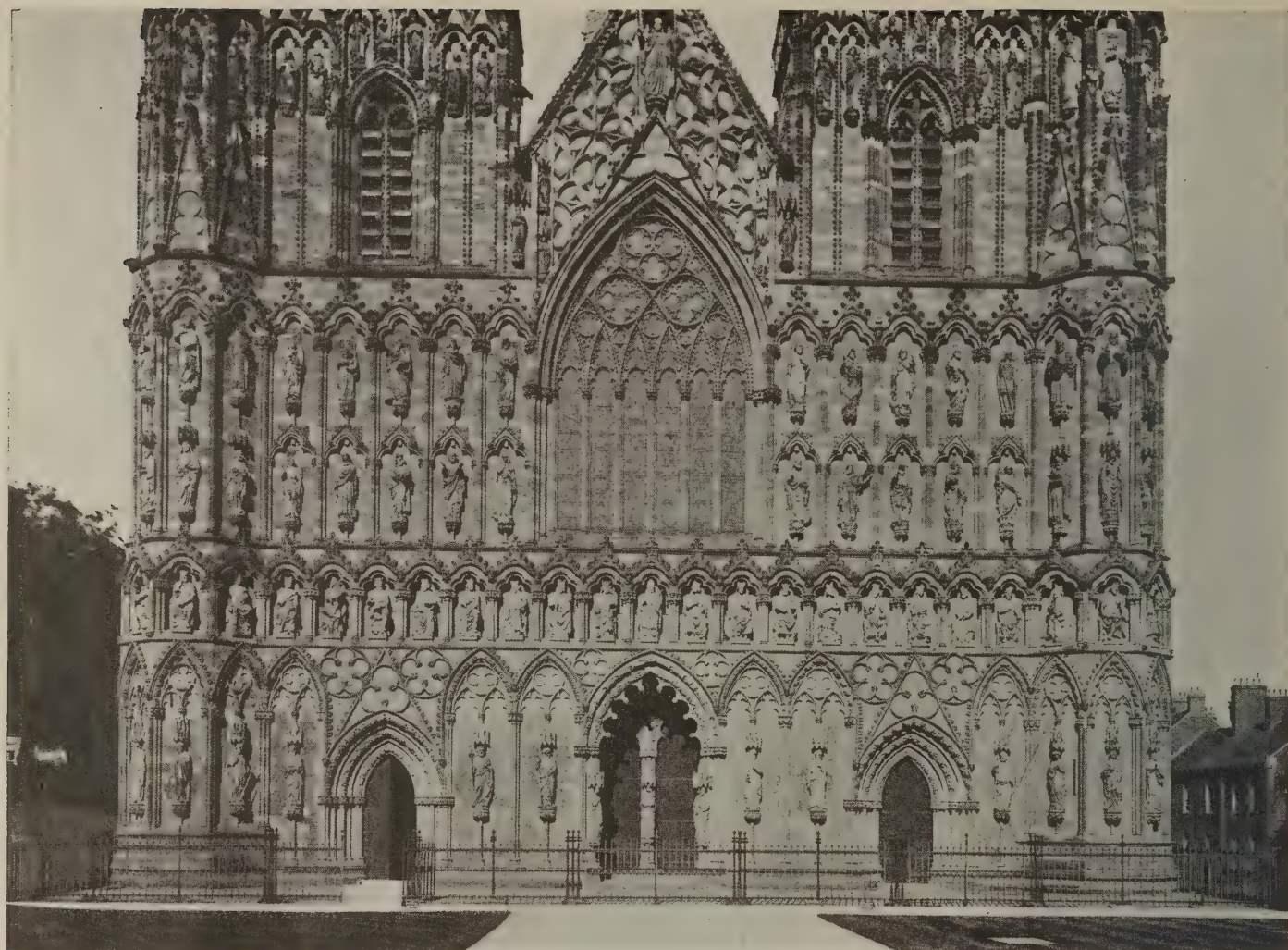
Winchester Cathedral, England



Dunblane Cathedral, Sterlingshire, Scotland



Melrose Abbey, Dumfriesshire, Scotland



Lichfield Cathedral, England

with the upright bars or mullions, formed a kind of stone grating. In this type of tracery a series of small stone arches forms heads to the lights below each transom and a minor mullion often springs from the head of each of those arches so that as the window increases in height the width of its lights decreases. This transom and mullion treatment is known as Perpendicular and is illustrated by the photograph of Winchester Cathedral.

Fig. 7 shows the setting out of the center light in the west facade of the Dunblane Cathedral which is also illustrated by a photograph. The treatment of this window shows a strongly marked contrast between it and those of the earlier periods.

In the building of cathedrals at this time the great windows were looked upon as the frames in which to exhibit stained glass pictures telling the incidents of Bible History.

In the north and west of Europe stained glass was considered an important feature of the decoration and thus the design of the church was always influenced by the desire for lofty windows.

Fig. 8 shows the setting out of a once most beautiful window in the ruins of Melrose or Sweetheart Abbey, also illus-

trated by a photograph. It is formed within an arch of fine proportion. The four mullions divide the window into five lights, pointed and beautifully moulded. The space between them and the great arch is filled with flowing tracery exhibiting great beauty in detail. This Abbey is now a ruin, but enough remains of the windows and the walls and the tower to show us its beautiful proportion and symmetry.

Fig. 9 shows the setting out of the main window in the west front of Lichfield Cathedral, also illustrated by a photograph. Here the arched window is formed with five mullions which are beautifully arched and cusped. The inner tracery bars are arranged to form two intersecting gothic arches which are filled out with tracery composed of circles and quatrefoils.

Fig. 10 shows the geometrical line for the great window in the west front of Winchester Cathedral.

Mercury Plumb Bob

A mercury plumb bob is more accurate than the ordinary type, as it is less affected by air currents. It is more compact and therefore permits working closer in corners, and also takes up less room in the pocket or kit.

Soldering Zinc

Sheet zinc is one of the easiest metals to solder, but the operator must be familiar with his work, says the *Brass World*. Most failures in the attempt to secure joints of the desired strength and quality, where sheet zinc is concerned, are due to overheating the metal. Too long an application of the soldering iron is often responsible for unsatisfactory results. Only a quick pass of the soldering iron over the metal is needed to produce a sound joint. If the contact is prolonged the zinc may melt or its internal structure become so changed by over-heating as to produce a weakening of the metal. Sheet zinc melts at a temperature of 786 degrees F. It is usual to heat the soldering iron until it becomes a dull red, and that is sufficient to perform the soldering of joints of sheet zinc. Solder a half-and-half grade is suitable; but preceding the actual operation, a "cut acid" fluxing solution, or a solution of zinc chloride acidulated with muriatic acid, should be applied to the metal being prepared for the work. Care must be exercised to insure the sheet zinc being first free from dirt and grease, particularly along the line to be soldered, and the seam surfaces must be in perfect contact.

A Small Bank Building



A small bank. Harry D. Phoenix, Architect

THE accompanying illustrations show a bank building designed by Harry D. Phoenix, architect, of Syracuse, N. Y.

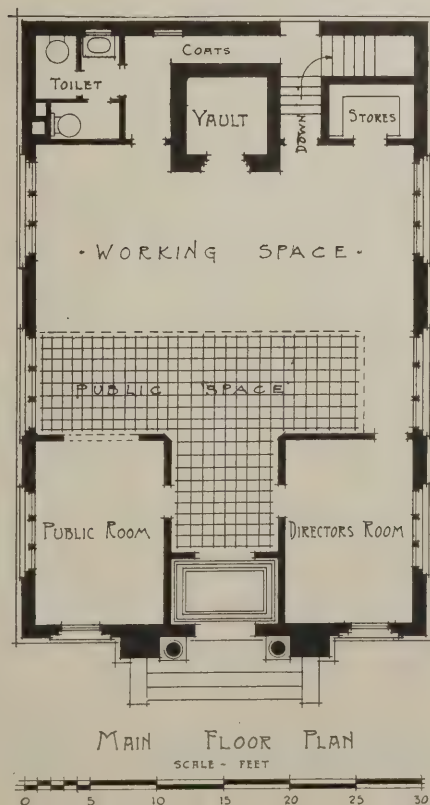
This building is a very satisfactory solution of the problem of a small building suitable for the use of a bank in a small town or as a branch of a larger banking institution.

The exterior is a very attractive piece of work; simple yet not severe nor barren, and expressing the element of stability that is considered quite important in bank design.

The exterior walls are of brick, with cement stone base and columns. The cornice, window frames and so forth are of wood, and the frieze and panels under the windows are of stucco. The brick is of rough texture laid up in Flemish bond with white joints, thus producing an interesting surface. The roof is of slate with copper gutters and flashings.

The vestibule and the public space are floored with tile and the ceiling has a plaster cornice and shallow beams.

At the left of the entrance is a public room for the use of customers who may be waiting for appointments and so forth. This room also opens directly into the public space through a wide cased opening.



At the right of the entrance is a door leading to the directors' room, which is used by the bank officials and for the transaction of private business with customers. Another door leads from this room into the working space.

The working space may be entered from either the front or rear, a rear door being provided for the latter purpose. The working space contains a steel and concrete fire-proof vault, under which is a supplementary vault in the basement for the storage of the less important documents, and so forth. A storage room for stationery and other supplies also opens from the working space.

The rear entrance is of the grade-line type with one flight of stairs leading to the basement and others leading to the main floor level. At the rear of the vault is a narrow passage that may be used for coats. A door from the working space leads to this passage and also to the toilets in the corner. The toilets are placed in separate compartments, with a lavatory convenient to both.

The banking room is well lighted and ventilated by the four large windows in the side walls, and the rear portion of the building has skylights for light and air.

Economy in Building

By Charles E. White, Jr.

HIGH cost of building has now brought about concentrated effort on the part of architects and builders to minimize excessive expenditure and economize to the greatest extent possible.

When building costs were lower there was not the incentive to economize. Rather extravagant methods prevailed in many portions of the United States and architects and builders, and their clients, the building owners, put many things in their buildings which were not strictly essential.

It is the history of every forward movement that the movement reaches its maximum velocity when grim necessity makes it impossible to continue in the old way. Present cost of labor and material has made it necessary to conserve. Former building methods which tended toward extravagance have now become intolerable and the foremost architects and builders,

combining the scientific and practical experience of many years in building construction have already worked out facts which, applied to buildings, tend to reduce costs materially.

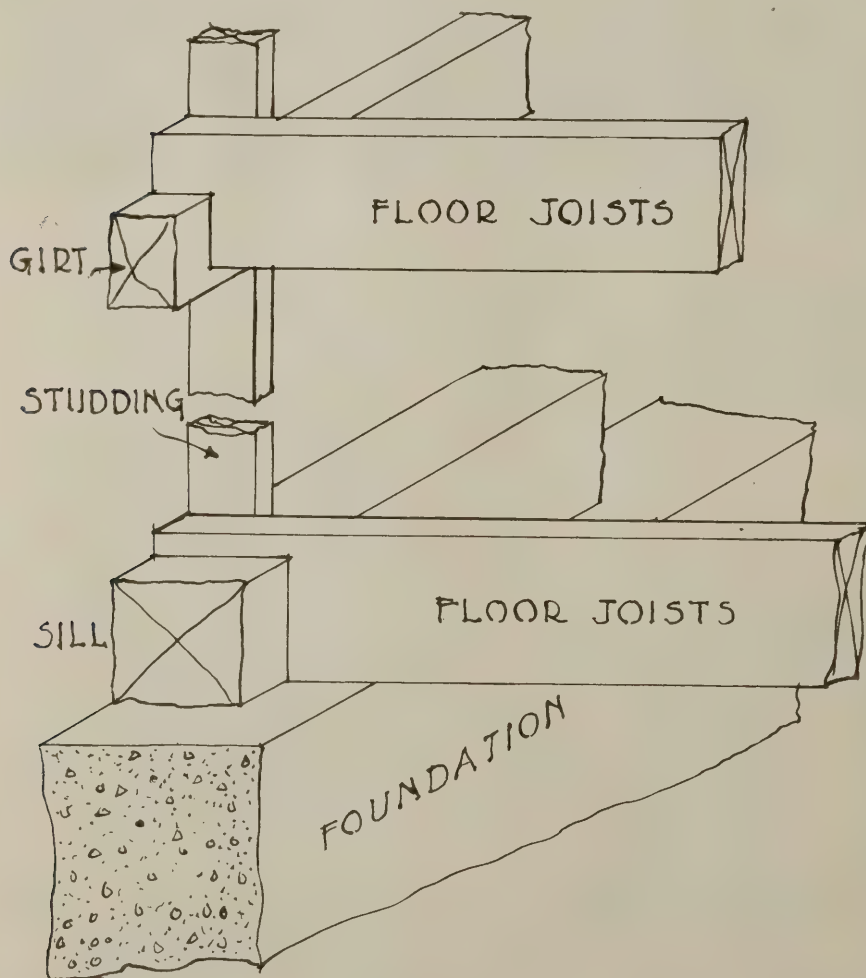
In considering present-day costs you should remember that the advance in the cost of building is not entirely on account of advance in wages and cost of materials. Very largely, present-day buildings cost more than buildings of 15 or 20 years ago because the public demands much better buildings now, with equipment of higher grade. Formerly tin bathtubs and marble-top wash bowls, as well as hopper water closets and cheap, hot-air furnaces, were all that was required in the way of heating and plumbing goods in even buildings of the so-called highest class.

Today, purchasers and tenants of buildings insist upon enameled iron, vitreous

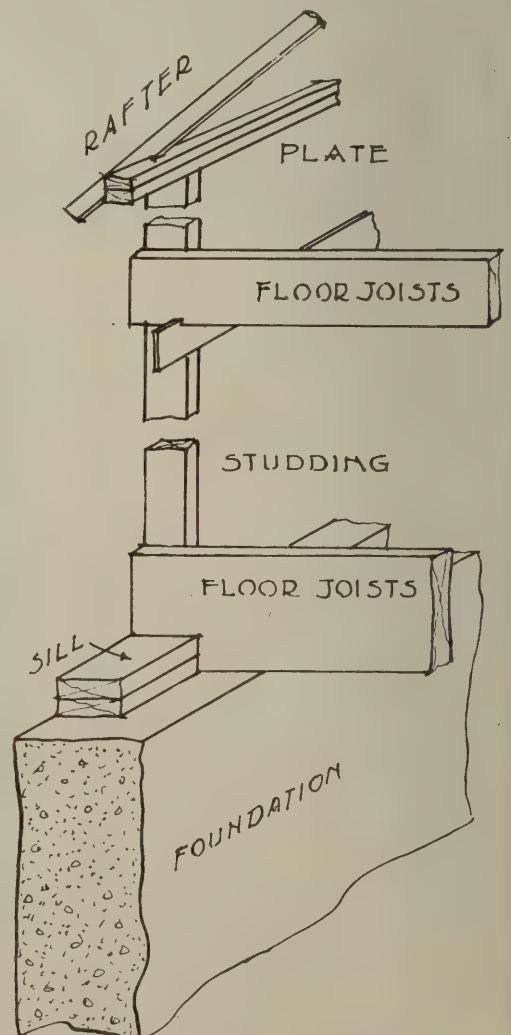
or porcelain plumbing fixtures, and hot-air furnaces or steam or hot-water boilers of very much higher type, and consequently much more expensive as to first cost.

We now require electrical wiring installations in which heavy insulated copper wire is installed in a continuous network of metal pipe conduit with steel outlet boxes instead of the old-fashioned "knob and tube" work. Electric switches and plugs are used in great profusion and the entire electrical contract is of very much higher grade than ever before.

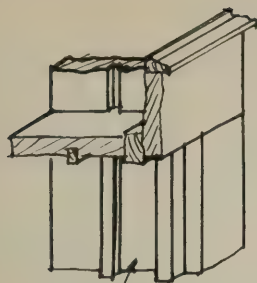
Hardwood floors are demanded in all rooms, bedrooms as well as living-rooms. Tile and marble floors and walls are now employed in buildings of modest dimensions, as well as those of more imposing appearance. Hard plaster is frequently used and metal lathing or plaster board are commonly specified, all most laudable



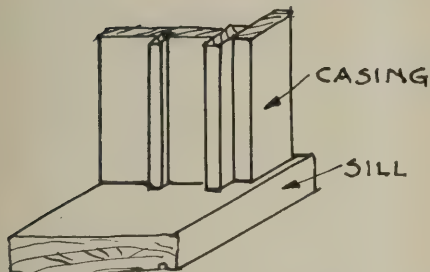
Old fashioned method of framing: expensive and very extravagant use of material not necessary in modern construction



An example of the more modern "balloon frame" in which all timbers are reduced to their smallest sizes



PULLEY STILE



A "stock" window frame costing much less than frames made-to-order and quite as practical in every way. This is true of frames made for wooden buildings as well as frames for buildings of masonry

methods of construction, but methods which are bound to increase cost.

Every basement is of full height, with an excellent cement floor throughout, and (in the case of residences) a complete up-to-date laundry with soapstone, enameled iron, vitreous or cement tubs, instead of old-fashioned, unsanitary wooden tubs.

We now use more structural steel or reinforced concrete than formerly. Enameled paints and high-grade varnishes are employed with greater frequency; roofing materials of greater durability are required; porch floors and outside steps are built of masonry rather than wood; we have cement and brick sidewalks and drives, iron fences, masonry walls, gold and silver lighting fixtures, portable and fixed vacuum cleaners, power clothes washers and ironing machines, and (speaking of residences and apartment buildings), white enameled gas and electric cook stoves.

On the spacious hardwood floors, if you please, we lay costly rugs or linoleum, as the case may be. We sit in beautifully upholstered chairs and put our feet under costly hardwood tables, reading countless magazines and books, in front of real fireplaces equipped with andirons, grates, dampers, fire screens and fire tools.

So it isn't fair to blame it all to the "high cost of building." Some of it ought to be charged off to "high grade of ideals."

Where is the first place to begin cutting down on the cost of a building? Not on quality, surely. There must be no compromise on the quality of labor or materials nor any cheapening of building methods which would tend to reduce the strength of a building or impair its ability to resist the ravages of time. But there

are many places where, formerly, there has been a considerable waste and it is at these points we must apply the most rigid inspection to see if we can eliminate such waste.

In frame buildings there has always been more or less waste in using timbers of excessive size. The extreme of extravagance in this particular, of course, being the houses of our forefathers in which corner timbers were as heavy as 8x8 inches; floor timbers were frequently four and six inches thick, with sills in proportion. There was no need to conserve on lumber in those days when the necessary timbers for a house could be obtained anywhere in forests near at hand.

There is no need to plead for conservation of timber now, as every reader knows the necessity of conservation, but we can reduce waste still further by designing our

frame buildings in such a manner that timbers of small size will suffice.

For instance, for girders of an ordinary house use three, 2x10-inch joists spiked together, forming what amounts to a 6x10-inch girder. A solid 6x10-inch timber costs more and would prove no stronger than the three thin joists, when properly spiked together.

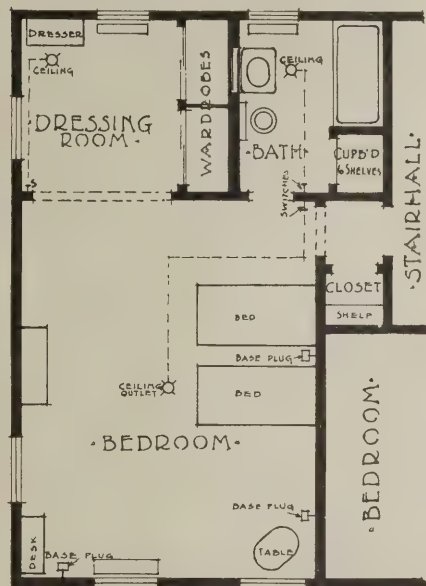
For sills you can get the same result by spiking two, 2x6-inch joists together producing the resulting 4x6-inch sill, flatwise on the wall. Instead of a solid "girt" all along the outside walls of the second story under the second floor joists, try a "rib-bon" composed of a 1x4-inch board, mortised into the studding. As most builders know this is the way a modern "balloon" frame is built and when the timbers are well spiked a structure quite as strong and enduring as the old-fashioned frame is the result, at considerable less cost in labor and materials.

Oak, birch and other hardwood floors are the best in the world but our champagne appetite on a beer income can sometimes be appeased by using softer, cheaper woods for bedroom and kitchen floors. There is a growing tendency to use fancy pattern linoleums on the floors of homes, anyway, so in some cases less expensive floors will do just as well.

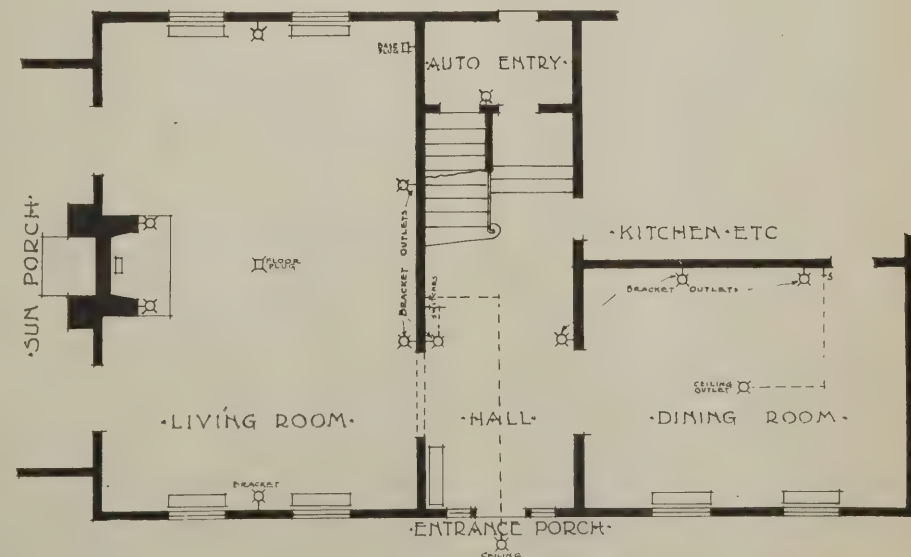
Southern pine makes a good, cheap floor, especially when "rift sawed" so that the grain will not scuff up or splinter in use. Fir makes a good floor for bedrooms and costs considerably less than oak or birch. On the Pacific coast they have other varieties of wood on the cedar or coarse pine order and these make good floors though not so hard and firm as hardwood.

Fir can be used to advantage for porch floors instead of the more costly pine. It stands well for outside use when kept properly painted.

One of the best places to cut out waste



Conserving on the cost of electric wiring. Many unnecessary and expensive outlets can be done away with when wall plugs and brackets are used



Chandeliers are expensive, so the careful owner will do well to eliminate them as far as possible. This diagram shows an economical wiring scheme for the principal rooms of a residence



Inexpensive exterior details: drop siding with "stock" casings around the windows

is in the window and door frames of a building. Use "stock" frames secured ready-made from the mill instead of requiring special frames which cost more, require more time in manufacture and are really no better than ready-made frames.

The amount of lumber that has been wasted in window frames is enormous; sometimes it seems as though as much lumber goes into the scrap pile as goes into the frame. A frame need only be large enough to do the work properly; any more lumber in it than this is extravagant whether it is wasted in an excessively thick sill or unnecessary linings on the interior. As a matter of fact the so-called "box frame," in which a complete box (with interior casing) for containing the weights is included, is more or less extravagant; the interior casing can very well be eliminated as lathing and plaster forms an interior lining for the box.

When it comes to interior trim use stock trim and reduce the amount of woodwork to the minimum if you really want to practice economy. Plain simple members are more popular nowadays, anyway, and you make a saving in first cost when you purchase stock trim from the mill. Next, you make a saving in labor when you use trim of small size. To this add the saving in painting and you will see there is quite a respectable economy.

Stock doors and sash are always less expensive than special designs and often more attractive than the latter. Besides this, you can usually get stock designs from the mill in much shorter time than special designs which must be run in small numbers through the machines. There are now stock doors for every purpose, interior as well as exterior, so it is not difficult to get the right door for the right place.

When it comes to paint you can effect a

saving by leaving out a coat or two here and there providing you specify the highest grade brands you can buy. It pays to use a brand of paint instead of trying to mix your own because you are in this way sure of quality. You are also sure the ingredients will be scientifically prepared and properly mixed. At the same time, with a reliable manufacturer standing behind his goods you can depend upon a square deal. When it comes to paint use the highest quality, only; four coats of first-class paint will often do the work of five coats of

cheaper paint, and do it better; it is genuine economy to use first-class goods.

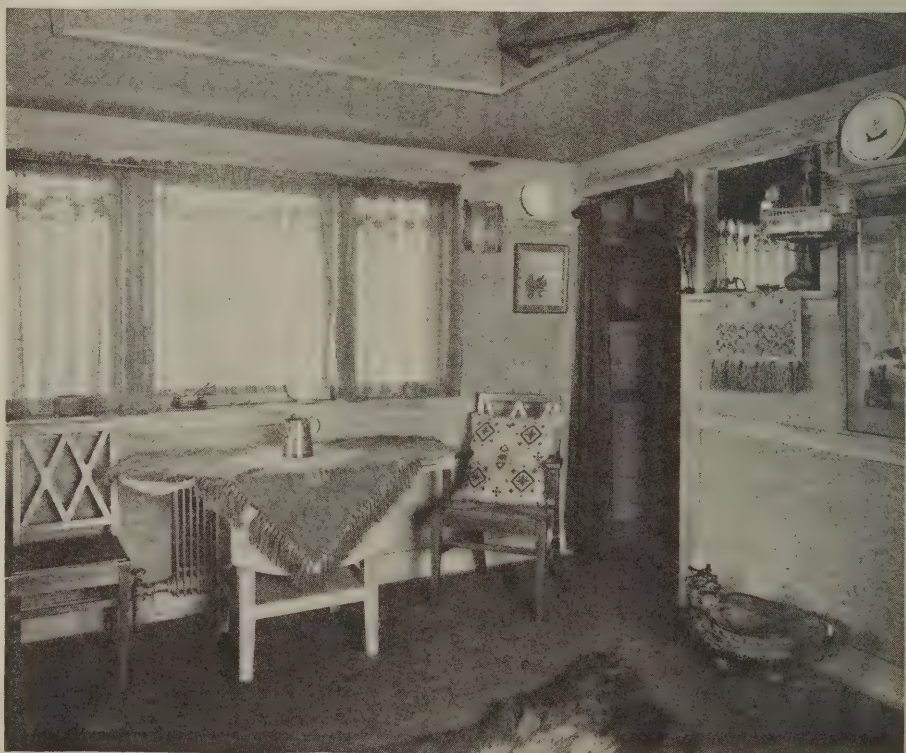
The glass situation is somewhat different from what it was a few years ago. Manufacturers no longer guarantee perfect sheet glass except at a fancy price. Especially in large lights, there will be many flaws. For this reason there is a tendency to have sash cut up into small lights, as imperfections in small lights of glass are not so conspicuous as in large lights.

In electric wiring there must be no economy in quality but by a little thought you can reduce costs by studying locations of outlets carefully and having no waste openings.

Begin with the living-room. Leave out the chandelier in the center (usually an expensive fixture). Light your room with side lights and floor and base plugs, and use only enough of these to do the work. The tendency now in houses is to light rooms by means of floor and table lamps instead of ceiling and wall outlets; this is usually economical.

Owners building houses or apartments to sell or rent have found that base and wall plugs are cheaper to install than chandeliers and wall brackets because in this way the *tenant or purchaser* furnishes the lighting unit (lamp).

In choosing brick or stone for the exterior, economy may be effected by selecting materials which can be obtained nearest at hand rather than those which must be shipped in from a long distance. Remember, on stone work plain, sawed work costs less than "bush-hammered" or other



A simple line of interior trim should be used throughout a building: trim like this can be purchased ready-made at any mill

more expensive surfaces. On brickwork, ordinary face brick with regular "tooled" close joints is less expensive than more unusual brick or special shade, with "fancy" joints.

Odd and unusual things are often beautiful and highly to be commended. They do not usually, however, conduce to economy. If you want to build at the lowest possible cost you must select cautious, con-

servative methods and employ the ordinary materials to be found anywhere in the open market. This does not mean that you will get a stupid design,—not if the designer is on to his job.

A Small Library

THE prime purpose of a public library is to render service to the reading public. In recent years, however, the tendency

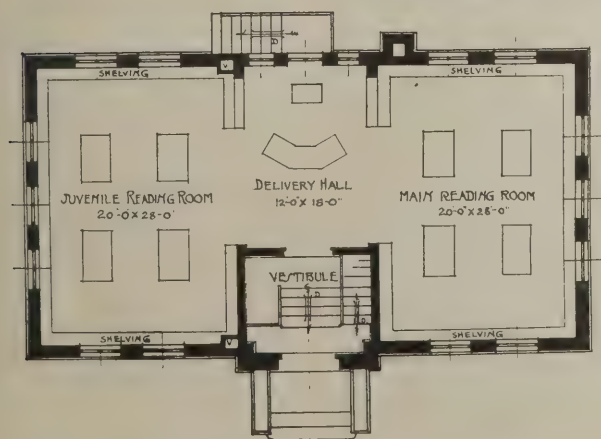
has been to extend the usefulness of public libraries, especially those of the smaller communities by providing a meeting place

to accommodate the community activities of the general public.

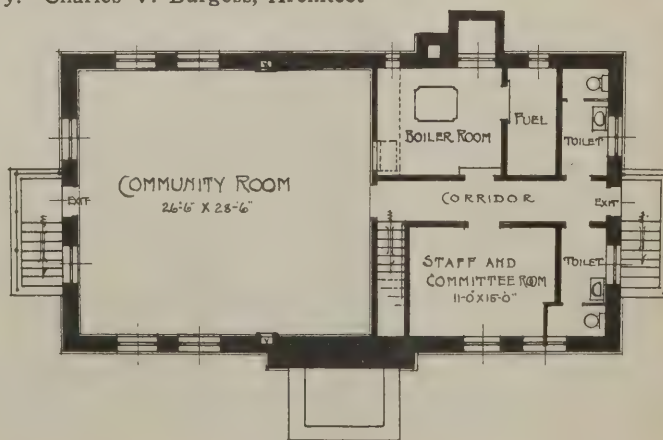
This is usually accomplished by providing



The Saugus, Mass., Public Library. Charles V. Burgess, Architect



FIRST FLOOR PLAN



BASEMENT PLAN

an auditorium or community room that is available for the use of community organizations and other public groups who require a large meeting place. The development of community spirit is receiving a great deal of attention, and from present indications bids fair to become one of the most important social movements of the time. It deserves serious consideration in the formulation of a design for almost any type of public building, especially libraries and schools.

The public library of Saugus, Massachusetts, which is the subject of this article, was designed by Charles V. Burgess, architect. It provides, in addition to the library accommodations, a community room for the use of public gatherings.

The exterior is a simple and dignified design in gray brick with cement-stone trimmings. The basement is of concrete, and the roof is of slate with copper gutters and downspouts. The entrance is unusually attractive and well executed.

The community room is located at one end of the basement and it may be reached by means of stairs leading from either the main vestibule or from the areaway at one end of the building. Two ventilating ducts provide ventilation in addition to that furnished by the windows. No permanent stage nor other special features are provided, as it is held that the few activities requiring those facilities may be taken care of by renting private quarters.

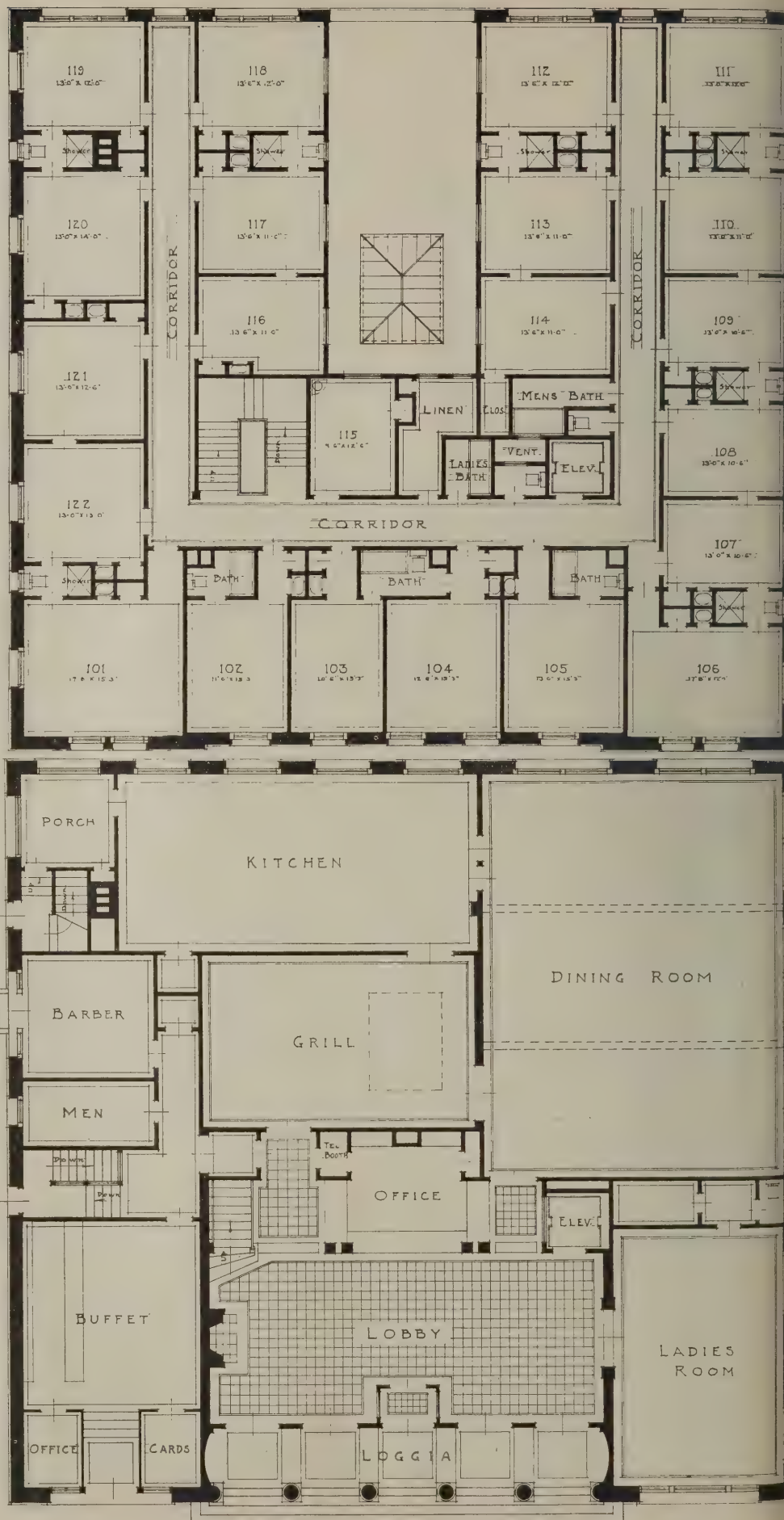
Another feature worthy of note is the arrangement of the public toilet rooms at the other end of the basement. These toilets may also be reached by means of an exterior area stair and thus may serve as public comfort stations as well as serving the occupants of the building.

A room for the use of the library staff and committees is located near the stair leading from the main vestibule. Across the corridor are the boiler and fuel rooms.

The entrance to the first floor is through a vestibule containing a short flight of steps leading up to the first floor level. Directly in front of the entrance is the delivery hall containing the librarian's desk and table. At the rear of this space is an exit and a flight of exterior steps leading to the ground level.

Two reading rooms are provided; the one at the right for general readers, the one at the left for children. The reading rooms are separated from the delivery hall by wide arches which permit the librarian to supervise the reading rooms without leaving the desk. High shelving surrounds the walls and good lighting and ventilation are assured by large windows in the three exterior walls of each room.

While men are earning more than double the wages they ever received before it should be obvious that the cost of the work they do must be paid by somebody. When the builder tries to protect himself he is "investigated" when he should be helped.



Floor plans of Minden Inn, Minden, Nev. F. J. DeLongchamps, Architect

A Country Hotel



Minden Inn, Minden, Nev. F. J. DeLongchamps, Architect

“WE have been seeking for 20 years a model country hotel of about 50 rooms and this is the nearest approach to it that we have yet found” is the declaration of John Willy of *Hotel Monthly*, to whom we are indebted for the illustrations, plans, and the following description of the Minden Inn, Minden, Nev.:

Minden Inn is a brick and stone structure three stories high, and contains 45 rooms and 25 baths. It was designed by Architect F. J. DeLongchamps of Reno for the Danberg Land and Live Stock Co., which built it and now own and operate it. You will note that the lobby is windowed its full length to the street. At one end is a parlor or ladies' lounge, as it is called; at the other a big mantel breaks the wall space. The clerk's desk faces the main entrance. To the right of the desk is the door opening into the main dining-room; to the left is the elevator, and the entrance



The Lobby

to the grill. The walls are beautifully finished in wood; the tile floor is rug-covered, and upholstered furniture is scattered comfortably about.

The main dining-room (see illustration) is regularly set up for 80, but it will comfortably seat 150, and for banquets will accommodate 200. This room has windows overlooking the private park on one side and the street on the other. There is a player piano in evidence, and the floor is waxed for dancing. The grill, to the left of the dining-room, is finished in dark wood and has a red tile floor. This room is patronized largely by automobile parties, who prefer it to the more formal dining-room. It is also used for the chauffeurs.

The men's side of the ground floor is to the left of the lobby. The former barroom, now dispensing soft drinks, fronts on the street. To the rear of it is a lavatory finished in marble and tile, and the barber shop with two chairs and a bootblack stand.

The kitchen is a large, light room with windows opening on the private park. It is equipped with modern oil burner range, and has patent electric blower for mixing the air and oil fuel. There is a rotary dish washer, and many other carefully selected labor-saving devices.

The basement contains a sample-room, a storeroom and a locker-room for the use of the employes. The hot-water boiler is installed there, and the reserve supply of firewood.

On the bedroom floors the woodwork and doors are white. The halls are painted; the rooms are papered. Each room is equipped with a wooden door transom, steam heat, running water, telephone and clothes closet. The furnishings include a brass bed with box springs, a dresser, a desk, rocker and straight chairs, simply draped curtains at the windows, and a neat, small-patterned carpet in neutral tones. There are both ceiling and bracket lights. The bathrooms contain porcelain tubs and every convenience required in up-to-date sanitary appointments.

Fire-Proof Construction in Country Places

C. B. Zalesky, of Rugh & Zalesky, architects, of Cedar Rapids, Iowa, talking to a representative of NATIONAL BUILDER, on the importance of fire-proof construction, expressed himself thus:

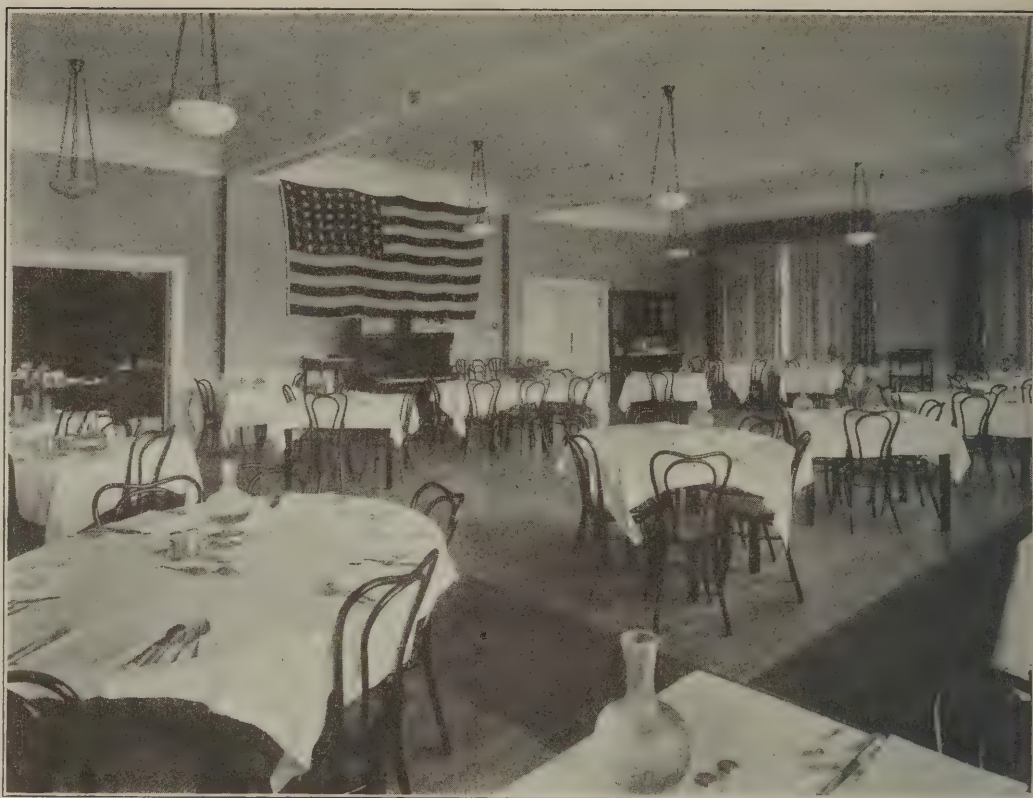
"One of the mistakes being made today in the construction of public and commercial buildings in country localities is neglecting to make them fire-proof. This

applies particularly to consolidated school houses.

"Fire-proof construction is even more important in the country than in the cities, for in our cities there are paid fire departments ready to respond to the first call for help to extinguish a conflagration. But in the country, no such help is possible. If the fire gets a start, the building generally burns down.

"We do a great deal of school building work and work on banks, and, until recently even many of the banks in the smaller places were not of fire-proof construction. The chief weakness in ability to resist fire was in the floors, which have been mostly of wood. But now there is a strong tendency towards concrete for floors in banks, the concrete being overlaid with wood.

"As an indication of the change of opinion on the fire-proof construction problem, I cite the fact that we have just completed a bank building in a little town of only about 500 people, and the directors decided to make it entirely fire-proof, as being their only assurance of its safety from fire. Having decided to make it fire-proof they went further and made it beautiful; for you can't afford to spend more money than you have to on a structure that is not fire-proof. Feeling safe in their investment, the directors expended about \$50,000 on a structure having a frontage of 30 feet and a depth of 55 feet. It was possible to use marble and other costly materials freely because the danger from loss by fire had been removed."



Dining-Room, Minden Inn, Minden, Nev.

Built-in Furniture Helps Sell Houses

The Reifschneider Realty Company, of Marshalltown, Iowa, has built 18 residences in Watertown this season and 65 in Newton. C. F. Johnson, in charge of the Watertown office, tells the NATIONAL BUILDER that he finds built-in furniture a great help in selling any kind of a residence, whether built for wealthy people or for people of moderate means.

"We build-in a great deal of furniture, and have been doing that for the past four years," said he. "We find built-in book cases, sideboards, buffets (with bevel plate mirrors all round the top), kitchen-cupboards, Pullman breakfast rooms, are all very popular with the buyers. Nearly all of our houses now have breakfast rooms.

"We find that the wealthy man, when he builds, builds in many of these things. Also the wealthy man that is a prospect for buying a house is keen for the built-in stuff, in spite of the impression that some have that it is the poor man without much furniture that is looking for built-in conveniences.

"Our houses run from \$7,000 to \$13,000 in value, and the houses that have the most built-in furniture are the easiest to sell. The main point is that the built-in furniture catches the women; the man doesn't crave it so much.

"As soon as a woman gets into a house and I show her the white enameled breakfast room, the house is sold, unless financial considerations stand in the way.

A California Bungalow in Kansas

By Arthur F. McCarty

THE bungalow illustrated is one of eight designed and built by the writer as a real estate development in Salina, Kans., all of them being sold on terms of one-tenth cash, the balance on monthly payments calculated on the plan of the building and loan associations, which makes the payment each month amount to \$1.20 for each hundred dollars of the sum to be paid off, the payments continuing for 144 months, and, in that period, the payments discharge the whole sum, principal and interest. The houses were sold for \$3,450 to \$7,500, varying with their size and quality and also with the rising costs of building. This is the first one built, cost \$2,650, was finished in the spring of 1918, and was sold a year later for \$3,450, including the lot, 41x80 feet in size. There was very little profit in this bungalow for the builder, but it started the development, and the later ones paid well.

As shown by the accompanying plans, the bungalow is 26x34 feet in size, exclusive of porches. The foundation is of poured concrete, not reinforced. The basement is the full size of the house, with dirt floor, and contains a furnace. There are no partitions in the basement. The concrete foundation was extended, or an addition to it was built around the porch, and four-foot hollow squares were constructed to carry the porch piers, all poured at one time. The front porch floor is a reinforced concrete slab five inches thick, containing $\frac{3}{8}$ -inch round rods one foot on center each way, and the steps are reinforced to hang from the floor, which rests in turn on the concrete foundation previously prepared. This house was built on low ground, much filling around it being required, which was the reason for this kind of construction.

The piers are of wood frame construction, covered with metal lath and stuccoed with white portland cement and asbestos, half and half. Stucco was also used on the foundation above ground and the chimney. The walls of the house are ordinary frame construction, boxed, papered and sided, the siding being California redwood in courses consisting of two four-inch and one eight-inch board alternating, and placed the rough side out, then stained brown with creosote shingle stain. The trim is white paint. The roof was sheathed solid, placing eight-inch yellow pine boards as closely together as possible, and thereon was placed composition roll roofing, covered with white sand. The white roof in contrast with the brown walls gives the bungalow a very striking appearance.

The porch has no ceiling, the rafters

showing. Car siding of clear lumber was used for sheathing, the rafters dressed and the whole stained brown. The gable of the porch is a grill made of cypress boards

kitchen and closets, where it is smooth. Sand finish plaster in a closet is apt to take the skin off knuckles when reaching for clothing.



A California bungalow in Kansas

placed upright, alternating two two-inch with one eight-inch board, and this grill admits air and some light.

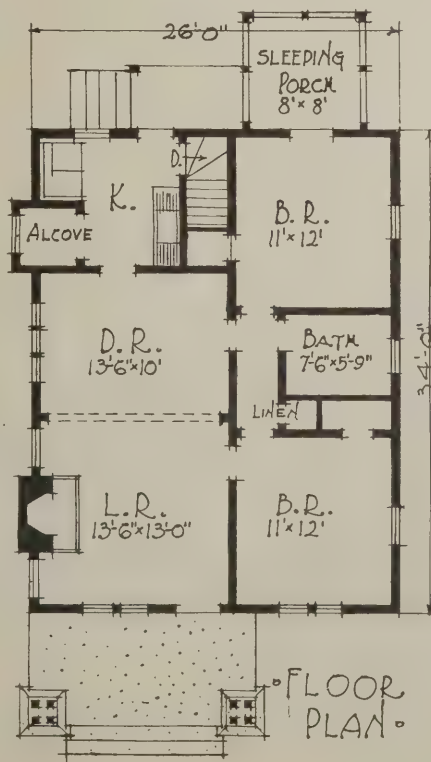
The interior of the house is floored and finished in Oregon fir, the design of trim being back-band; the doors two-panel stock. Plaster is sand finish throughout except in

The living- and dining-rooms are as one room, and the result is livable and convenient. The fireplace is of rough tapestry brick with mantle of wood, and all the woodwork except in kitchen is finished natural on the fir. The bath is placed conveniently between the two chambers, and the sleeping side of the house is entirely separate from the living side. Both chambers have cross ventilation and good closets, with electric lights in the latter. The linen closet is in the small hall, and contains two drawers and two doors, the lower of which is a compartment with a shelf, and in the floor below the shelf there is a small trap door to provide access to a chute to basement should one be desired later.

The sleeping porch is large enough for one full size and one child's bed and is screened and provided with canvas curtains on rollers to shut out rain on occasion. It is reached by a French door from the rear chamber.

Gas is used for kitchen fuel and there is no kitchen chimney. The large built-in cabinet, the elevation of which is illustrated, contains the sink and enough shelves, compartments and drawers to hold all any ordinary pantry will hold. The screened kitchen porch was eliminated from later houses, as it has been found undesirable, being a sort of catch-all.

The breakfast alcove is one of the features of this house, and, finished in white enamel, is dainty and attractive—the whole



kitchen is finished the same, by the way. The housewife who lives in this bungalow says she saves a large part of her laundry by having the alcove, as the family uses the large dining table but two or three times a week, using but a small cloth for the nook table.

The roof-pitch is low, but one-sixth, and the summer sun gets pretty hot, so ventilators were placed in the gables. They are of slats to keep out the rain, backed with screen to keep out flies and bugs, and there is a tightly-closing door for winter time. They are left open all summer and make

a surprising difference in the mid-day temperature of this low bungalow.

The house has electric lights, gas and water and is called thoroughly modern according to the standards of the town. The main frontage is west, with the north side to the side street.

"Bungalows Eternal"

THE problem of the attractive, maintenance-proof fire-resistant bungalow has

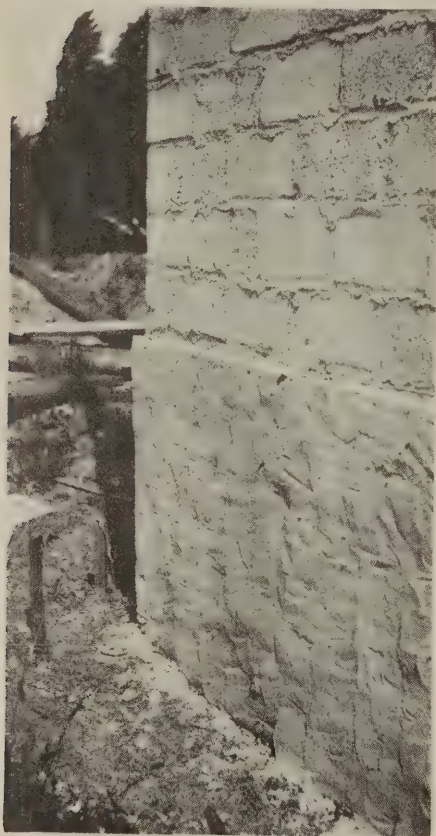


Fig. 1. Wall detail of concrete houses at Riverside, Illinois, showing rough texture of concrete stucco block and careful sealing of the walls below grade with a coat of 1:2 portland cement mortar



Fig. 2. General view of bungalow under construction. The block are quick to lay because of the stucco covering, requiring only plain flush joints

been solved in a recent development at Riverside, Ill., which includes some twenty-five one-story residences of concrete block and stucco construction. The contractor, Conrad Carlson, built them on the assumption that the ready sale of small dwelling houses at prevailing high prices could be made sure by building them of highly fire-resistant construction and eliminating as far as possible every item of maintenance expense.

Foundation and building walls are of concrete block, carrying two coats of portland cement stucco, with stippled white marble or granite finish; in a few houses

trimming or a partial veneer of face brick has been tastily used to form contrast with the broad stucco areas. In all of the houses precast concrete sills, lintels and architectural trim were used. Basement and porch floors are of concrete; the building floors are of the usual wood joist construction, protected on the under side with metal lath and cement plaster. The roofs are of red concrete roofing tile and cement-asbestos shingles on a wood frame, the under-side of which is fire-protected in the same manner as the under-side of the floors.

Maintenance of the exterior is limited to



Fig. 3



Fig. 4

Fig. 3. One of the completed "maintenance-proof" houses at Riverside, with concrete block and stucco walls, concrete floors and trim, and roof of red concrete roofing tile

Fig. 4. Another attractive concrete bungalow of the Riverside group with no exposed frame construction except window frames and gutter boards. The builder, E. Conrad Carlson, advertises his buildings as the "bungalows eternal"



Fig. 5



Fig. 6

Fig. 5. The neat and attractive appearance of two-tone stucco work trimmed with red face brick is well demonstrated in this building. Like other houses of the group, the walls are of concrete block, but the roof is of cement-asbestos shingles. Fig. 6. This residence, under construction, has a face brick veneer over concrete block up to the sill line, above which the block will be covered with stucco. Although the structural wall material is identical in all of the "bungalows eternal," the occasional artistic use of face brick as a trimmer or a veneer has added to the interest of the group.

painting of the window frames and the gutter-board, the only exposed wooden portions, and to replacement of gutters as required. The interior arrangement of all the houses is compact, keeping the cubage unusually low for the size and convenient arrangement of the rooms. No two houses are identical in size, shape, plan or roof, although a great saving of material was affected throughout by the standardization of wall material, window and door frames and other structural accessories.

The type of wall construction is shown in Figure 1. The block used are of the plain unfaced variety supplied for stucco covering; below grade these are covered with a rich cement mortar and above grade with a body coat of portland cement stucco carrying an attractive surface coat of light color. Several houses carry tinted stucco surfaces, produced with standard mortar colors, while the dwelling shown in Figure 4 is trimmed with red face brick and that shown in Figure 5 will have a brick veneer and stucco surface when completed.

More Thorough Fire Stopping Needed

Edward Mahnke, building inspector of Waterloo, Iowa, tells the NATIONAL BUILDER that better work in making fire stops in houses would greatly decrease the number of serious fires. Many of the fires that now destroy entire houses would be held in one place and be easily put out, were it not for the drafts that exist in the walls of houses. "In one case," said he, "our fire department put out a good-sized fire that burst out from one side of the house at a considerable distance from any possible source of conflagration. It remained a mystery till, a considerable time afterward, a part of the house was opened up to make some additions. Then the course of that fire was plainly traceable. It had started 40 feet from the place where it originated, had confined itself as it went, to the region where the draft was, and had not become

serious till it reached the open air. It had died out of itself through the first part of its passage. If there had been fire stops to bar its course, it possibly never would have broken out anywhere.

"I find the worst condition as to fire stops in houses that were built more than twenty years ago. Then, in many houses, the fire stops were ignored, as they were considered merely mice-stops. Neither the state law nor the municipal code permits us to interfere with these houses, except in alterations being made that require us to issue a permit."

Color of Cypress Heartwood No Indication of Durability

Southern bald cypress is about the most variable in color of any of our native woods, and in different localities is known as red cypress, yellow cypress, white cypress, and black cypress. There is a

rather prevalent belief that cypress with dark colored heartwood is the most durable, but the opinion of the U. S. Forest Products Laboratory is that as far as durability is concerned the color of the wood makes very little difference. In service records obtained by the laboratory, any difference in the length of service of red cypress and yellow cypress appears to be due entirely to a difference in the amount of sapwood in the timbers. Cypress trees with light colored heartwood usually have more sapwood than those with dark heartwood and sapwood is not resistant to decay.

The important thing if durability is desired appears to be to select the heartwood of cypress regardless of its shade.

Keep the Mixer at Work

The mixing machine has other uses fully as important as its employment as a concrete mixer.

In this photograph it is making mortar—and incidentally money—for its owner.



Mixing mortar with a concrete mixer

Three Colonial Houses

STYLES in houses come and go, sometimes springing into popularity in a season and then dying out almost as rapidly. The colonial style, however, for almost three hundred years has made its influence felt in American house design. It may

waver in popularity somewhat, as for instance during the Victorian period of the past century when jig saws and cupolas took the place of good taste, but it is too deeply rooted in our consciousness for us to ever give it up entirely.

Its advantages are many and include the important fact that it was "made in America." True enough, it was adapted from the English houses with which the early colonists were familiar, but nevertheless, it embodies many elements that make



Fig. 1—Residence of Mrs. Irene D. Overn. C. E. Schermerhorn, Architect

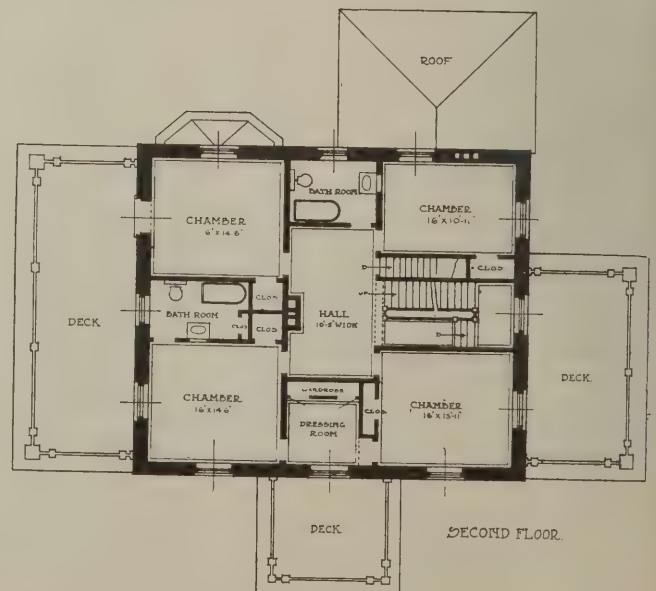
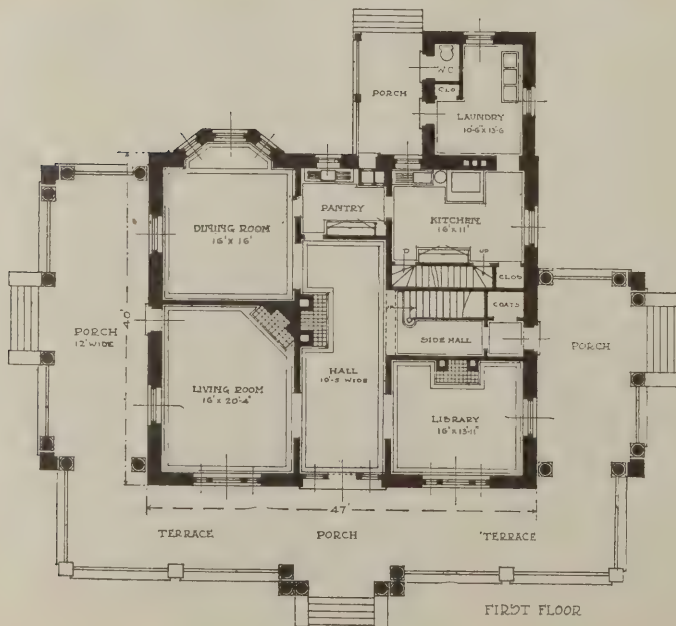
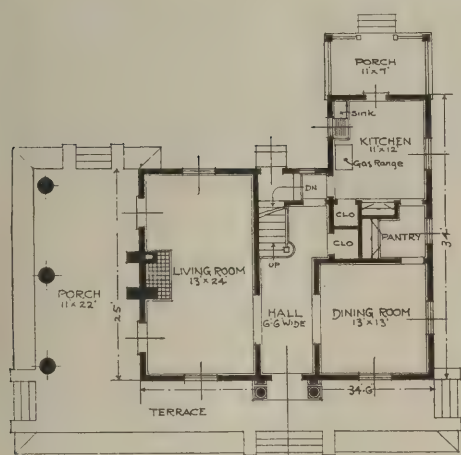
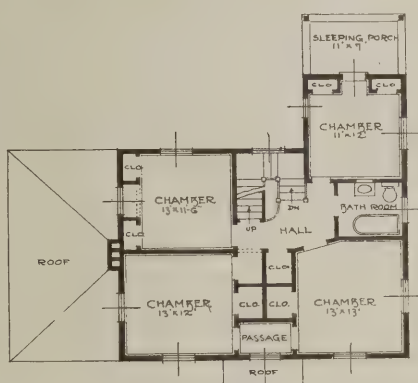




Fig. 2—Residence of Chas. T. Eastburn. Chas. T. Schermerhorn, Architect



FIRST-FLOOR-PLAN



SECOND-FLOOR-PLAN

it a distinct style developed to suit our national character and manner of living. Another advantage of the colonial house is due to the fact that any of our common materials may be used in its construction. The early types supply ample precedent for the use of clapboards, shingles, stone, brick or stucco for the walls,—the colonial builder as a rule used the material that was most easily obtained in his locality, thus gaining a naturalness of effect that is often lacking in our modern method of scrambling the materials used in houses built in the same locality.

The houses that accompany this article were designed by C. E. Schermerhorn, architect. They are modern adaptations of the colonial styles; somewhat freely handled in some respects, yet always retaining certain characteristics of the style upon which they are based.

The Overn house at Oak Lane, Pa., has stone exterior walls with wood trimmings painted white. The three porches are really one, connected by the terraces. The garage at the rear is also of stone with wooden details similar to those of the house.

The entrance is directly into a large hall, at one side of which is a side hall leading to the auto entry and also containing the main stair, under which is contained a coat closet. At the left of the main hall is the living room and at the right is the library each opening into the hall through a wide opening. The hall, living room and library each contain fireplaces, the one in the library being a gas grate, no chimney is provided. An unusual feature is the absence of a door between the living room and dining room. This is no doubt due to the personal requirements of the owner.

The dining room contains a bay window and opens into the hall through a wide opening. At the rear of the main hall is the pantry which lies between the dining room and the kitchen. It contains a sink, built-in cabinet, outside-icing refrigerator and a broom closet. The kitchen contains a sink, a built-in cabinet, and a coat closet. The kitchen has excellent cross-ventilation and back stairs lead to the second story and to the basement. A small wing at the rear of the kitchen contains the laundry, furnishing an example of the present tendency to remove the laundry from the basement. The laundry also serves as a rear entry and opener onto a large rear porch. A toilet room also opens from the rear porch.

The second floor contains four large bedrooms, each opening from the wide hall. One of the bedrooms has a private bath, and a general bath is provided at the end of the hall. The two front bedrooms are separated by a dressing room containing a built-in wardrobe. Each bedroom is provided with ample closets and has cross-ventilation. A stair leads from the hall to the servants' quarters on the third floor.

The Eastburn house at Yardley, Pa., is of frame construction with wide clapboards on the exterior. The chimney and the porch columns are finished with stucco. A nice feature of this house is the fireplace on the porch which no doubt proves useful during the spring and autumn.

This house also contains a central hall a feature of which is the widening at the rear where the stair is placed. A door at the rear of the hall opens into a short passage which leads to the kitchen and to the auto entrance. The basement stair is placed

under the main stair and is also reached from this passage.

At the left of the hall is a large living room which contains a fireplace and has French doors leading to the porch. Wide openings lead from the hall to the living room and to the dining room and a coat closet is placed at the rear of the hall.

kitchen ventilation and lighting is from windows on opposite walls, thus providing the utmost of efficiency in this respect.

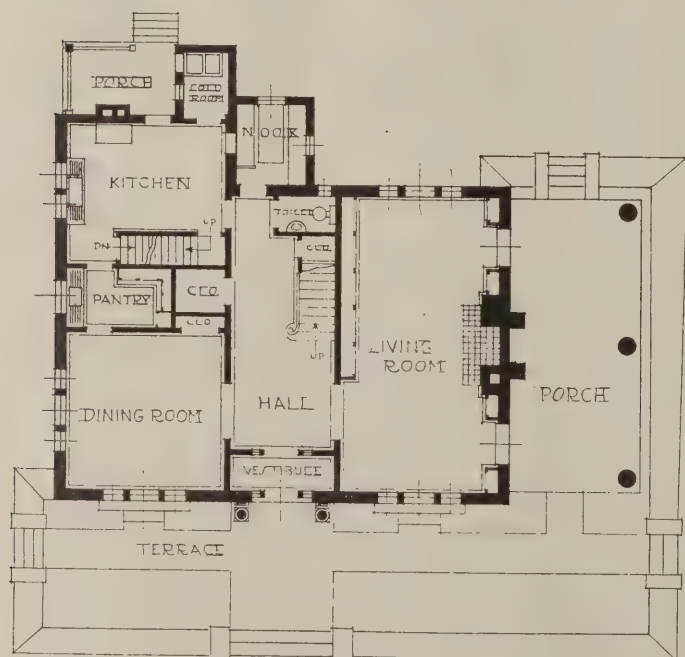
The second floor contains four bedrooms, a bath room and a sleeping porch. Each bedroom has cross-ventilation and ample closet space,—each of the two rear bedrooms having double closets. The two

Figure 3 is a stucco house with wood trim and slate roof. This house has a Germantown hood at the second floor level, a characteristic of much old work around Philadelphia. This house also has a porch fireplace and is well proportioned and very attractive.

The entrance is through a vestibule lead-

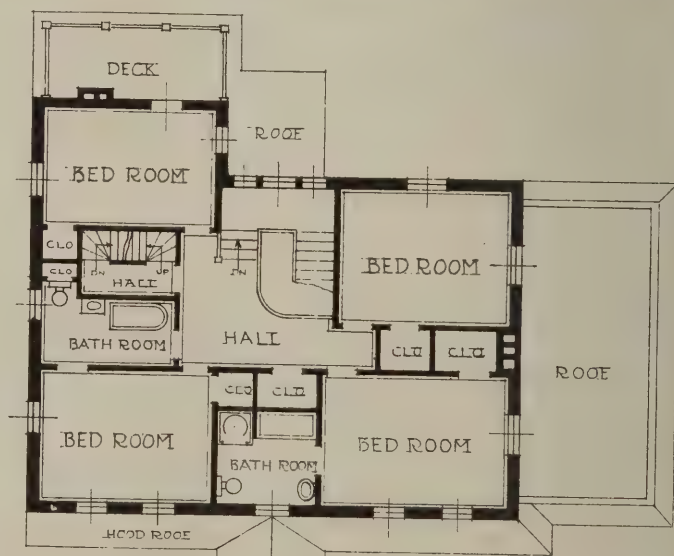


Fig. 3—Stucco house with wood trim and slate roof. Chas. T. Schermerhorn, Architect



The dining room is separated from the kitchen by a pantry which contains a built-in cabinet. The kitchen contains a built-in cabinet, a sink and a storage closet, and opens onto a large rear porch. The

front bedrooms are connected by a passage and a stair leads from the hall to the attic story. The hall contains a large linen closet and is lighted by a wide window at the stair landing.



ing into the hall; a toilet room is placed under the stair at the rear of the hall and two coat closets are provided.

Wide cased openings leading to the dining room and to the living room are placed opposite to one another in the hall. The living room contains a fireplace and French doors open onto the porch. Bookcases are built in at each side of the French doors

and along more than half of the opposite wall. The dining room contains a linen closet and is separated from the kitchen by a pantry which contains a sink, a built-in cupboard and a broom closet. The kitchen contains a back stair to the second story and a basement stair. It also has a cold room with a built-in refrigerator and opens onto a rear porch.

The location of the breakfast alcove or nook is unusual, but it is easily accessible from the hall and from the kitchen and is no doubt more satisfactory than if placed directly in the kitchen.

The second floor contains four bedrooms and two bath rooms—one general bath, and a private bath opening from a front bed-

room. The general bath contains a towel closet over the water closet and the private bath has a shower in addition to the usual fixtures. Each bedroom has a large closet and cross-ventilation. A large linen closet opens from the hall and a small stair hall contains the back stairs which lead to the kitchen and to the servants' quarters on the third floor.

Bricklaying

By William Carver, Architect, and Andrew Pentland, Mason Contractor

Habits that Save Time, Unnecessary Motions, and Economize Material, Once Formed, Continue as a Benefit to the Worker, to the Industry and to Society —and this is the Big Idea in Starting Right

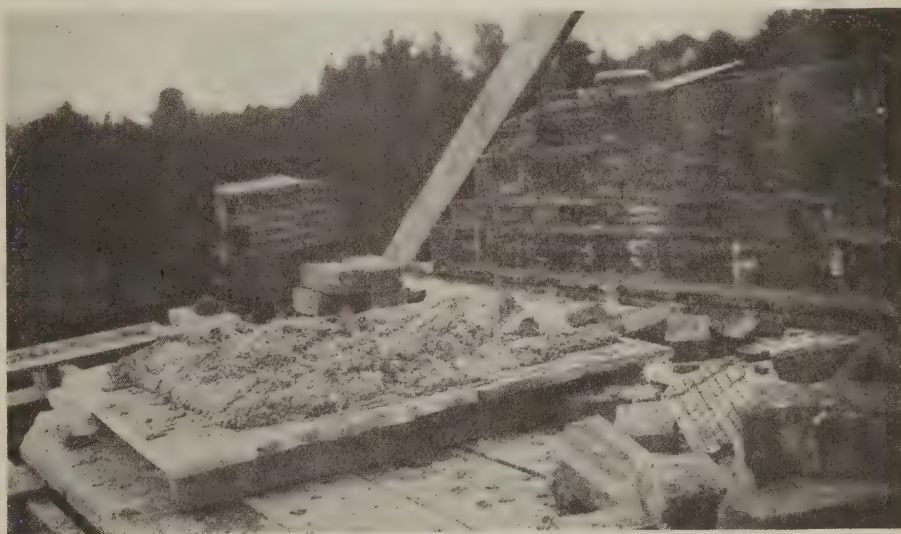
IN the olden days the status of an apprentice was far different to what it is now, the relations between apprentice and employer being more nearly equal to that between guardian and ward at the present day. The apprentice lived in his master's house and was at his beck and call at all times. The master was required to see that his apprentices attended church regularly and was at perfect liberty to thrash them if he considered they did not behave and if they ran away they committed an offense against the law. Thus the apprentice's enjoyment of life depended largely on the disposition of his master, and there is no doubt that many boys had a pretty hard time of it, although the system produced artisans whose work is the envy of their present-day successors. The practice of "living in" with its many abuses gradually passed away until under modern conditions the apprentice's time is his own after working hours and he receives fair compensation for the work he actually does even while learning.

But even though the apprentice's morals and church going are no longer under the direct supervision of his employer, yet the contractor can with profit teach his apprentice to be tidy and careful in his work. Efficiency engineers, who have made a study of the movements necessary to perform any given task, while differing on many things, are unanimous in their statements that the slovenly workman is the least efficient; bearing out of course the universal notion that carelessness means wastefulness. The untidy workman's mortar board will have the mortar scattered all over it, making it necessary to put in more motions and to reach out further to collect enough mortar on his trowel. He will have brickbats and more mortar under his feet, making standing uncomfortable. These things not only look bad, but cut down the workman's production and also have a bearing on the contractor's reputa-

tion. Untidiness is undoubtedly closely related to laziness and will display itself in the quality and appearance of the work. The poor quality of one man's work may entirely offset really good work done by half a dozen men in any trade whether connected with building or not, and the contractor will be well repaid if he can induce his apprentices to be careful and tidy.

A contractor of our acquaintance has

a certain amount of waste. All the short lengths cannot be used, but the contractor referred to has reduced this waste to a minimum. With his brickwork there is absolutely no waste, every bat and piece being worked in as filling somewhere. This contractor is a likable sort of chap and his men are glad to co-operate with him, with the result that the amount of waste material from any one of his jobs is almost nil.



Untidy mortar board and scaffold

been successful in saving himself a good deal of money during the past year by explaining frankly to his men the actual cost of the materials they use, and what it means to him to be economical by using odds and ends of material lying around the job which in days gone by would hardly have been worth saving. To his carpenters, for instance, he explained that every foot of studding cost him a nickel and appealed to them not only to use up waste pieces but to use a 2x2 and not a 2x4 in places where the 2x2 was strong enough. With woodwork there must always be, of course,

However, carefulness and neatness are habits which it will pay the contractor to drill into his apprentices while they are learning their trade. The boys come under his supervision at their most plastic age, when it is just as easy to form good habits as bad ones. Being strict with the apprentices will also help to tune up the whole job. The regular journeyman will be influenced by it and the tendency will be toward saving of materials by everyone, a tidier looking job and a little better work.

On large work the bricklayers' laborers are organized into gangs under a labor

foreman, but on small jobs the bricklayer will sometimes have to direct the laborer or laborers himself. The chief thing to remember is that the bricklayer's time is a great deal more valuable than the laborer's and that the laborer's job is to keep the bricklayer supplied with all the materials he wants so he will lose no time by waiting, and to place the materials conveniently so that there will be no lost motion by the bricklayer in getting it into the wall.

A strip of scaffold on the side nearest the wall and about 16 inches in width should be kept clear of all mortar and brick. The bricklayer needs that amount of space to work to the best advantage. The bricks and mortar boards should be placed so he will not have to step out of this space to reach them. Ordinarily, bricklayers are spaced about six feet apart on a straight wall with but few openings. Where the wall resolves itself into a number of piers

Laborers, like many other subdivisions of humanity, have a tendency to get careless, and the apprentice should assist in supervising their work. Doing so will help him tremendously later on, too, for if he would advance he must learn to handle men. After becoming an expert bricklayer his road to success will lead him to become a foreman, in which position his chief qualification will be his ability to get the utmost efficiency out of the men under him. The apprentice cannot begin any too soon to appreciate just what this means, and to start solving the problem in a way best suited to his own personality.

There is no class of work on a building in which it is so easy to keep track of what is being done as with brickwork. When building a wall the mason stands in plain sight all the time, and his activities can be checked even from a distance. When he works the wall grows in height, when he

more expert than others and the speediest ones have their section finished first, thus gaining a short interval of rest until the other men catch up. When each man is assigned an equal quantity of work it is always easy to see who is the most rapid workman, by observing which men are periodically idle; such men having finished their section ahead of the slower ones and having to wait for them. Sometimes the men at the leads put the line up another course as soon as the first man on the line has finished, thus crowding the slow men, while the fast men are working at a comfortable gait. To equalize the situation and make it quite fair for both the fast and the slow men each mason should be assigned such an amount of work that all will be kept equally busy. This will also be better from the contractor's point of view, since it is perfectly obvious that the maximum efficiency of a group of men will be obtained when all are working their hardest. The wide-awake foreman will thus study his men and portion out the work according to the ability of each. The slow men will have the smallest piers assigned to them and the fast men will be given handicaps in the shape of larger piers or longer stretches of wall. With the work so co-ordinated it is possible to introduce the competitive spirit already referred to. Every man will have a sporting chance of finishing his section of wall first and when the line is moved there will be but few laggards.

Although the typical bricklayer is a cheerful and good-natured sort of individual, the apprentice must not expect to find himself the hero of the hour when he first appears on the job ready for work. By experience the bricklayer has found the new apprentice to be somewhat of a nuisance. He knows nothing whatever of the things that have become second nature to the older hand and he must be taught everything from the ground up. For the first few days he will be pretty much in everybody's way. Of course a smart boy will soon learn the ropes, but at first the bricklayers will regard him as a troublesome human question mark. It is therefore strictly up to the apprentice to establish himself on a favorable footing with the rest of the bricklayers and the foreman and fortunately there is one sure way in which he can do this.

He should remember that all the men on any given stretch of wall are working together as a team, the object of their joint efforts being to keep the wall moving up steadily. Now and again a man will fall behind the rest, owing either to his natural slowness or to the fact that he has run into a complicated piece of work, and in such a case any bricklayer will regard the apprentice in a much more friendly way if he lends a hand and enables the bricklayer to catch up without slowing down the others and making him conspicuous. If he shows his willingness to lend assistance in



Tidy mortar board and scaffold

on account of a greater number of openings there is generally one mason to each pier. On the smallest house job where one bricklayer and a laborer are doing all the mason work there should not be fewer than three mortar boards, and these boards should be spaced the same distance apart—six feet—as on large jobs. No contractor should ever try to save money by being niggardly with mortar boards. The bricklayer runs up a wall evenly along its entire length, and valuable minutes which soon lengthen into hours, will be wasted if the mason has to take a step or two to reach the mortar board or his brick supply. And every mortar board should be kept well supplied with mortar and a pile of bricks be placed between each board. The laborer should not, however, put as much mortar on the boards when one man is working over a considerable stretch of wall as he would if one man is stationed at every board. In the latter case he would deposit a full hod on each board, and in the former case one hodful would be sufficient for two boards.

stops the wall stops. This makes for ease of inspection.

In some lines of work it is possible to introduce friendly rivalry between individual workmen and groups of workmen, with the happiest results for both employer and employe. Such rivalry always increases a man's interest in his work and he actually enjoys it more, leaving his work at night tired but happy. From the employer's viewpoint such a spirit is welcome, for the men work harder and the job runs with less friction.

A brick job adapts itself particularly well to this, although it is said that the unions do not care over much to have a job run on those lines. The best bricklayers are always put at the corners of the building, the points from where the line is suspended. These corners are called "leads." The line to which the masons work when laying brick is laid to every course, and is thus raised course by course as the wall grows in height. The wall is divided into sections, each man having about a six-foot length to build. Some men are, of course,

such cases, the apprentice will not only be better liked by the man he actually helps but will stand a chance of becoming popular with all of them. This is an item of no small moment to the apprentice, who is there for the purpose of receiving instruction from these men in the trade he wants to learn. If he earns their good-will they will take a real interest in his progress, and he will get many more good tips, which will help him to learn the trade faster, than if he had done nothing in particular to win their regard. The foreman, too, will notice the boy's willingness to do what he can to keep the work moving, and will be more inclined to advance him quickly and to give him higher wages, which all goes to prove the truth of the saying that it always pays to render a little more service than one absolutely has to.

Answers to Questions in the October Number

1. Brickwork laid with "shoved" joints has all the spaces between the bricks completely filled with mortar, which is not the case in ordinary work. Shoved joints are formed by laying a bed of mortar on top of the course below somewhat thicker than the joint is to be. This bed of mortar must be continuous over the surface. The bricks in the next course are placed a short distance from the position they will eventually occupy and are then slid into place, the brick being pressed downward as well. This results in forcing the mortar up at the edges of the brick, thus filling the vertical joints. While shoved joints for brickwork are often specified it is rare indeed that they are actually used. To be quite sure of getting them it is almost necessary to have an inspector watch every brick-mason. The physical exertion required to shove brick all day is considerable, and a few days of such work will result in the hands of some bricklayers becoming raw and bleeding. Shoved work is consequently not hilariously popular among the members of the craft.

While it is probably true that the full compressive strength of brickwork cannot be developed unless all the joints are completely filled with mortar, brickwork is so enormously strong that for all practical purposes the ordinary way of laying brick provides a factor of safety many times over that actually required. For foundation walls resisting heavy earth thrust, or for heavily loaded piers, or other special work, it is sometimes advisable to have all the joints filled.

Grouted brickwork has the same object in view—the filling of all the joints with mortar, but this is accomplished with much less labor than by "shoving" the joints. The course below is covered with a bed of mortar as for shoved joints. The outside course is then laid in the ordinary way, header high, and one course of stretchers is laid in the ordinary way on the inside face of the wall. The brick in the middle of the

wall is then laid on the mortar bed below, the mechanic using both hands to place the brick. A few trowels of mortar are then thrown over these brick, and a little water from a pail thrown over the mortar, which readily thins out when the trowel touches it, and is easily worked into all the vertical joints, completely filling them. Another bed of mortar is laid over the course and the operation repeated.

2. 1.1.6 mortar is composed of one part portland cement, one part lime putty and six parts sand (all by volume). This is called cement-lime mortar, and tests have shown it to be one of the strongest and most economical of all the mortars.



Placing a "trig"

3. Where a wall is extremely long it is impractical to stretch a line so that it will not sag too much. In such cases the line is supported at one or more intermediate points by a "trig," a picture of which is shown here. A short piece of line eight or ten inches long is looped around the line at right angles to it and a brickbat laid on top to hold it in place. The bricklayers at the leads sight along the line to make sure that the trig lines up accurately between the leads or corners.

4. Among the good books available on brick construction are Scrimshaw's "Bricklaying in Modern Practice"; Galbraith's "Bricklaying System"; and one of the volumes of Kidder's "Building Construction" discusses brickwork. Frank E. Walker's "Estimating" is a valuable general text book on estimating, a portion of it being devoted to brickwork. The Common Brick Manufacturers' Association publishes "Brick—How to Build and Estimate", which is

intended to be a complete guide to the building of a brick house, and contains also tables for estimating brickwork. This book is sent for a few cents.

Questions

Every contractor and builder should be familiar with brick and brick construction. If you desire any information on brickwork the authors will do their best to answer your questions.

(1) What is meant by the terms "header" and "stretcher"?

(2) Is a wall bonded together with metal ties as satisfactory as a wall bonded with bricks running through it?

(3) Do air spaces in the wall prevent the passage of heat and cold?

(4) Is furring necessary on a brick wall?

Saving Mine Timbers From Decay

Enormous quantities of valuable timbers are being placed in the coal and metal mines of this country without any preservative treatment against decay. That the life of these timbers might be greatly lengthened by the injection of certain chemicals has been proved by the U. S. Forest Products Laboratory in numerous service tests. In 1910 the laboratory installed in an Alabama mine untreated timbers and timbers which had been treated with coal-tar creosote. Ten years later all the untreated timbers had been removed because of decay, while 80 per cent of the creosoted timbers were still sound and none had decayed to a point where removal was necessary. This is only one of the many records obtained by the laboratory which should induce every mining company to install some sort of wood treating plant.

At least three preservatives have been found suitable for mine work. These are coal-tar creosote, zinc chloride, and sodium fluoride. Creosote is the most effective in preventing decay. Timbers thoroughly impregnated with it are likely to resist decay until they are crushed or worn out. Occasional objection is made to the possible fire hazard of creosoted wood, but long experience indicates that the additional fire risk is very small. Zinc chloride and sodium fluoride are odorless, and if anything they tend to reduce the inflammability of wood. They are cheaper than creosote, and although they do not give such permanent protection they greatly increase the life of timbers. Coal-tar creosote may be applied by the brush, dipping, open-tank, or pressure methods. Zinc chloride and sodium fluoride may be injected by the steeping, open-tank, or pressure methods. The cost and effectiveness of the methods of treatment increase in the order given. The saving possible with any of them is so great that it will pay every mine to adopt the use of some preservative on permanently located timbers.

How to Fill and Finish the Various Woods--By A. Ashmun Kelly

OAK offers an unlimited field for the skill and fancy of the finisher, and has been finished in more ways than any other wood. Among these finishes may be mentioned the natural, the light antique and the dark, golden in various shades, forest green, Flemish, fumed, Antwerp, green weathered, cathedral, ordinary weathered, brown, etc. Many colors, ranging from white, through bright yellow, up to black, have been employed in coloring the wood, according to the fancy of the stainer and finisher and the demand of the public. Even blood red has been in vogue; but the principal finishes have been the golden, weathered, Flemish, Mission, etc.

All woods should be made perfectly smooth for staining and finishing; and as some, notably oak, have a very open pore, they will require good paste filling in order to produce a solid and smooth foundation for the finish.

The wood may be varnished and rubbed to a dead effect; or rubbed and polished; or left with the full luster, unpolished and unrubbed. This latter finish requires a room perfectly free from dust and dirt, for the least speck of dust on the varnish will show and mar the effect. It follows that such a finish cannot be properly obtained in ordinary house finishing. Yet we do have such a finish, in house interior work, though in an inferior way, of course.

Even when the full gloss finish is given there must be more or less rubbing of the previous coats, in order to get the best effect. The easiest finish is the rubbed, for this gets around the difficulty of specks on the varnish. The rubbing may be done with steel wool, even with sandpaper, but pumice stone and water give the best results. Be careful not to rub too much in one place and not to rub too hard, or you will easily rub through and ruin the work. Bear on lightly, and rub the surface with a circular motion, starting at one end or side of the work and rubbing regularly across or downward. The sole object is to level the surface and remove the luster of the varnish. Some workers stop when this stage is completed, and call it a finish; but another effect can be obtained by rubbing it down with a polishing oil, giving a polished finish.

Fumed oak is popular and deservedly so, for certain effects. This finish may be obtained by exposing the wood to ammonia fumes in an air-tight box or room, or by the direct application of ammonia to the wood. The first process is done with 26-deg. ammonia; the stronger the ammonia

the quicker the effect and the better the work. For a room having 2,000 cubic feet of space, a gallon of strong ammonia set about in shallow dishes will be sufficient; and so on, proportionately, for lesser jobs.

See that your wood is properly dressed and made clean, and have the wood or objects so assorted that the batch will come out as nearly uniform as possible. For the fuming chamber you can make a room or box of wood about 10x30 feet and 10 feet high. It should have double walls, with paper between, and a window with a double sash. The window should be hung

A knowledge of wood finishes is here imparted by an eminent authority which should prove exceptionally valuable to the architect or builder responsible for the execution of this class of work, one of the first that is subject to criticism, favorable or unfavorable, by the average housekeeper

with hinges, the inside sash opening inward, the outer sash opening the other way. Place a door in one end of the chamber, constructed something like a refrigerator door; and a rack inside to hold the objects. It is a good plan to have a glass-covered opening through which to observe the progress of the fuming. A light fuming usually takes about twelve hours, but circumstances and conditions vary so much that the time required may run anywhere from twelve hours to twenty-four; there is one method which requires only six. For the darker finishes, dark Flemish for instance, a much longer time is required. Should the fuming prove too light when taken out, the application of boiled oil and turpentine (about one-fourth turpentine to three-fourths oil) will darken it a little more; rub dry with a cloth.

Imitation fuming is done by applying liquid ammonia direct to the wood. This

should be done in a place where there is a good, strong circulation of air. The liquid ammonia of course raises the grain of the wood, which the fuming does not do. Cover the surface quickly and evenly, and avoid letting any of the ammonia run back over the work already done for it will darken and mar it. As a rule, it is better to use a rather weak solution of ammonia because an increase of color may be had by two or more applications of the liquid.

Imitation fuming may also be done with stain. For this purpose use iron filings steeped in vinegar or sulphuric acid diluted to any required strength with water, applying as many coats as desired. This stain gives a very nice silvery effect to a wood containing tannin. Then there is ivory drop black thinned with turpentine; just before the stain sets wipe it off with a rag. Or take burnt umber ground in oil and darken it a little with lampblack in oil, adding zinc white to give it a grayish appearance. Thin it with equal parts of brown japan and turpentine. Apply freely, and when set wipe off the surplus and fill with uncolored paste filler. There is also the lime effect, made by spreading fresh quick-lime in paste form over the wood, the caustic burning the wood to the desired effect. Potash solutions are used in varying degrees of strength. With full strength the effect is reddish and not exactly like the fumed.

You can imitate oak on such woods as ash, elm, alder, box, chestnut, maple, sycamore, and yew. This may be effected with iron or copper nitrate. Take a quantity of old nails and dissolve in strong vinegar, or some other acid (sulphuric, for instance) diluted. The solution must be applied cold. Weak solutions of iron (iron acetate) give green shades, while stronger solutions give various shades of brown deepening in proportion as the strength of the iron salt solution is increased.

Ash wood is very open-pored and requires a heavy paste filler, and because of the naturally light color of the wood the filler should be natural or uncolored. The finish for ash is the same as outlined for oak. *Butternut* is to be filled and finished the same as ash. *Beech* may be finished in its native color, or it may be stained to imitate walnut, cherry or mahogany. There is a handsome curly kind, and the quarter-sawed also is very fine. If you finish this wood in its natural color let the last coat of varnish have its full gloss. To stain it, use a water or spirit stain; both are used,

some finishers preferring one, some the other. Beech is a very close-grained wood and does not take stain readily; its delicate markings are easily obscured, hence a transparent stain is best.

Birch, like beech, may be stained to imitate other fine woods. For this purpose take the red birch, especially the curly variety. It may be stained to imitate mahogany, and golden and green oak. But the natural finish of both the red and the white birch is fine; it should have the rubbed varnish finish. Some think this wood is ruined by staining. It has a close grain and should be coated with shellac varnish to seal the pores. Usually there are three stains—golden, golden red, and dark red. The golden effect is obtained by means of raw and burnt sienna, with a touch of light chrome yellow. Mix these with the first-coater or surfacer, following with a second coat of primer or thin varnish, and finish with a coat of polishing varnish.

To stain dark birch mahogany, first give it a weak solution of bichromate of potash. When this is dried, apply the following stain made by mixing together rose pink, Van Dyke brown and burnt sienna in such proportions as will produce the required color and thinning with oil and turpentine and a little brown japan. When this stain has dried, sandpaper the wood lightly with fine sandpaper. Then take shellac and add to it a little Bismarck brown (aniline), just enough to tinge it. This will give a more uniform color than the shellac alone, or without stain. The last coat of varnish may be rubbed with No. 0 or No. 00 pumice-stone powder.

A birch door stained mahogany is very handsome in connection with white painted woodwork, and where the curly birch has been used many prefer it to the real mahogany wood.

Oil stain tends to obscure the grain of this wood; and rose lake will fade, of course. Water stain is better than oil stain; it sinks deeper into the wood and does not rub through as the oil stain does. To get an oil stain use burnt sienna, burnt umber and rose lake in such proportions as will give the desired shade. After applying the stain let it dry, then rub lightly with fine sandpaper; apply two coats of shellac varnish, which is to be rubbed down; then give it two coats of varnish, and finish by rubbing with flour pumice-stone and rubbing oil to a dull polish. It is necessary to shellac before varnishing in order to fill the wood and so prevent the varnish from sinking in.

Cherry is one of our finest native woods, yet it is seldom finished natural, however satisfactory the natural finish might be. The usual stain may be made from burnt sienna, or Bismarck brown, and dragon's blood or alkanet root, among the several vegetable stains, will do. Cherry is useful for making imitation mahogany. Shellac is the first coat after staining, and the finish is the same as for maple.

Maple varies in color from nearly white to gray, and the less we interfere with this natural color in our finishes the better the work will look when done. Oil darkens maple, so that the first coat must be white shellac, after which varnish may be applied with discretion, without fear of altering the natural color of the wood. But do not use too much varnish, or the natural color will again be endangered. Use pale varnish, and if two coats cover it solidly that is enough. The dark varnishes are the quickest to dry; hence use the slower ones. Damar varnish is nearly colorless, but is too soft to use on hardwood. There is a copal varnish which is very pale, and this is the one to use on maple. One coat of this pale or so-called white copal varnish will make a finish. Flow it on freely and level out well. Allow four days between coats of varnish. You should get a very fine finish with two coats of varnish, rubbing the last coat with flour pumice-stone and water, using a soft felt rubber; a bit of old felt hat will do.

Red gum is finished the same as birch. *Redwood* needs paste filler, well brushed into the wood. Let stand about 15 minutes and then rub off the surplus filler. Let the work stand for 24 hours to dry, then sandpaper smooth, dust off, and give it a coat of shellac. When this in turn is dry sandpaper it, dust off, and apply a second coat of shellac. Then the work is ready for two or three coats of varnish, polishing varnish being the best. Some apply as many as five coats. Allow the last coat two days for drying, and then rub with fine pumice-stone powder and water. After the rubbing let it stand 24 hours; then rub with pulverized rotten-stone and water. Let this dry; then clean off with water and a chamois. Finally, rub with sweet oil and clean up with a rag dampened slightly with alcohol, which will remove the oily grease. A cheaper finish may be made by simply shellacing the wood, applying two coats of varnish, or even one coat, and rubbing the last coat enough to remove the gloss. For this purpose use curled hair or moss.

Increased Importance of Insulation

R. J. Brennan, an architect of Waterloo, Iowa, in conversation with a representative of NATIONAL BUILDER, said:

"The enormously increased cost of fuel of all kinds makes it necessary to so construct houses that as little as possible of the fuel will be wasted. Lack of thoroughness in construction has cost the nation enormously in fuel, but we did not realize it while fuel was comparatively cheap.

"There should be a campaign for the better insulation of houses. Not only must we urge the men engaged in doing the work of construction to see that all possible is done to make the houses warmer, but we must instruct the general people as to the importance of this matter, so that they will see that houses being built for them are insulated against the waste of heat.

"There are many things that can be used for insulating a house, both patented and unpatented. I am entirely in favor of using the patented kinds; for they can be obtained easily and at moderate cost, and all of them have been put into the best possible shape for use and can be applied with the smallest amount of labor.

"I have in mind one kind of insulating material that is very effective in keeping out the cold. I figure that this material could be used all through a two story, eight-room house costing \$6,000 at a cost not to exceed \$200, which is a mere trifle compared with the saving that would come from its use.

"It is impossible of course to get down to exact figures on what direct losses of heat are in the different kinds of structures, because such structures vary infinitely in this regard, even when they are apparently just alike. A few cracks more or less in

one will make a big difference in the amount of heat wasted.

"In the ordinary frame structure with a brick veneer, and without the use of any of the insulating materials except ordinary building paper, the loss of heat is probably around 20 per cent, even with lath and plaster on the inside. Through the ordinary frame wall, lathed and plastered on the inside and with clapboards on the outside, the loss is generally estimated at not less than 30 per cent; for clapboards, of course, cannot be laid air-tight, and there are cracks, often big ones, between the boards under the clapboards; and generally where common building paper has been put on, the house owner does not know whether it has been applied carefully or not.

"The solid brick wall unplastered lets out as much heat as does the frame wall, but by careful plastering on the inside, the heat loss is reduced about one-third. A hollow tile wall 12 inches thick with stucco on the outside will perhaps compare favorably with frame plus brick veneer, as to warmth.

"For holding in the heat, the attic should always have a floor, and it should be a tight floor, whether it be used or not. The fact that this floor is often omitted in bungalows makes bungalows great wasters of heat. It has been estimated that the bungalow without a floor in the attic wastes over 60 per cent of the heat that is created. The heat simply goes up through the plaster at the top of the room and out of the roof. Some that have figured on this question say that if a thoroughly tight floor is put in the attic of the bungalow it will reduce the heat loss to about 25 per cent."

The Importance of Equipment

THE accompanying photographs, all of which were made recently on *one* housing development, present a graphic example of the major part that mechanical equipment plays in modern building construction. No attempt was made to include all

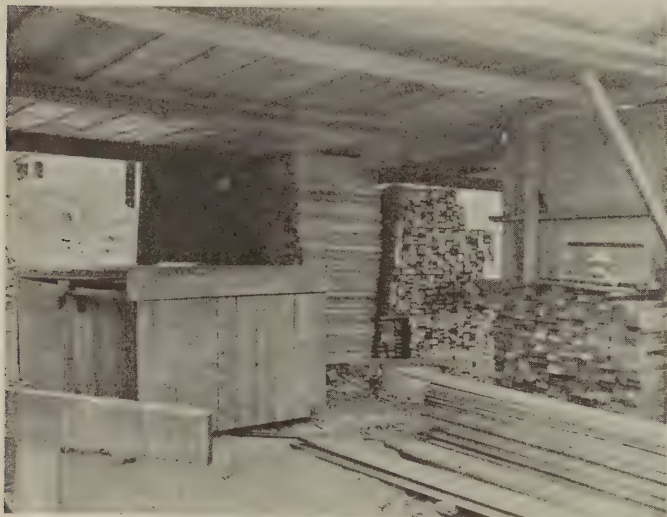


Fig. 1—Power saw-rig in portable housing mounted on sled runners



Fig. 2—Portable machine for bending reinforcing rods, conduit, pipe, etc. Power pump in background



Fig. 3—Another power saw-rig in operation



Fig. 4—Concrete mixer on the move



Fig. 5—Another mixer "on the job"

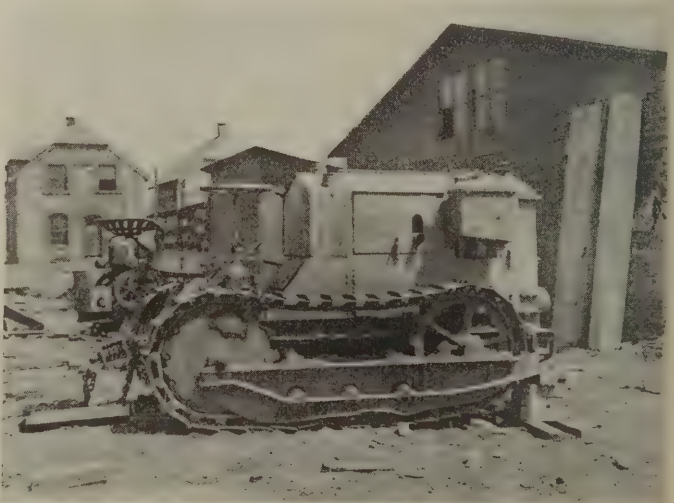


Fig. 6—Tractor used for hauling mixers, dump wagons, etc.



Fig. 7—Excavator scooping out for basements

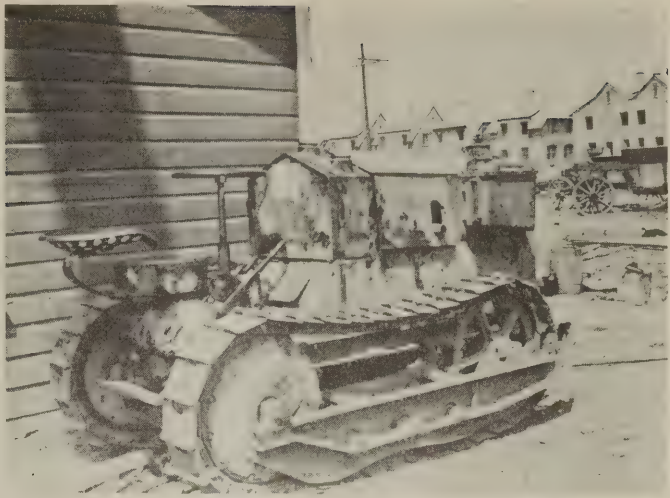


Fig. 8—Another "tank" ready to go over the top



Fig. 9—Trucks unloading sand and gravel for concrete



Fig. 10—Trench and ditch excavator

of the equipment, only the larger machines seen in a more or less rambling tour were "snapped." The idleness suggested by some of the photographs is due to the noon hour during which they were made.

The equipment illustrated represents an investment of many thousands of dollars, thus suggesting that the days of "shoe-string" contracting are passing.

A New Demountable Truck Body

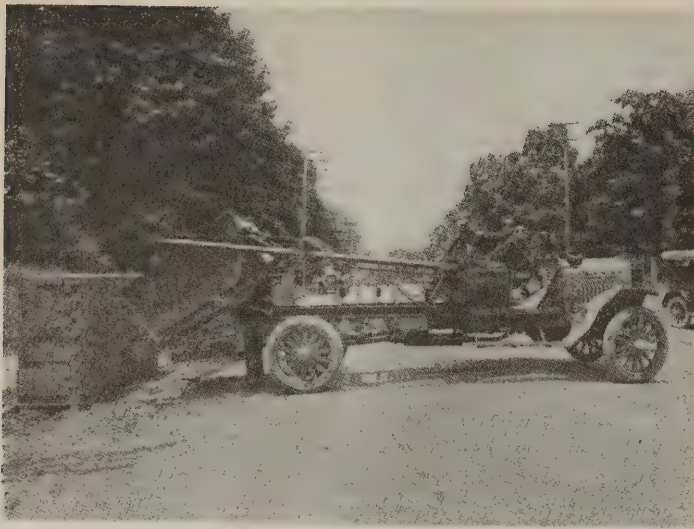
The high cost of material and labor is not an unmixed evil, as these conditions have stimulated an extraordinary activity to find means to overcome them by labor and material saving appliances. One of the most interesting of these, designed for the transportation and delivery of brick and tile and similar building materials, is shown in the illustration on the following page. The equipment consists of a frame, with power hoist, cradle and two detachable bodies with pallets. The frame is bolted to the chassis of the truck by means of U bolts so that it is not necessary to drill any holes in the frame of the truck. This frame simply acts as the proper support for the



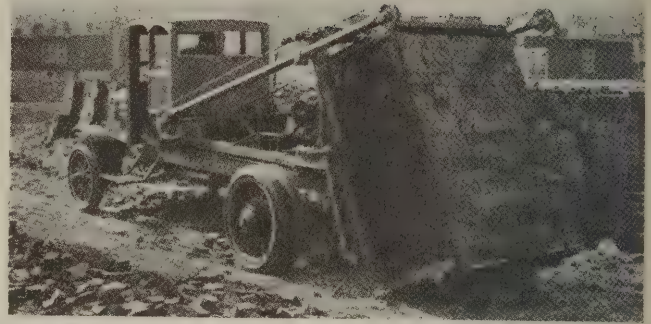
Fig. 11—Another dump truck

cradle. The cradle moves back and forth on the frame in such a manner that the body may be set on the ground and then carried back on the truck in the proper

position for hauling. One important point to be considered is that the body is not lifted as a dead load, as it would appear, but is simply pulled over the arc of a circle.



Raising the body back on the frame. The driver controls this entirely from his seat



Brick are handled with ease. No breakage. One man can operate truck

This makes it easier to handle the load. The hoist is sufficiently strong to handle the load with perfect ease, and is so made that it is self-locking so that the load may be held in any position desired. The power to operate the hoist is derived from the power take-off the truck. All truck manufacturers equip their trucks with this when specified, and the truck must be supplied with this. If the outfit is placed on an old truck, which does not have a power take-off, the power take-off can be obtained from the manufacturer and easily attached to the truck.

The detachable bodies are held in place on the cradle by means of two lateral arms which securely hold a pipe on the body. It is impossible for the body to slip in any way whatever. When it is desired to detach the body, the equipment is lowered until the body is on the ground and then the arms pass under the pipe. The body cannot be detached while on top of the truck. The pallet acts as the tail gate of the body and is held in place by two iron pipes. When the load is deposited, these pipes are slipped out and the brick are left stacked on the pallet, when the truck is pulled away. The pallets are of rough wood construction and are left under the stack until the brick are used.

About Sand and Cement

The Iowa State Engineering Experiment Station is doing a good deal of work just now with the substances that, combined, constitute concrete, as a structural material. Professor C. A. Poland, who is one of the directors of this work, tells the NATIONAL BUILDER that the more sand is studied the more important is the role it is recognized as playing in the constitution of concrete. In many cases in the past where the cement was charged with being poor, as the concrete crumbled or otherwise disintegrated, the real fault was probably in the sand rather than in the cement.

"For instance, the size of the grains of

sand or gravel has much to do with the strength of the concrete," said he. "If a sand be used in which the composition consists of very large grains and very small grains, the concrete made with such sand would be a weak concrete. Our experiments show that, so far as the sand is concerned, it should be composed of all sizes of grains, each size being in abundance. That gives the strongest possible concrete.

"But we find that sands differ greatly in quality, as to whether they are the composition of debris from hard or soft rocks. Sand derived from the breaking down of soft rocks makes a poor sand for concrete to be used in building. In respect to hardness of material, bank sands differ enormously, and river sand is as uncertain in this respect as is bank sand. No two lake sands are alike.

"A great deal of the concrete work in Iowa is made with pit gravel as it comes from the pits and without grading. It has been found that this can be safely done if the proportion of cement used is right, and the concrete is to be used for foundation work. It used to be thought that pit-run gravel must in all cases be screened and graded. But of course no fixed formula can be adopted for the making of the concrete, for the formula must vary according to quality of sand.

"As to the quality of cement coming from the factories, we do not have any trouble with that any more. Cement manufacturing has been brought to such a point of perfection that any standard brand may be safely accepted as good. Almost a continuous test of cement is made at the manufacturing plants, sometimes as often as once every half hour.

"Our work comes chiefly with cement after it has been out of the factory for some time. If it has been stored in places where there is some moisture, it deteriorates very rapidly. This deterioration sometimes takes place between the time when the sample is sent us and is returned, if

the storing has been in a damp place. In such cases the cement may become worthless in a short time."

Drying Lumber With Superheated Steam

A kiln-drying process which will dry 1-inch softwood lumber green from the saw to 10 per cent moisture content in 24 hours or less has been developed at the U. S. Forest Products Laboratory, Madison, Wisconsin. The novel feature of the process consists in forcing superheated steam at high velocity first in one direction and then in the opposite through the pile of lumber in the kiln. This treatment dries the lumber very uniformly and rapidly with a minimum of checking and warping.

The superheated steam process has been found applicable to Douglas fir, firs of all kinds, western hemlock (not eastern), white cedars (not western red), sugar pine, western yellow pine, and southern yellow pine. It is entirely unsuited for some softwoods on account of collapse.

Drying lumber by this process consumes more steam per thousand feet of lumber than ordinary kiln-drying processes, and is recommended only where economy in fuel is not essential. As it is deleterious for lumber to be exposed for more than 2 or 3 days to the temperatures used, the superheated system steam kiln is not adapted to the drying of lumber in thicknesses of more than 2 or possibly 2½ inches. It should be stated, furthermore, that the treatment somewhat reduces the toughness of the lumber, so that where this quality is of prime consideration, as in airplanes and wagons, a low temperature process of drying should be used. On the other hand, the superheated steam method reduces the "working" of the board and the hygroscopicity of the wood and also "fixes" the resin and gum. The effect upon knots as compared with low temperature drying has not been fully determined.

A Practical Discussion on Concrete Sidewalk Construction

DURING the past fifteen or twenty years, concrete has come to be accepted as the almost universal sidewalk material. Perhaps no material of construction ever came into more general use in a shorter space of time. In fact the large volume of faulty construction which necessarily accompanied the development of the concrete sidewalk apparently has not reacted at any time to keep people from building more.

Sidewalk construction constitutes a rather exacting use of concrete, since the walk in reality represents a long thin ribbon of material almost always placed where

tact with ice, snow or frigid atmosphere. Therefore, sidewalk design and construction are entitled to more scientific study than has been accorded in the past.

The Subgrade

A frequent cause of trouble in earlier sidewalk construction was insufficiently substantial subgrade. Figure 1 shows a walk laid on a subgrade not sufficiently compacted at the outer extremities. With support in the center and insufficient support at the sides the slab received a "broken back"—cracked down the center.

spongy and perishable material must not be used. The materials placed in the depressions must be thoroughly compacted in layers not more than 6 inches in thickness, and the entire subgrade tamped until it presents a firm unyielding surface. The subgrade, like the finished slab, should have a slope toward the street curb (if parallel to curb) of at least 1/4-inch to the foot.

If the sidewalk is to be constructed over an old cinder or stone path, it is necessary in order to secure a uniformly compact subgrade, to loosen the material in the old



Fig. 1

Figure 1. This crack down the center of a walk indicates poor foundation.

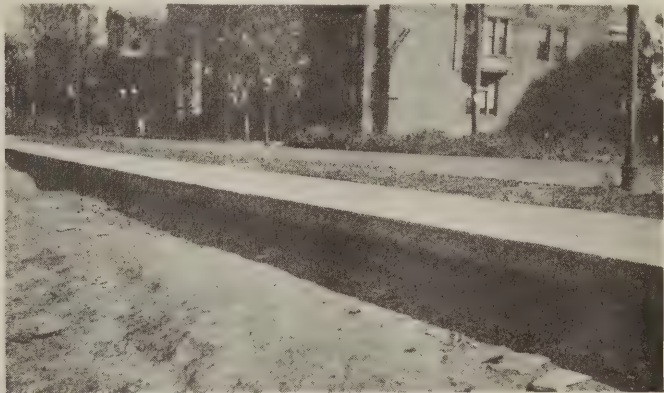


Fig. 2

Figure 2. Undermining the subgrade of this walk will eventually cause failure. This condition could have been avoided by building the subgrade as directed in the accompanying article.

the frost can penetrate beneath it and as frequently exposing a proportionately large surface area to the expansive action of the sun's heat and to contraction from con-

In the preparation of the subgrade, all soft and spongy places must be removed and depressions filled with firm earth, cinders or gravel. Muck, quicksand, soft clay,

path, spread it over, the full width of the walk and re-compact it. Fills must be made of firm earth, cinders or gravel, carefully compacted as described above in

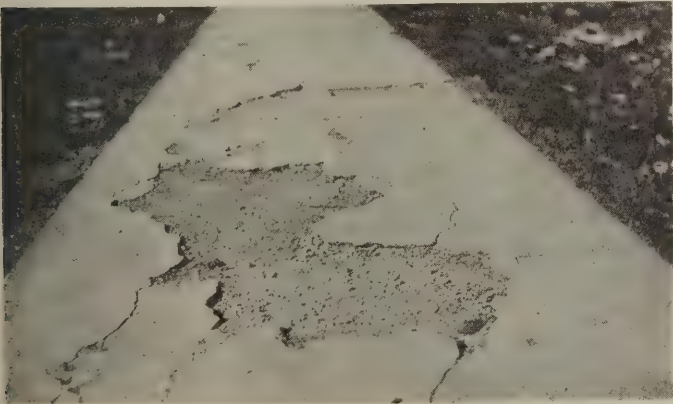


Fig. 3

Figure 3. Almost complete failure of walk due to base course made with dirty materials and very little cement. The surface course was poorly bonded to the base and portions may be easily lifted off the latter with the hands.

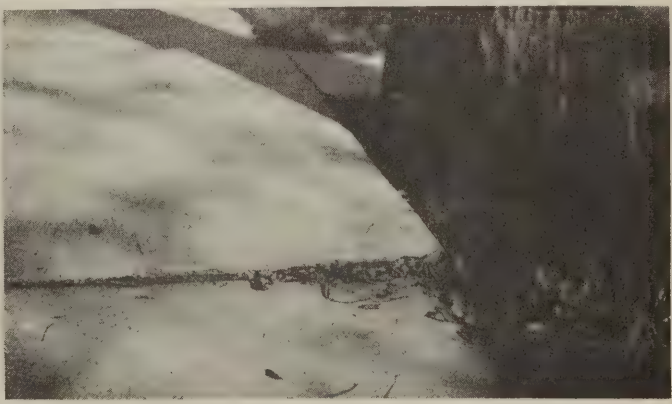


Fig. 4

Figure 4. Concrete sidewalk slab moved by tree. If it is necessary to lay a walk closer than three feet to a tree, the adjacent slabs should be laid on six inches of gravel and cut up to small sections, each of which may move independently; wherever possible, construct the walk so as to avoid going closer than three feet to a tree. Set out new trees at least three feet from existing walks.

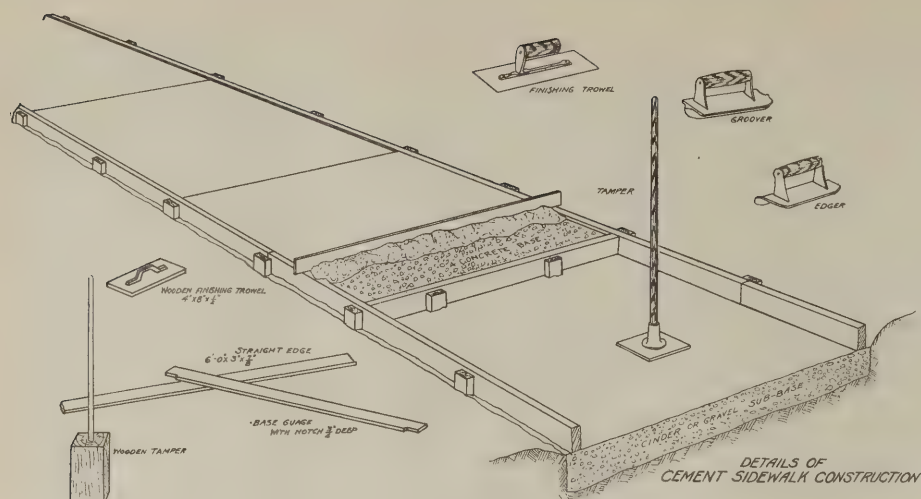


Fig. 5

Figure 5. Illustration showing standard method of placing two-course sidewalk and tools used in the work.

the case of material placed in depressions. Fills must extend beyond the walk at least one foot on each side, and the angle of the sides of the fill should be about 30 degrees with the horizontal.

Where the surface of the completed walk will be very nearly on a level with the natural grade, the slabs are placed in an excavation. After earth has been removed approximately to a level which will denote the under side of the slab, the surface of the excavation is tamped until an unyielding surface is secured; the latter is then brought to the desired level preparatory to laying the slab.

If the soil surrounding the walk is such that it cannot readily take care of reasonable quantities of water by natural drain-

age, other methods of drainage will have to be provided, as an accumulation of water under the slabs may permit the walk to be injured or moved by frost.

Drainage methods vary with circumstances, but a layer of gravel, 6 inches to 8 inches thick, beneath the slabs, is usually sufficient to take care of such moderate quantities of water as are likely to find their way under the slabs. If such means

are considered insufficient, the area may be drained by means of tiling paralleling the side of the walk to which the water drains, installed in the usual manner and covered with a bed of gravel. The drain may be placed at a depth of $2\frac{1}{2}$ to 3 feet, a few inches outside the line of the walk.

Placing of Forms

It is important that the forms be of lumber which is straight and true, well staked and otherwise held to established lines and grades. The upper edges of the forms should be true and accurately set at the surface levels of the walk. Metal division plates provide the most convenient means of separation of adjacent slabs during construction. Use of the forms is greatly facilitated by keeping the surfaces clean and well oiled or coated with soft soap or whitewash to prevent sticking.

Alternate Methods of Construction

The greater number of city sidewalks are of two-course construction; that is, the main body of the slab is made of an economical concrete mixture of cement, sand and stone, and the surface, placed later, consists of a thin layer of rich cement and sand mortar which can be troweled as smooth as desired.

Single-course sidewalks are made of a rich mixture of cement, sand and stone,

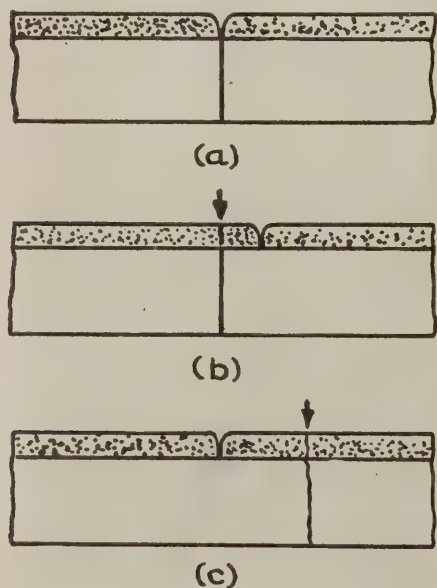


Fig. 6



Fig. 7

Figure 6. Illustration (a) represents two-course sidewalk construction with division between abutting slabs properly made. The groove in the surface course is directly over the parting in the base course. In illustration (b) parting has been properly left in base course, but groove in surface course was misplaced, resulting in crack through the latter directly above the parting at point indicated by arrow. In illustration (c) no parting has been made in the base course and crack through both courses occurs at point indicated by arrow, regardless of location of groove in the surface course.

Figure 7. Sidewalk slab lifted and shattered by the expansive action of adjoining slabs. There is approximately 250 feet of sidewalk to each side of this failure with no expansion joint in the entire length.

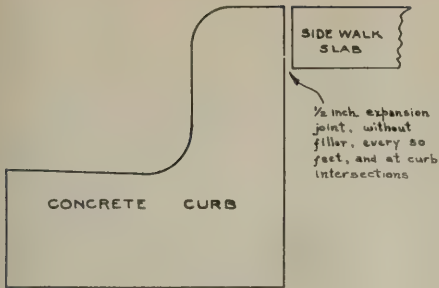


Fig. 8

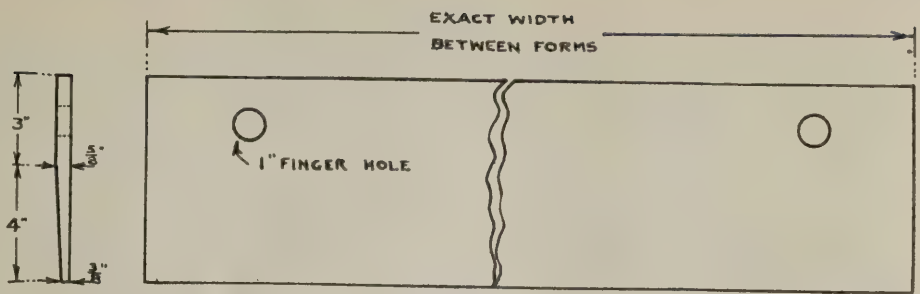


Fig. 9

Figure 8. All of the bad effects of expansion, including movement of curbs and lifting of slabs may be easily overcome by providing a $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch opening between slabs, or between slab and curb, making one such opening in every fifty feet of walk and at each intersection with the street curb. These joints may be conveniently formed by the use of a piece of siding or other similar board having smooth sides and a slight taper, as shown in Figure 9.

Figure 9. Partition board, convenient for making expansion joints. The board is tapered and provided with finger holes for easy removal. The surfaces should be smooth and covered with a thin coat of heavy oil. The partition board should be removed as soon as possible without danger to the slab.

producing slabs of greater strength for their thickness but usually not capable of taking on as smooth a finish as the mortar surface, although usually smooth enough for almost every purpose.

Single course construction has the advantage of a considerable saving in the labor of laying and usually of a certain saving of material, as shown by the following example:

Materials required per 100 square feet of sidewalk, single course construction, 1:2:3 mix, 4 inches thick:

Cement	8.64 sacks
Sand	17.28 cubic feet
Pebbles or stone.....	25.95 cubic feet

Materials required per 100 square feet of sidewalk, two-course construction, base 1:2½:5 mix, 4 inches thick, wearing course 1:2 mix, 1 inch thick:

Cement	10.32 sacks
Sand	23.72 cubic feet
Pebbles or stone.....	30.85 cubic feet

The recommended mixtures for sidewalks are as follows: For the base of two-course walks, 1 part cement to 2½ parts sand to 5 parts pebbles or broken stone, such course to be at least 4 inches in thickness; for the wearing course of two-course walks, 1 part cement to 2 parts sand for average traffic or 1 part cement to 1 part sand for heavy traffic, with a thickness of at least $\frac{3}{4}$ inch; for the entire body of single course walks, 1 part cement

to 2 parts sand to 3 parts pebbles or stone.

The Slabs

The slabs or independently divided blocks should be limited in area to 36 square feet, with no slab having a length greater than twice its width. Sidewalk slabs are commonly made 6 feet square, or 6 feet long with width equal to that of the walk, up to 6 feet.

Each slab must be entirely separate from those adjoining it, in order that it may move independently and may contract or shrink independently and not have to pull away from other slabs with consequent danger of breaking irregularly through the

slabs as illustrated in Figure 6 C. To provide for expansion, a joint $\frac{3}{8}$ -inch to $\frac{1}{2}$ -inch in width as illustrated in Figure 5, is left every fifty feet of walk length, to provide for expansion. A similar joint is also provided at each intersection with street curbs.

The usual method of forming a positive division between adjoining slabs requires the use of thin stiff sheet steel division plates. These should be kept clean and well oiled and should be withdrawn within a few hours after the concrete is placed. It is exceedingly important that the joints are clean-cut and absolutely straight.

A very successful but somewhat more

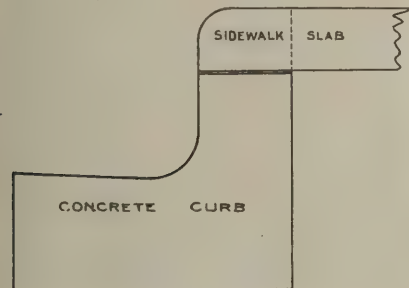


Fig. 10



Fig. 11

Figure 10. Method of preventing condition shown in Figure 11 by bringing out sidewalk slab over the curb. A recess of sufficient size to accommodate the slab is made in the curb, and a distinct and smooth parting made between slab and curb so that the former may move entirely independent of the latter.

Figure 11. Expansion of a concrete sidewalk in this case amounted to 2¾ inches forcing out the curb at street intersection. Such a consequence can be entirely prevented by either of the two methods shown in Figures 8 and 10.



Fig. 12



Fig. 13

Figure 12. The effect of dirty materials in the mixture. This sidewalk was built of dirty and alkali laden aggregates, with the result that strength was acquired very slowly and the walk was soft and crumbly, allowing the corners and other weak portions to break off when the forms were removed.

Figure 13. Surface course of a sidewalk at Carroll, Iowa, destroyed because of poor bonding with the base. This was the result of laying surface course on a dry base.

expensive method of securing positive divisions is to lay the slabs alternately. In such case wooden division boards are used. Every other slab is laid first, and a few days later the intervening slabs are placed, with strips of building paper forming the division between slabs.

One Course Construction

As stated in a preceding paragraph, single course walks are made of a 1:2:3 mixture of cement, sand and pebbles or stone. Just sufficient water should be used so that the concrete will hold its shape when struck off with a strikeboard. The concrete should be deposited as rapidly as possible, and without interruption except on completion of an entire slab. Concrete of the consistency described should require only very light tamping to compact it in the forms.

The surface of the walk is brought to proper grade and to a true plane by the use of the strikeboard. A zig-zag motion of the strikeboard has the effect of removing excess materials from the high places and of filling the hollows. The surface should be true to grade and absolutely flat before the float or trowel is applied.

The surface is given the desired texture

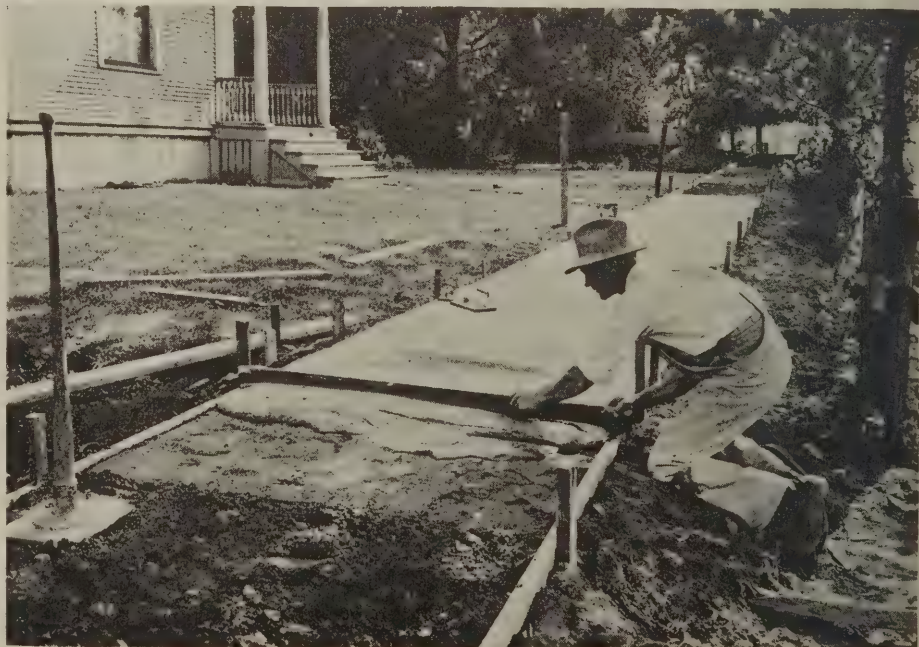


Fig. 14

Figure 14. Striking off mortar surface. The strikeboard should be used to bring the surface to the proper level, the function of the float and trowel being only to secure the desired texture. By giving the strikeboard a zig-zag movement excess material is removed and worked into the hollows.



Fig. 15

Figure 15. Using the wooden trowel or float and the steel finishing trowel. For most purposes the float surface is preferable to smoother surfaces, affording better foothold. The steel trowel should be used sparingly, since over-troweling is likely to produce hair cracks and dusting.

by the float or trowel. The float is merely a wooden trowel with rectangular face conveniently made about 5 inches by 15 inches. The surface produced by the float is rather gritty and somewhat irregular, forming corrugations which prevent slipping. For this reason the float finish is recommended for use wherever practicable.

For surfaces of finer texture the steel trowel is used. Troweling with the steel trowel draws to the surface the finer particles from the mixture, producing a finish of great smoothness. There is danger in the over-use of the steel trowel, for the greater proportion of fine material on the surface, the greater the possibilities for hair cracks, dusting and slippery finish. Therefore, the steel trowel should be used as sparingly as possible.

Two Course Construction

The base course in two-course walks is made of a 1:2½:5 mixture with sufficient water to flush under light tamping. It is laid in the same manner as the one-course walk, being levelled off to a grade ¾ inch or 1 inch (the thickness of the wearing course) below the surface.

The wearing course should be placed immediately, or while the base course is still green and the surface moist and clean. If the base course is allowed to dry out, the surface course can only be bonded to it with greatest difficulty. The wearing course should never have a thickness of less than ¾ inch. The surface is finished as described for one-course walks.

Protection

As soon as the finished walk has hardened sufficiently to avoid damage, the surface should be sprinkled with clean water

or covered with wet sand or earth and kept wet for at least 7 days. In an exposed location the newly finished walk should be shielded from the sun and wind until it can be sprinkled. Tarpaulins or other similar coverings may be used, usually covering the work for the first twelve hours.

Great care should be taken not to expose the walk to traffic until it is able to withstand such use. Heavy loads driven upon or over the walk during its first few weeks

should move at slow speed and on planks covering the surface.

Sidewalk construction may not continue in weather where the temperature is likely to go below freezing within 24 hours, without making full preparation for cold weather concreting, including heating of aggregates and water, and provision to protect the finished slabs against freezing.

Housing Lack in Cedar Rapids, Iowa

Building authorities in Cedar Rapids, Iowa, claim that the city is short about 1,000 houses, mostly for the housing of the working class of people. Perhaps 100 houses were built the past year by speculative builders, but this was but a slight help.

An effort was made a few months ago to raise a fund of \$300,000 for the purpose of constructing 100 houses, which were to be the beginning of a permanent housing movement. But people refused to subscribe the money asked, many of them declaring that they would not contribute money to be spent for material and labor at the present excessively high prices.

Iowa State College Feels the Housing Shortage

The Iowa State College, located at Ames, is being seriously affected by the failure of house building to keep up with the demands of the institution. Last year there were over 4,000 students at this institution, and it is estimated that the enrollment this fall will reach 5,500, an increase of over 1,500 with no place to stay. The city of Ames has only about 5,000 population.



Fig. 16

Figure 16. Forming grooves in surface course at division points between slabs. It is most important, as shown in Figure 4, that these grooves be formed directly over divisions in the base course.

Can the Builder Make Business?

By Arthur G. Hultquist

**The Business of Building as with Any Other Business Cannot Safely Grow of Itself
—Personal Suggestions Showing Where Profit Lies in Building
Is Up to the Builder**

IF a builder, particularly in rural neighborhoods, can bring himself to think of his work as that of a pioneer in the development of his locality, he will make a study of all its possibilities. Too often builders have to be literally dragged in at the last moment to the conferences of the local village or town boards or commercial clubs. Because he may be a little roughened up by the outdoor struggles with mother earth and building materials, the builder is inclined to feel out of place among the "silkstockings" and to ignore calls for special meetings to consider improvements. In point of fact he should be leading the bunch, if he is anything more than an order taker.

There are a number of towns in Wisconsin, and I guess in most of our states, where there are streets of residence buildings that would appear well in any metropolitan city, but the business sections are a collection of cheap, shoddy mixed up structures of wood and brick for the stores that are living off the custom of factory workers or the neighborhood farmers. Most of the storekeepers are usually renters. As a rebuilt or remodeled store building on a main street of a prosperous town stands a good chance of paying for the investment of rebuilding or remodeling out of its increased earning power, a movement initiated by builders would stand a good chance of "mopping up" the eyesores and have the effect of stimulating business all along the line.

At Lake Nebagamon, Wis., the local farmers had to store the products they raised and put them in root cellars over winter or drive 25 or 30 miles to Superior, the nearest market. This trip would take them one day and one night, with the result that their horses were pretty near all in or not fit for work when they got back home again. They got together and planned a co-operative warehouse. The organization has a capital of \$25,000. The warehouse they have built is shown in the illustration. It has a capacity of 25,000 bushels. It is built of brick and concrete, with two stories, the lower being part basement. On the side facing the tracks a wide door leads to the basement where feed, flour and grain

are stored. From the basement a stairway leads to the second or top floor, in the center of which are a number of large, deep bins of crated construction extending from the basement up. Potatoes are stored in these.

At the back of the warehouse are two doors through which potatoes and vege-



Farmers' Warehouse at Lake Nebagamon, Wis.

tables are handled from the loads to the scales, where they are weighed and then emptied on an elevator which conveys them to a screen, and further to the bins.

The small potatoes, if any, fall through the screen and are taken back by the owners.

A heating system has been installed to control the temperature.

By this organization and warehouse the farmers have obtained a ready, permanent market for the products they have to sell. All the farmers are urged to sell their products here, but nothing will be taken unless carefully inspected and considered good. The potatoes, vegetables and grains are here handled to the advantage of both the seller and the buyer. A fair market price is always paid out of the organization fund at the prevailing price. Sales are made at the intervals that promise a reasonable profit.

What all this means to the builder is that it shows a certain local condition that caused the construction of a warehouse. What do you know about such warehouses, reader? If you knew things were ripe for such a construction, are you in shape to go out and give some ideas of how it should be built and equipped? It is a big asset to be forehanded with the information and

hustle that makes business, and this is all the moral to this story.

Excessive Profits Discourage Building

One of the best known architects in Iowa, talking to a representative of NATIONAL BUILDER, said:

"Last year I had a big job that was to be let out by piecemeals. When the figures on the work came in, one contractor's bid for the particular work he was to do totaled \$25,000. The aggregate of the lowest bids was deemed too high, and the work was deferred till this year.

"When bids came in this year, the part that contractor was to do he bid to do for \$34,000, an advance on his part of \$9,000 over his bid of the previous year. The job was let and he got the work. I asked him afterwards how his bid happened to be so

much more this year than last, as it was not indicated by advance in cost of labor and materials. He replied that in the bid last year he had estimated 20 per cent profit for himself, while this year he had estimated 40 per cent profit for himself."

Later it was figured out that of the \$9,000 increase in the cost of the job, only \$3,466.66⅔ was for increased cost of labor and material, while \$5,533.33⅓ misrepresented increased profit charge, producing an aggregate profit on his part of the job of \$9,700, while last year he had been satisfied with a profit of \$4,166.66⅔.

Too Many Rooms

Clinton, Iowa, is short of houses, and rents are high for a city of its size,—about 25,000 inhabitants. But, in spite of the crowding, many empty rooms are reported to exist. A prominent architect says to NATIONAL BUILDER, "I am renting a house of 12 rooms, only eight of which I am using. But the house is built for one family and I do not know that I want to take another family into my house with me. And there are many other like cases in Clinton. I believe I could go out and find a thousand empty rooms in this city."

Questions and Answers

Architects and Builders are Invited to Contribute to this Department Either by Asking Questions or Answering Them. National Builder Will Pay for Answers to Questions Asked and for Better Answers from Wider Experience

Measuring Plaster

H. M. G. asks for tables for use in estimating, at a glance, the number of square yards of plastering contained in a room.

We know of no such tables and in fact do not see how a simple table could be devised for such purposes. Rooms are so varied in size, character and number and size of opening, that it seems that such a table would be too cumbersome to be practicable. However, if any readers of NATIONAL BUILDER know of a table of this kind they will confer a favor by making it known.

Porch Forms

E. L. W. of Utah asks how the forms are made for the concrete work of porches.

Figure 1 shows a method recently seen

between these two grades of shingles, in some localities. Moreover the writer has found quotations based on one kind of shingle in one town and on the other kind of shingle in another town. He found in one city 5-to-2 shingles selling at \$12.50 per thousand, while in another city 150 miles away he found 6-to-2 shingles selling at \$10.50 per thousand.

In an Illinois town, an old carpenter said to the writer, "When you buy shingles always buy the 6-to-2 shingles; they cost less and do not split so badly as do the thicker shingles."

In Muscatine, Iowa, the manager of a lumber company said, "No one will buy a 6-to-2 shingle here, and we do not carry them. They are supposed to warp badly. But I had some thick shingles put on my house last year, and many of them are

three-penny galvanized nails, instead of the regular shingle nails, which split the shingles too much."

The representative of the NATIONAL BUILDER was discussing building matters with Professor A. H. Kimball, head of the architectural department of the Iowa State College, when he remarked, "There is not necessarily any great difference between a 5-to-2 and a 6-to-2 shingle. It depends on the quality of the wood, and the seasoning it has had, and the man that nails it on, and the weather after it is nailed on. If a green shingle,—an unseasoned shingle—is nailed on a roof on a hot day in summer and gets two or three days of hot sun it will warp, and the thinner shingle will warp faster than the thick shingle. But if the shingle is put on in cool weather and has a considerable period in which to dry out,



Fig. 1—Porch forms



Fig. 2—Porch forms

in which the pier caps, door sill and porch floor were all cast in place. The form work is simple and requires no special explanation. Figure 2 shows a similar porch with concrete work completed.

Small members such as sills, caps, and so forth are, however, more often precast and set in place afterward.

Thick or Thin Shingles

There are two general thicknesses of shingles in use. The butts of five thick shingles if put together are supposed to measure just two inches; such shingles are known as 5-to-2s. The butts of six thin shingles if put together are supposed to measure 2 inches in thickness, and they are known as 6-to-2s.

During this period of high prices, there has been a considerable difference in prices

warping now." A carpenter in the employ of a real estate company commented, "The thin shingle does not warp any worse than the thick ones; I have had both kinds warp on me and have never been able to find out why."

In Cedar Rapids, Iowa, Paul N. Clark, of a real estate company that annually builds a good many houses, declared, "If a man uses the thin shingles on his house, he is likely to find, at the end of ten years, that they are all shot to pieces."

Quite a different opinion was expressed by C. F. Johnson, of the Reifschneider Realty Company, Marshalltown, Iowa, which company built 83 houses in two cities this year. He says: "The difference in wearing is not much, but our experience is that the thicker the shingle the less is it likely to split. But that does not bother us, for, in putting on shingles, we use

it will not warp. If it is good quality wood it will not split when the nails are driven into it. In using the thin shingle I should want to be sure that the man that nailed it on put in the proper number of nails and not just one nail in the middle of a big shingle, as is sometimes done. As thin cloth will often wear just as long as thick cloth of the same quality, so thin shingles will often wear just as long as the thick shingles, if all the conditions I have named are right."

French Doors

In up-to-date houses the cased opening between living room and dining room is replaced by French doors. Attention to these details give a builder a reputation for modern ideas.

Brick Trim

The skillful designer is seldom discouraged by the caution that "the costs must

be kept low. In most cases he is rather stimulated by the idea that he must use commonplace materials in a manner to give

distinction and interest to his design.

The buildings designed by Charles S. Frost, architect, for the Chicago Housing



Fig. 1—Brick trim



Fig. 2—Brick trim



Fig. 3—Brick trim



Fig. 4—Brick trim



Fig. 5—Brick trim



Fig. 6—Brick trim



Fig. 7—Brick trim

Association, are a case in point. As these houses are built to sell to workmen, without profit, economy is a prime consideration. The architect has, however, by simple means contrived to give them an attractive appearance at a low cost.

One of the most important elements in their distinction is due to the use of brickwork as trim. Quoins, window and door trim, belt courses and so forth are formed by projecting brickwork beyond the wall surfaces. The interesting character of this treatment is shown by the accompanying photographs. The method is applied to both hollow tile walls that are to be stuccoed and to ordinary brick walls. In the latter case the brick trimmings are of a contrasting shade to those of the wall.

Wooden Down Spouts

During recent years the wooden gutter has come into favor, and as a natural consequence the wooden down spout has been lately developed. Its friends claim in its favor that it is more durable and sightly than those of sheet metal and its cost is less.

The accompanying photograph shows a pile of wooden down spouts built up of one

inch stuff and ready to be installed on a large housing project.

Well-Built Houses Most Satisfactory

"I notice that the speculative builders of houses, those that build houses to sell, are

using stucco more and more," remarked H. E. Hunter, architect of Cedar Rapids, Iowa, to a representative of NATIONAL BUILDER. "The houses with some stucco seem to sell better than other kinds just now. But for myself, I prefer brick; it is a safer proposition.

"One brick house that I built in 1915 cost about \$35,000, of which about \$2,500 was on account of its fire-proof construction. In the floors we used tile slabs, which we covered with wood; and gypsum block partitions. In the foundations we used reinforced concrete. I built the house to be not only fire-proof but dust-proof and smoke-proof, which is of great importance when soft coal is burned.

"So far there have been no settlement cracks in that house. The house has been free from dust, which seems to sift through the ordinary house. Last year, the people in the house burned soft coal, and the dust and smoke did not get through the house.

"With a smaller house, this fire-proof construction might cost as much as ten per cent more than in ordinary construction, say on a house that costs \$25,000. But in any case, a brick house will give most satisfaction if it is as well-built and fire-proof as possible."

High Prices Lessen Fire-Proof Construction of Schools

John C. Wood, architect, of Clinton, Iowa, is doing much work at the present time in the construction of school houses in Iowa. He tells NATIONAL BUILDER that the high prices for material and labor have discouraged fire-proof construction of school houses, and that the tendency in this state is to construct fewer and fewer school houses of this kind. This, he says, is to be deplored, but it is a course that is forced on many school boards, which are absolutely limited in the amount of money they have to expend for a school house.



Wooden downspouts

Therefore, many of the new school houses being erected have wooden joists, wooden floors, and wooden roofs, instead of reinforced concrete for principal material. He estimates the cost of fire-proof construction to be 25 per cent above that of the school houses now being erected.

How to Tell When Lumber Is Ready to Be Taken From the Kiln

The two things which a dry kiln operator must be able to prove at the end of a kiln run are that his lumber is as dry as is required and that it is free from invisible seasoning stresses which would cause warping when the wood is resawed and shaped into furniture or other products. Neither of these points can be proved by examination of the outside of the lumber. They are easily determined, however, by the following tests which have been devised by the U. S. Forest Products Laboratory, Madison, Wis.:

constant weight. The weight lost during this drying is the weight of the moisture which was in the section. Divide the weight of the moisture by the weight of the oven dry section and multiply by 100. This will give the percentage of moisture in the section and also in the stock in that part of the kiln from which the sample was taken.

For furniture manufacture and other high grade uses, the moisture content of any board in the kiln should not vary by more than 2 or 3 per cent from the final moisture content specified.

Use Section B to find out whether the stock is uniformly dry from center to outside. In order to do this the section must be cut apart and the moisture content of the inside and outside found separately. If the stock is $1\frac{1}{2}$ inches or more in thickness, cut the section parallel to its edges to get an outer shell of material $\frac{1}{4}$ inch thick. Trim the remaining block equally on all four sides to leave a core $\frac{1}{2}$ inch thick. If the stock is less than $1\frac{1}{2}$ inches thick, cut Section B so as to get an outer shell

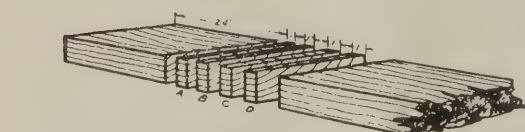
the wide faces of the original board to form tongues or prongs, leaving about $\frac{1}{2}$ inch of solid wood at one end of the section. If the stock is less than two inches thick, make two saw cuts; if it is more than two inches thick, make five saw cuts. From sections having six prongs break out the second prong from each side, leaving two outer and two central prongs. From sections having only three prongs remove the center prong. In Section D saw one central saw kerf to form two prongs. Stand the sections on end in some convenient place in the shop to dry.

Observe carefully the action of the prongs from the moment of sawing. Do they bow in or out or remain straight on the saw? Do they change shape after room drying?

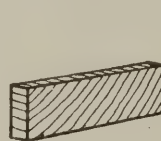
If the prongs remain straight both on the saw and after room drying, the lumber is perfectly seasoned, being free from stresses and uniformly dry throughout.

If the prongs remain straight on the saw but turn in after room drying, the moisture distribution is uneven, the sur-

MOISTURE CONTENT SECTIONS



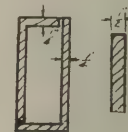
METHODS OF CUTTING TEST SECTIONS FROM PLANK



SEC. A
MOISTURE CONTENT SECTION
To be weighed, oven dried & reweighed to determine moisture content.

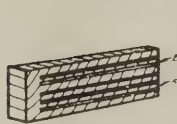


SEC. B
MOISTURE DISTRIBUTION SECTION
Outer margin sawed off as shown. Outer & center portions weighed, dried, & reweighed separately to determine moisture content.



CASE HARDENING SECTIONS

SECTIONS TO BE ROOM DRIED BEFORE CONCLUSION AS TO CASE HARDENING IS MADE



SEC. C
Thick stock sawed as shown for Case Hardening test. Prongs 2 & 5 to be broken out



Not "Case Hardened"



"Case Hardened" Permissible



"Case Hardened" Not Permissible



Effect of over steaming. Not Permissible



SEC. D
Resawed test for Case Hardening. One saw kerf



Not "Case Hardened"



"Case Hardened" Permissible



"Case Hardened" Not Permissible



Effect of over steaming. Not Permissible

TEST SECTIONS FOR MOISTURE CONTENT & CASE HARDENING

Before the lumber is removed from the kiln, choose a fairly representative board from each truck load of stock. Cut four one-inch cross-sections (A, B, C, D) from the board at least two feet from the end.

Use Section A to find the average moisture content of the dried stock. To do this, weigh the section immediately after cutting, on a balance accurate to one-tenth of 1 per cent, and then dry it on a steam pipe or in an oven at 212° F. until it reaches

and inner core each $\frac{1}{3}$ the total thickness of the section. Find the moisture content of each piece by the method used for finding the moisture content of Section A.

The moisture content of the inside and outside of the stock should be equalized, by steaming if necessary, to within 2 per cent before the lumber leaves the kiln.

The third and fourth sections, C and D, are for case-hardening and moisture distribution tests. Saw Section C parallel to

face being drier than the inside. A short steaming treatment to balance the moisture content should relieve all stresses.

If the prongs turn in on the saw and do not turn out after room drying, the lumber is "case-hardened" and is drier outside than inside. Use a steaming or high humidity treatment to moisten and soften the surface. The shrinkage of the outside in redrying should relieve the interior tension, and cause the stresses to disappear.

Uses for Brick in Hollow Tile Construction

Hollow tile is sometimes criticised because of the common custom of breaking whole tile to fill out short spaces, thus weakening the tile and causing more or less waste of the material.

The criticism may be more or less unfounded on facts, but by using bricks to supplement the tile, such spaces can be filled in without cutting any tile.

Figure 1 shows brick used at the ends of short courses at a window opening. In the building shown behind the excavator in Figure 2 bricks were used to fill in the tile "steps" which occur along the rake of

the gable. In Figure 3 bricks are used to top off the tile piers and bring them to the desired height to receive the cement caps.

Emergency Houses Need Not Be Thoroughly Modern

George T. Hedges, real estate, is reported to be the most extensive builder of houses in Cedar Rapids, Iowa. Paul N. Clark, of that company, says the policy of the company now is to build as many small houses as possible, as the times require small houses. Some of the houses they are building are on streets where sewers are not in. By leaving out the modern improvements, at first, the houses and lots can be made to cost only \$4,000 in each case, and the improvements can be put in later. This is regarded as moving towards the point of least resistance. This company takes the stand that at present an emergency exists in the housing situation, and that a house without modern improvements is a good deal better than no house.

Says Mr. Clark: "Frame houses are still the cheapest, but stucco houses are not much more expensive than frame, especially if a man will take into consideration the saving in painting in the future."

A Suspicion of Onesself Rather Than the Other Fellow Will do More to Settle Differences than the Reverse

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of National Builder published monthly at Chicago, Ill., for October 1, 1920.

State of Illinois, County of Cook, ss.

Before me, a Notary Public, in and for Lake County in the state aforesaid, personally appeared Geo. P. Miller, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the National Builder, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Tradespress Publishing Corporation; Editor, A. H. McQuilkin; Managing Editor, A. H. McQuilkin; Business Managers, Geo. P. Miller and H. P. Sessions, all at 542 S. Dearborn St., Chicago, Ill.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Tradespress Publishing Corporation, individual stockholders: W. D. Callender, T. J. Sullivan, Geo. P. Miller, N. C. Rockwood, W. B. Mayor, D. R. Hicks, A. H. McQuilkin, H. P. Sessions, H. J. Wolfe, W. S. Paulson, Chas. O. Nelson, all at postoffice address, 542 S. Dearborn St., Chicago, Ill., and C. H. Fuller, at 101 W. 41st St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) There are none.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is—(This information is required from daily publications only.)

(Signed) GEO. P. MILLER.

Sworn to and subscribed before me this 24th day of September, 1920.

FRANK L. CHENEY, Notary Public.
(My commission expires Dec. 21, 1921.)
Form 3526.—Ed. 1916.

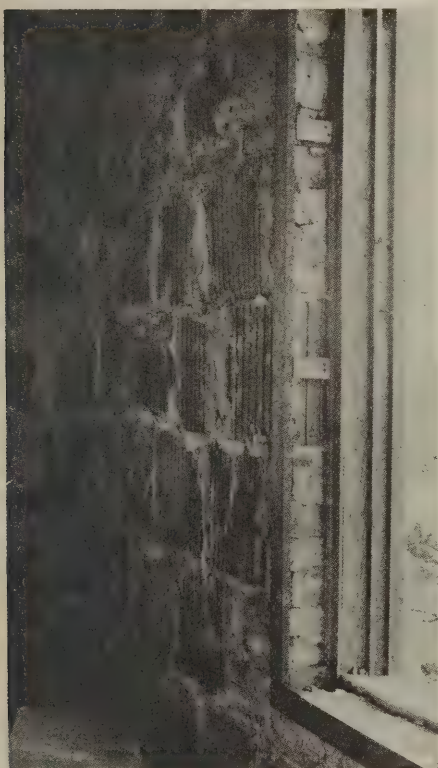


Fig. 1—Use of bricks at end of short courses at window opening



Fig. 2—Bricks used to fill in tile "steps" along the rake of gable

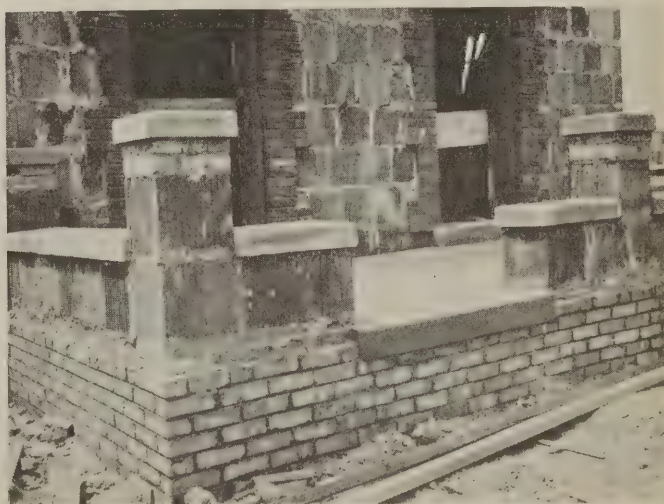


Fig. 3—Use of bricks to top off tile pieces to right height for cement caps

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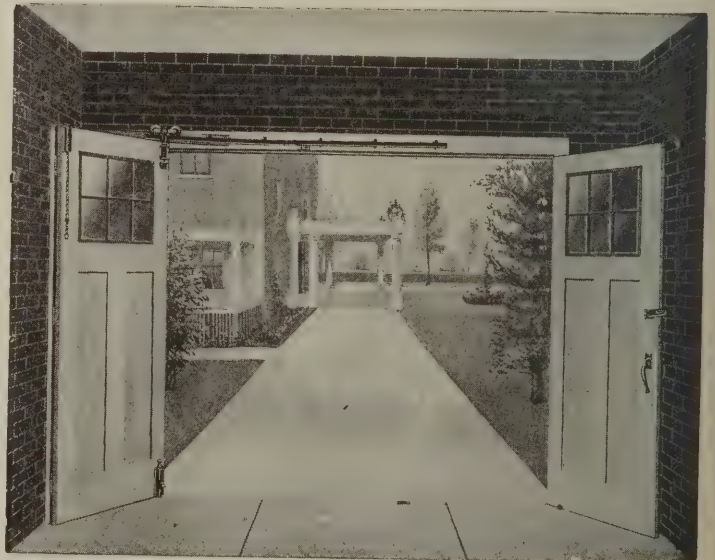


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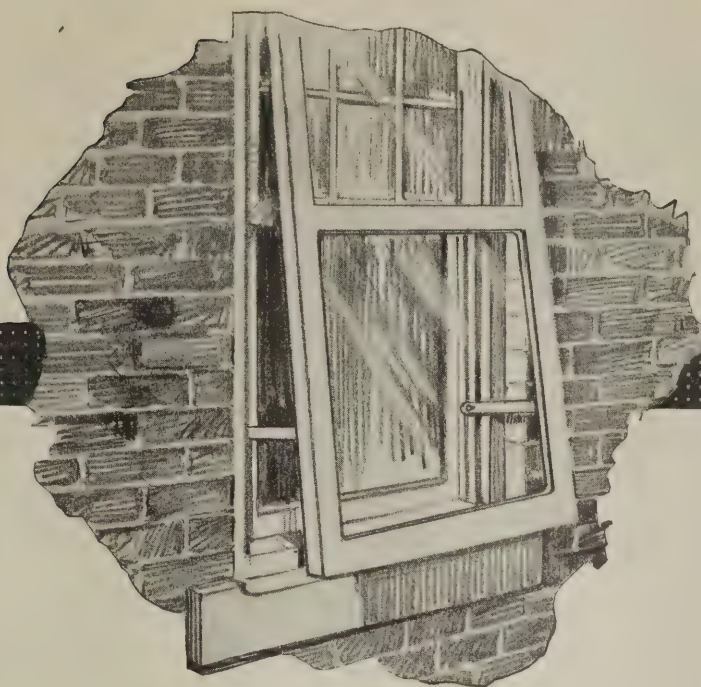
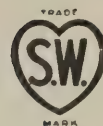
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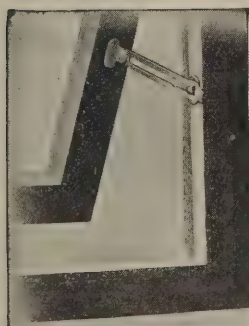
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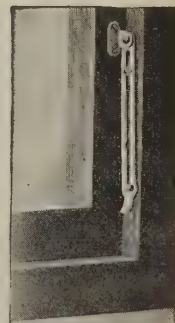
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Sash Open



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Announcements and Publications

The Proper Treatment for Floors, Woodwork and Furniture is the title of a handsome booklet lithographed in colors issued by S. C. Johnson & Son, Racine, Wis. Price 25 cents.

Plans and Elevations for Houses for Settlers, built by the California State Land Settlement Board, is a fifteen-page pamphlet showing the types of houses constructed, with sketch plans and cost of construction at time of building, 1918 and 1919. Issued from the California State Printing Office, Sacramento, Calif.

The White Pine Series of Architectural Monographs—These beautifully presented contributions to the building arts show, in Number 4 of the sixth volume, designs for a roadside tavern, a series of competitive drawings, with the report of the jury of architects, Cass Gilbert, Howard Shaw, Chas. Z. Klauder, F. R. Walker and R. Clipston Sturgis. Number 5 shows the beauties of the old colonial buildings of Old Deerfield, Mass., with sympathetic introductory text by Rawson W. Haddon. Issued by the White Pine Bureau, Merchants Bank Building, St. Paul, Minn.

The Extension Division of the Associated Advertising Clubs of the World announces that the claims presented in the Glide Belt advertising of the Goodyear Tire and Rubber Company, asserted to be exaggerated by the Bradford Belting Company of Cincinnati, have been fully authenticated and the truthfulness of the Goodyear advertising established on investigation.

Hay Tools and Door Hangers are illustrated in catalogue No. HT54, issued by F. E. Myers & Bro., Ashland, Ohio. A remarkably interesting array of ingenious labor and material saving devices are shown of vast interest to the agricultural builder and engineer.

Portable Permanent Buildings is the title of an illustrated descriptive pamphlet issued by the Anchor Corrugating Construction Co., 140 Washington Street, New York City, showing methods of unit construction, price list, etc.

Expanded Metal Construction, September issue, the monthly published by the Northwestern Expanded Metal Co., 37 West Van Buren Street, Chicago, as usual, is beautifully illustrated and has many practical suggestions valuable to architects and builders.

Kolesch & Co., New York, N. Y., manufacturers and dealers in drawing materials and appliances, have issued a new price list in which net prices are quoted, subject to change without notice. The object attempted is to more fully meet orders at the lowest prevailing price.

The Expert Estimator and Business Book for Painters is another of the "Expert" Series by A. Ashmun Kelly, published by the author, and retailing at \$1.50. The first part deals with the practical problems of measuring and estimating, with price lists and comparative tables; sign-painting and paper-hanging are included. The second part deals with the business management end of the shop, giving practical suggestions and points for consideration.

The Expert Paint Mixer, by A. Ashmun Kelly, is designed for the use of house and structural painters. It gives a course of instruction in the preparation of paints used for interior and exterior work, with directions for applying them. Clear and helpful observations are included, on the theory, nature, and origin of color, descriptions of bases, pigments, and liquids employed in the compounding of paints; tables are supplied, with suggestions of a practical nature. This book is published by David McKay Company, Publishers, 604-608 South Washington Square, Philadelphia, Pa.

The Expert Paper Hanger, by A. Ashmun Kelly, is a reference work designed for the use of practical paper-hangers. It comprises methods used by expert workmen in covering walls with papers, textile goods and other fabrics, and includes the preparation of walls, etc. A glossary of terms and a complete price list give additional information. The Master Painter Publishing Company, of Malvern, Pa., publish the book, which retails at \$2.00.

The Expert House Painter, by A. Ashmun Kelly, author and publisher, is out in a second edition, revised and completely rewritten. This book is for the experienced house painter as well as for the less expert worker, containing full instructions for doing every description of painting done by house painters. The nature and sources of the liquids and pigments used in the painting trade are discussed. Formulas are given for various paint mixtures, with tests for ascertaining the purity and value of materials. Retail at \$3.50.

The Expert Wood Finisher, by A. Ashmun Kelly, author and publisher, makes its first appearance in a second edition. This is a hand-book for both expert workmen and learners in the art and practice of finishing woods by staining, filling, varnishing, rubbing, polishing, oiling, waxing, etc. The best and most approved practices in the handling of the different woods, hard and soft, are explained in detail, with chapters on special finishes, such as the piano finish, French polishing, violin varnishing. Some important data is given on the refinishing of old furniture, the removing of spots and

stains, the treating of old, soiled floors. The staining of wicker and willow furniture is explained. This book retails for \$3.00.

A New Labor-Saving Star Spring Hammer Drill for drilling holes in brick, concrete and stone, the drill turning automatically, is announced by the Star Expansion Bolt Company, 147-149 Cedar Street, New York, and 120 West Lake Street, Chicago.

Lightolier Sales Book "H" is an elaborate presentation of the extensive and varied styles of lighting fixtures manufactured by the Lightolier Company, 569 Broadway, New York City. The suggestive value of the illustrations to architects and builders is aided by a handsome lithographed insert sheet in the actual colors of the lightoliers.

Hot Water Comforts in the Home is the title of an interesting booklet issued by the Thermal Appliance Company, Inc., 125 East 46th Street, New York, manufacturer of industrial and domestic water heater. The booklet is printed in two colors, and shows illustrations and diagrams regarding the installation of the "teco" water heater.

Bostwick Building Materials, briefly described for the busy man, is the title of a leaflet issued by the Bostwick Steel Lath Co., of Niles, Ohio.

McIntyre Live Air Space Automatic Concrete Building Tile Machines are illustrated and described in a large leaflet issued by the Benfer Concrete Machinery Co., Engineers Building, Cleveland, Ohio.

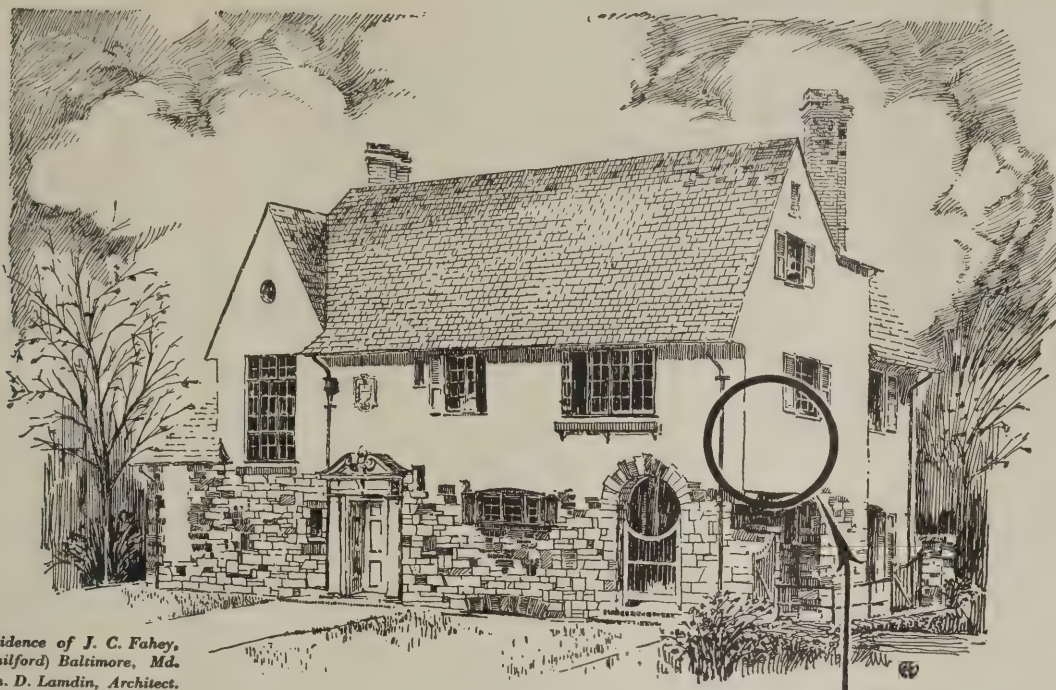
Cortright Metal Shingles are the subject of an illustrated descriptive booklet issued by the Cortright Metal Roofing Co., 50 North 23rd Street, Philadelphia, and 538 South Clark Street, Chicago.

Metal Building Corners and Drop Siding Clips are illustrated and described with other building specialties in Bulletin No. 6, issued by the F. D. Kees Manufacturing Co., Beatrice, Neb.

Vitrified Tile for Storage Bins and Grain Elevators is illustrated and described in a folder issued by the J. M. Preston Company, Lansing, Mich. The company has factories in Michigan, Ohio, Indiana, Pennsylvania and Iowa.

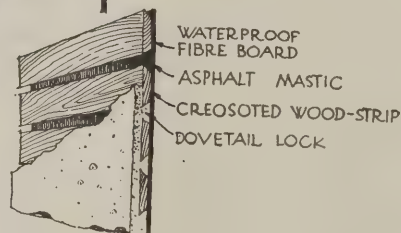
Light and Power Plants are illustrated and described in an elaborately illustrated and colored pamphlet issued by the Delco-Light Company, Dayton, Ohio.

A New Partition Material for Offices, etc., is illustrated and described in a catalogue entitled "Sanymetal," issued by the R. F. Carpenter Manufacturing Co., 978-988 East 64th Street, Cleveland, Ohio.



Residence of J. C. Fahey,
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Vol. 63 December, 1920 No. 12

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NATIONAL BUILDER

Volume 63

Chicago, December, 1920

Number 12

The Situation

SELF-DENIAL all along the line, in profits, wages, and extension of service appears to be the first solution of the building problem. The same sacrifice of self that swept the country during the war fever is now demanded to put the country on its feet. The wage-earner wants investigations to begin at the neighborhood market and work back to the grower and producer. The legislative remedial measures both state and

recount as what the committee has deduced from them. Nearly every statement made was preceded by a history of conditions before, during and after the war. The ideas of conditions that the committee will use in an effort to apply measures of relief are of the first importance.

A summary of the conclusions reached in part by the Senate Committee and issued by Senator Calder follows:

armistice, building once more came to a standstill through governmental interference and through high prices caused largely by popular demand for consumables and luxuries.

In answer to the question—"What can be done about the housing crisis?"—Without going into particulars, I would reply—"Reverse so far as you can the unfortunate chain of events which caused the crisis."



The Calder Senate Committee on Reconstruction and Production in session in Chicago. Senator Wm. M. Calder, center, examining a witness. Senator Kenyon, of Iowa, is taking notes of the evidence

national that the Calder Senate Committee's investigations have discovered to be a solution in part, must necessarily be slow in formation and in application. Immediate action is required. The building trades must make the first moves in freeing themselves from stagnation. To do so will be not so much a sacrifice as an investment in prosperity. The finger of suspicion withdrawn and the hand of helpfulness extended is declared to be the need of the hour—though some hearty spanking requires to be done.

The various statements made before the Calder Committee are not so necessary to

"What Can Be Done About the Housing Crisis?"

For many years before the war, housing conditions had been gradually improving, rentals were low and the death rate in one of our great cities, New York, had fallen to 12 per thousand.

During the war, the building industry which had been generally normal was suppressed by the government and came to a standstill in November, 1918, and it was about 4 per cent normal in December, 1918.

Within the first year after the armistice, the rate of building again approached normal, but during the second year after the

Of these events the following may be mentioned:

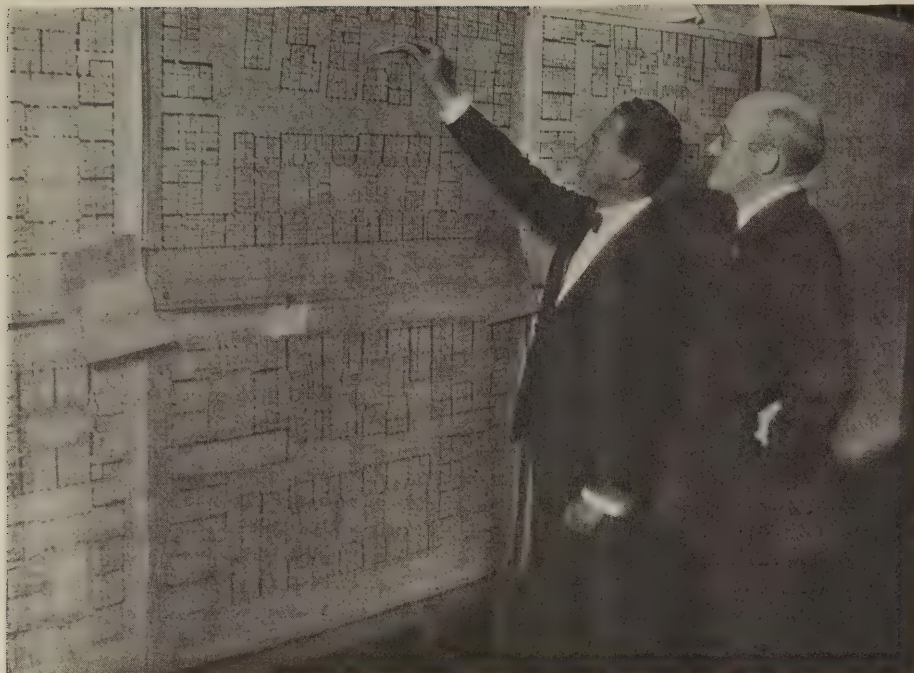
On October 2nd, 1917, Judge Lovett issued Priority Order No. 2 denying the use of open top cars for the transportation of building materials.

In the spring of 1918, Secretary McAdoo urged that all but "necessary" building be stopped.

The Capital issues Committee restricted credit for the banking industry.

The Labor Department and the War Industries Board allocated labor and materials for war uses.

(Continued on page 56)



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Five thousand dollars in cash prizes were awarded in an architectural competition held for the remodeling of a typical New York tenement block, "to make it a decent place to live in." The competition was held under the auspices of the Joint Legislative Committee on Housing and the Reconstruction Commission of New York. The illustration shows Messrs. Sibley and Fetherson, winners of a \$1,000 prize, in front of their drawings

Promotional Work

An interesting contrast to the practices that have been retarding building in the east is shown in the illustrations of the distribution of prizes to architects for plans to remodel a typical New York tenement block.

The Hold-Up

A conservative statement of the results of the investigations of the Lockwood Senate Committee on Housing is made by C. A. Crane, secretary of the General Contractors' Association of New York, in the Bulletin of the Associated General Contractors of America for November.

The revelations adduced by the Lockwood Senate Committee on Housing are not pleasant for those contractors whose methods of price fixing have been exposed, nor for labor leaders who have been accused of demanding a price to forestall strikes. Their plight, however, arouses no sympathy. Unfortunately, in besmirching themselves, the entire contracting industry is by implication besmirched in the public mind, on the assumption that the same practices obtain with all contractors. That result is as inevitable as it is true that the innocent must suffer with the guilty. The conviction of one merchant for profiteering leads instantly to the popular conclusion that every other merchant is doing it.

The testimony so far given before the committee tends to show that two associations, plumbers and cut-stone contractors, required their members to pay into a cen-

tral directing body four per cent on the gross amount of their contracts; that all bids were forwarded for examination and "advice" to this central body before being submitted; that an attorney who acted as director of their operations received as his fee about $\frac{1}{2}$ per cent of the amount paid

in and the balance went into an "insurance" or "re-adjustment" fund; that a close working alliance existed between these associations and the Building Trades Council which embraces all the unions of skilled trades in New York except the brick-layers, and that independent contractors found it impossible to get material or men to do their work until they joined the association, even though they employed none but union men and paid union wages, unless they bought the privilege to work from the boss labor leader. One immediate result of the investigation was the cancellation of the contracts for the new courthouse superstructure, evidence tending to show the bid for the limestone work was agreed upon by nine limestone contractors, all of whom were to be "taken care of" in the bid.

The World's Highest Salaried Labor Leader

The story of the rise to power and wealth of this labor leader, Robert Brindell, president of the Building Trades Council, is not new to the public. It was featured in the Sunday newspaper magazines last spring when he was heralded as the highest salaried labor leader in the world. He has testified that he receives 50 cents a month from the dock builders' and carpenters' unions, composed of 4,000 to 5,000 men. That's \$25,000 to \$30,000 a year. Testimony also showed that workmen contribute \$10 per week to mysterious "funds" for the privilege of holding union cards. Six contractors testified to making payments of over \$12,000 to Brindell in the last six months in order to secure his O.K. And total collections from contractors, owners



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Judge Abraham I. Elkus handing a prize of \$500 to Edward F. Washburn, of Klaber & Washburn, who gave a second-best solution of the problem cited in the caption to the preceding illustration

and workingmen paid to Brindell and the Building Trades Council aggregate over \$400,000 in the same period.

One owner told the committee that he paid \$25,000 to settle a strike called for no apparent reason, and that he understood the money was for Brindell. A wrecking contractor testified that he paid Brindell \$1,000 for a card permitting him to take a contract, and on another contract for a cellar and foundation job he was told he must pay \$7,500 and take in a partner acceptable to the "boss," who would see that the contract was increased \$150,000, which was to be the "partner's" share of the deal. He refused the proposition and being unable to proceed with his work, his contract was taken away and given to the proposed "partner."

A wrecker testified that while removing a building for Geo. A. Fuller Co. he was told by Brindell he must discharge his wrecking gang and put Brindell's men on. He refused. The Fuller company were notified that if they didn't remove the wreck-

Fuller company. They paid out \$47,000 to complete the job with Brindell's men.

Closed Shop and Cost-Plus Blamed

Counsel to the committee intimate that it has merely scratched the surface thus far in its investigations. A special grand jury has been impanelled to consider any evidence of a criminal nature developed. The situation, while amazing to the uninformed public, is not at all a surprise to those who have been following events in the building field during the past year. Undoubtedly the two principal contributing factors to the present condition are the closed shop and the cost-plus method of contracts. It has been held by the courts that an agreement for the closed shop is against public policy. We believe that as a result of the Lockwood Committee's investigations, the general use of the cost-plus form of contract will be condemned on the same grounds.

Cost-Plus Encourages Price Combinations

Not many years ago there were not more than half a dozen concerns which made a specialty of cost-plus contracts. During the war it was an absolute necessity to adopt that form on Government construction. Expense was a secondary consideration then. The war is over now, but we find that nearly all large building operations are going ahead on the cost-plus basis. Because of it, price combinations thrive. There is no incentive to fight them, if the owner is paying the bills.

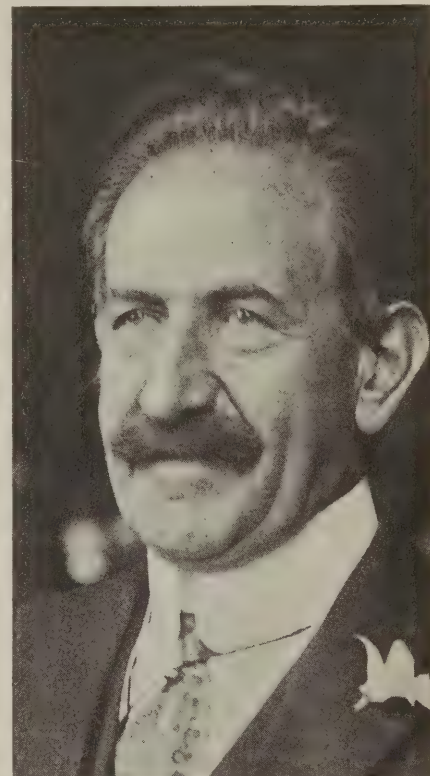
"Cost-plus" has become so prevalent that it is almost impossible to get a guaranteed estimate even for painting a roof or a minor plumbing job. Imagine a tailor refusing to tell what your suit of clothes will cost until it's finished! It is time to revert to the old-time methods of competitive bids on the lump sum or unit price basis. Under it, the largest contracting organizations in the country were developed and prospered. Their very existence depended on keeping within their bid price and they were constantly seeking and devising economical methods of handling their work. Their success depended on team work all down the line—the *esprit d'organization*; and this disappears mysteriously—there is an intangible difference in the same men, when they know they are on a cost-plus job. It contributes as much to the high cost of building as any other single cause.

May Employers and Workmen Agree on Closed Shop?

The indictment of the closed shop as against public policy is contained in a recent decision of the Chancery Court of New Jersey that is particularly apropos of the present situation in New York, because it deals with the agreement made a year ago between the New York Building Trades Employers' Association and the Building

Trades Council. (See Lehigh Structural Steel Co., and Donnell-Zane Co., Inc., v. Atlantic Smelting and Refining Works, et al., in Law and Labor, October, 1920, page 234.)

The facts in the case show that the Lehigh Structural Steel Co. contracted to fabricate and erect a building for the Atlantic Smelting and Refining Works and sub-let the erection to Donnell-Zane Company. A strike was pulled on Donnell-Zane by the iron workers to force a closed shop. Donnell-Zane resisted and proceeded



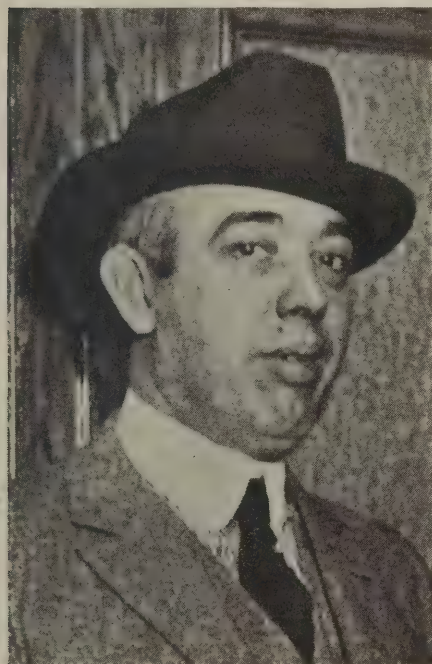
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Samuel Untermeyer, acting chief counsel for the Lockwood Joint Legislative Committee, now inquiring into the real conditions underlying the housing and building situation in New York City

to employ non-union men. The Atlantic Company informed the contractor that he would not be permitted to finish the job with non-union men because if he did so a general strike would be called in their plant, because it had been agreed that the erection should be done with union men only as shown below.

On further investigation it appeared that the Building Trades Employers' Association of the City of New York (an association of nearly all the building contractors of New York), of which the Iron League is a member and of which league Donnell-Zane are members, entered into a contract with the Building Trades Council of Greater New York and Long Island on November 20, 1919, to become effective January 1, 1920, and to continue for one

(Continued on page 58)



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Robert P. Brindell, president of the Building Trades Council of New York City, accused of taking cash to avert strikes

ing contractor, strikes would be called on every one of their jobs in the city. They appealed to the arbitration board of the Building Trades Employers' Association, and on appearing before the board found it consisted of Brindell and a member of the Employers' association. They "compromised" the matter by telling the wrecker he would have to put Brindell's men on or get off the work. He agreed, provided the Fuller company would meet the payrolls. He said with his men he could do it for \$12,000 and paid that amount over to the



A Branch Library. Mildner & Eisen, Architects, Detroit, Mich.

See working drawings in blueprint detachable insert in this issue



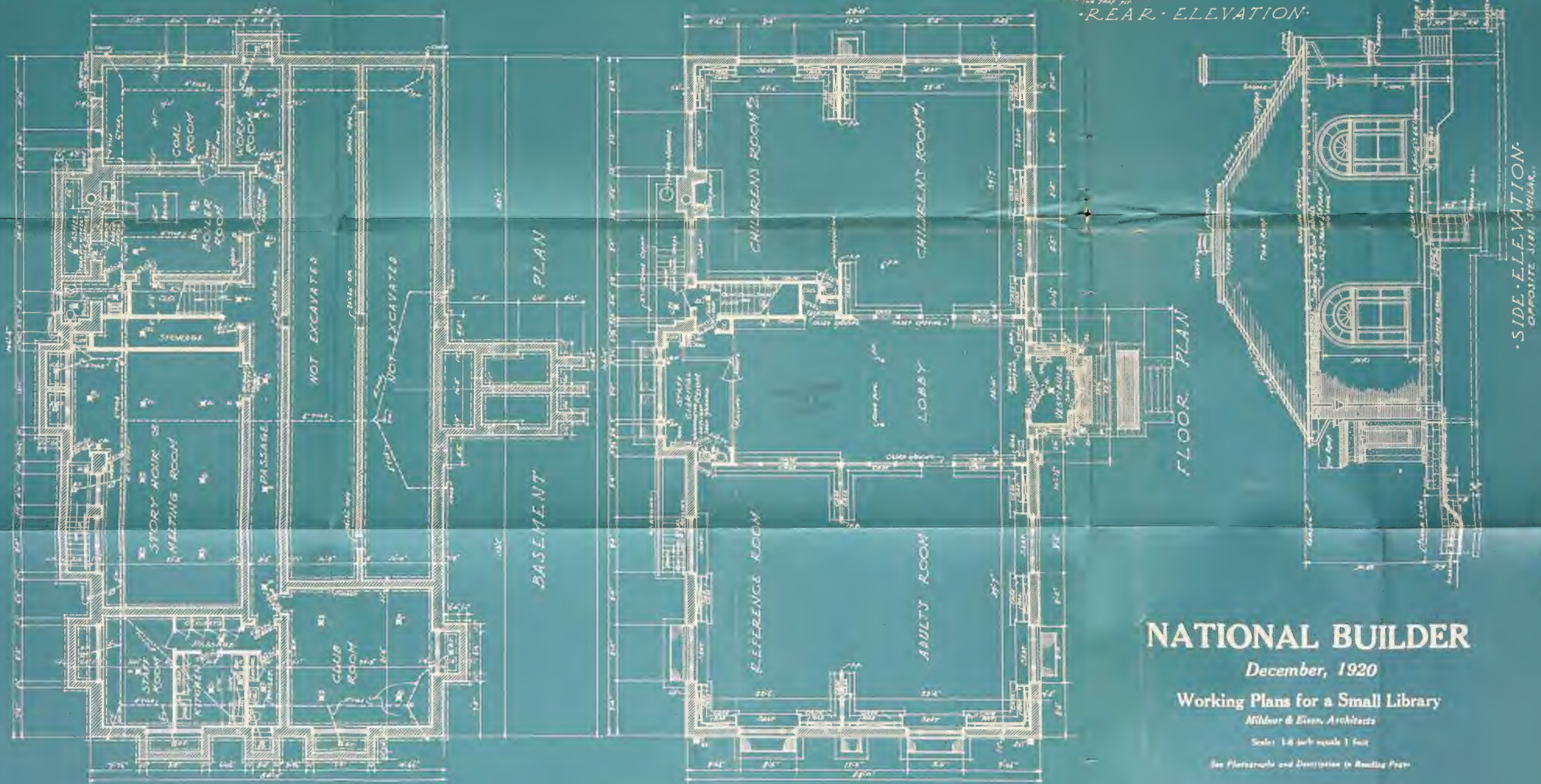
R.REFERENCE R.O.C

ILDER

Library



ng Pages



NATIONAL BUILDER

December, 1920

Working Plans for a Small Library

Wilder & Egan, Architects

Scale: 1/8 inch equals 1 foot

See Photographs and Description in Reading Room

A Branch Library

Working Drawings of this Small Library are Shown in the Blueprint Detachable Insert in this Issue

THE Ginsburg Branch Public Library is located in Detroit, Mich., and was designed by the firm of Mildner & Eisen, architects. It forms an attractive and well planned example of a moderate sized library suitable for use in a small city or town or as a branch of a large city library.

The exterior design is somewhat Italian in character, but modified to conform to American ideas and methods. The wall construction is of brick, and the sparing use of stone trimmings on this building is commendable. When a large number of scattered, stone details are used on a wall of dark toned brick, the result is often "spotty" and restless in its effect.

The stonework on this building is limited to the water table around the building and to the treatment around the entrance. Thus the entrance is given proper distinction and importance and the dignity of the entire building is preserved.

The treatment of the window openings is interesting, the panels under the sills allowing the proper proportions to be preserved. The frames of the windows are of wood.

The roof is of tile, with a simple cornice and stained show rafters projecting on the sheathed soffit of the overhang. A frieze formed of stucco with brick patterns is carried around the upper portion of the wall. This frieze is hidden by the heavy shadow in the photograph, but it is quite noticeable in the actual building and forms an attractive detail of the design. Another feature that is practically lost in the photograph is the effectiveness of the "English bond" that was employed in laying up the brickwork of the walls. By this means the walls are given a "sparkle" and texture that is attractive without being flashy.

The roof construction is composed of wood joists or rafters supported by steel trusses. The main floor is of reinforced concrete.

The vestibule has a tile floor and its walls are of vitrified brick laid in an ornamental pattern. The ceiling is arched and formed of plaster.

The main floor is of composition flooring material which wears well, is easy to clean and reduces sound. The walls and ceilings are plastered, and the ceiling has an ornamental plaster cornice and beam system. A large central ceiling light is placed under a skylight and affords ventilation as well as increasing the light. All of the interior trim, including the bookcases and cabinets, is of wood, and the partition screens are glazed with small panes set in metal bars.

A wide lobby leads from the vestibule

to the loan desk and clerical department. At one side of the clerical department is a janitor's slop sink which is also accessible from the reference room. This department also contains a lavatory for the use of the staff and a small lift or dumb-waiter for handling books from the basement.

At this end of the lobby is the rear entry and a reinforced concrete stair to the basement. At one side is a public telephone alcove and near the entrance doors is a drinking fountain.

At the left of the lobby is the adults' room and the reference room. At the right are two rooms for children; one of the children's rooms contains a fireplace and a lavatory cabinet.

Wide, built-in seats are built under all of the windows and wall radiators are placed behind the bookcases and the heat is delivered through the upper part of the cases by means of ducts and registers.

Only a portion of the basement is excavated. At one end is the boiler and fuel rooms. At one end of the boiler room is an ash pit, a toilet room and a slop sink. There is a closet under the reinforced concrete stair. A janitor's workroom and a large storage closet open from the main passage.

A large "story hour" or meeting room opens from the main passage; an outside

stair also leads to this room. This stair and the lift which runs to the staff room on the main floor make the story hour room also useful as a place for packing and unpacking books. A small clubroom also opens from the main passage.

At the end of the main passage is a door leading to the staff suite, which consists of a restroom, a small kitchen and a toilet-room. The short passage which connects these rooms contains four lockers for the use of the staff.

The absence of general toilet facilities is a noticeable fault in this building. The basement, however, offers plenty of available space that may be utilized for the installation of public toilets if desired.

Boxing of Framed Structure

Henry Borger, Bazine, Kansas, writes: "I should like to ask the question through your magazine;—Which is the stronger and more substantial, when the boxing is nailed on horizontal or diagonal? and why? We have had the argument. Some claim that the diagonal is the more substantial; while others claim that after the sides are boxed up there is no difference in strength. Has any one ever had it tested, the different ways of boxing?"



Reading room of a branch library. Mildner & Eisen, Architects

Barge Boards and Gable Ends

By John Y. Dunlop

BARGE or verge boards such as those which illustrate this article are generally considered as necessary to the proper finish of half-timber gables.

Where the roof at the gable has no projection, the barge board is nailed on to the face of the wall and the roof boarding or battens lap over and are nailed to the upper edge of the barge board. When the barge board projects, the purlins, ridge and wall plates are carried out past the face of the gable for the required distance to form a support for the end rafter. The barge or verge board is then fixed to the rafter.

In roofs where there are no purlins, special arrangements are made to support the projecting rafter.

There are various methods of finishing the verge gable ends. In some cases special verge tile is used; in other cases the barge board is set the thickness of the tiles higher than the roof covering. Then after the tiles have been laid close up to the barge board a strip of wood some three inches broad is nailed on the top to cover the top edge of the barge board and the joint between the board and the tiles. The most up-to-date method is to allow the tiles or slates to extend over the top of the wood finish of the gable as shown in the illustration of the Fox and Hounds. This is usually done by means of small cantilever pieces that are attached to the first rafter inside the gable. These extend across the wall and project sufficiently far to receive the finish. The end of the cantilever pieces are often tenoned so that this part passes through mortises in both rafter and barge board and are fastened in position by a wood pin through the projecting tenon. Barge boards having a face more than a foot wide should be built-up to prevent warping. In the half tone illustration of the Fox and Hounds the barge boards are supported at the lower end on a cantilever bracket, while at the middle, the purlin forms the center support, and the ridge is the support at the top. The barge boards are tenoned the one into the other at the top. In many cases the barge boards are tenoned at the ridge into an upright post called a finial which is often elaborately treated.

We have many examples in both ancient and modern work, of ornamental barge boards, and the accompanying illustrations give a fair representation of how the early carpenters decorated the gable ends of buildings. All of the examples shown are based on geometrical designs which have the advantage that instruments can be used to draw the outline.

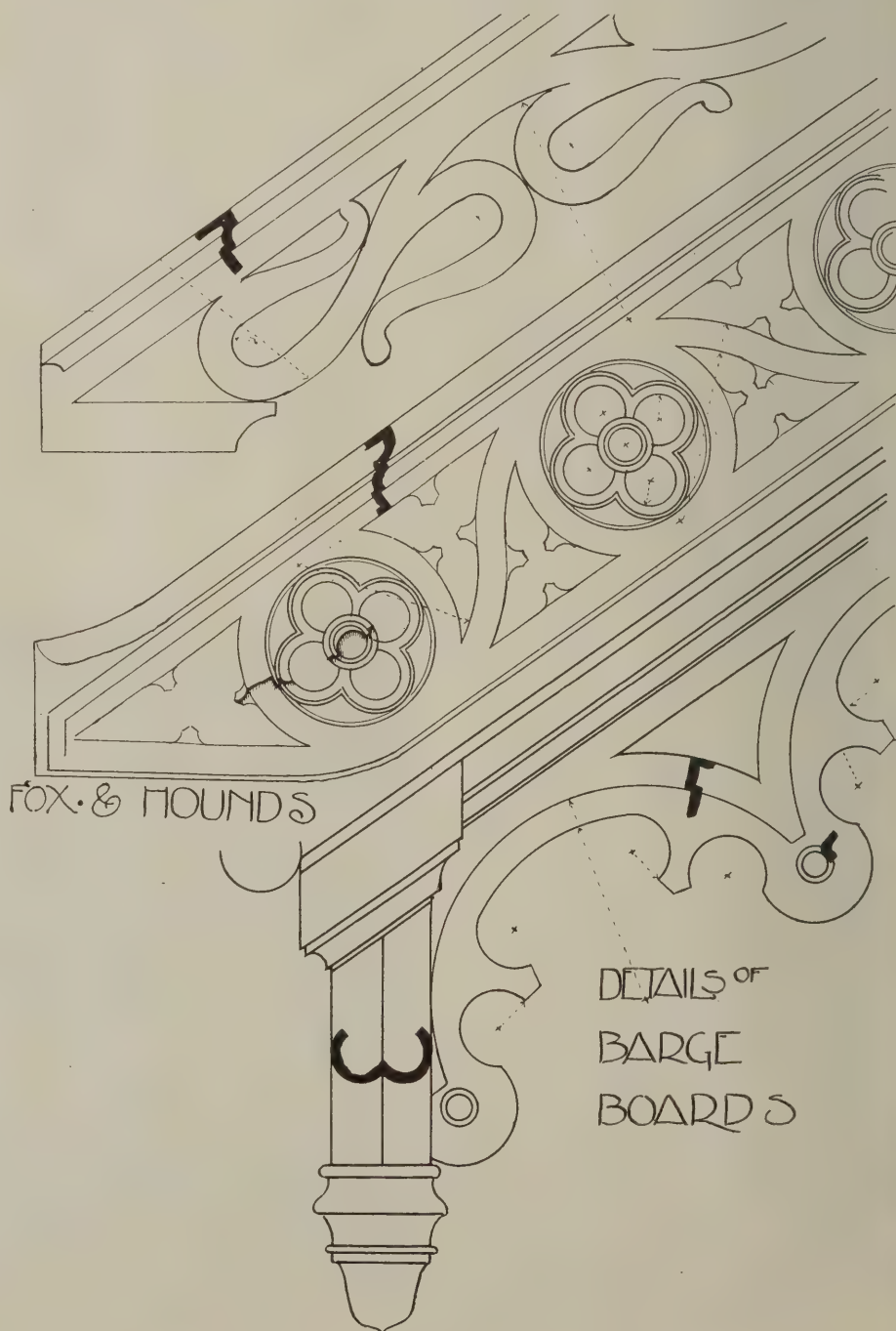
In the line drawings of the various de-

signs, three distinct types of work are shown. There is first the open barge cut from one piece of wood and in which the design has only been partly drawn with the compasses. Several of the centers are given such as those for the main wavy band which extends from the bottom to top. The centers for the ends of the S-loop are also given. All of the other curves of this design must have been drawn freehand.

Of course we can only guess how this ornamented barge board was cut out, but

in the most of shops at the present time it would be done with the saw. Necessarily a great amount of boring would be done to allow the saw to be started. Still the bulk of the outline would be taken out with the saw and finished with the spokeshave and file. The top of this barge board is tenoned to a small finial post.

In the sketch of the barge board of the Fox and Hounds we have a pierced design which is made up of circles filled with quatre-foil ornament. Tangent to the cir-



cles is a wavy band which divided the space between the circles into spherical triangles. Each of those triangular spaces have a cusp on each side.

In the lower design the lines show a built-up and cut barge board. The back board is one inch thick, while the outer board is three-quarters of an inch. Each of these parts are screwed together from the back with what to all appearances are iron screws. This barge board is tenoned into a final post fixed at the eave of the roof.

In each of these examples oak has been employed in the construction of the barge boards.

In the front gable of the Fox and Hounds a quaint and picturesque effect has been obtained by allowing the floor timbers to project. These are cantilevered over the main face of the wall underneath and are also partly supported by the curved brackets which support the beam carrying the ends.

Leaded glass windows are a feature of these gable ends. Nowadays there is a tendency to increase the use of this material for decorative purposes which is due to the growing use of casement curtains and to the prevailing idea of the up-to-date housekeeper who wants to do without interior shades hanging from the tops of the windows. Clear glazing means blinds of some sort or heavy curtains to obscure the windows at night. Leaded glass windows do away with those extra fittings and are a valuable and artistic treatment of the house.

In the stone country house shown, the gable ends are built with sloping edge covered with long stones extending from the eaves to the apex. These coping stones are laid on to prevent the rain from soaking in to the wall. Of course all stone gables don't rake from top to bottom, many of them are changed in direction at the points where the stones are tied into the wall of the gable. This connecting up of the coping stones to the gable often takes the form of a decorative feature, as is shown midway up the slope in this example.

In this same illustration some of the gables are shown stepped from the eave to the ridge. This method is something similar to that which in Scottish architecture is called crow stepped gables. A better illustration of a crow stepped gable is shown in the illustration of a cement cottage.

A very simple treatment of a gable end is shown in the illustration of a thatched cottage. The construction of this roof is simple. Battens or purlins are nailed to the rafters to receive the layers of straw. The battens extend beyond the gable to receive the wood barge boards as shown in the illustration. The straw is laid on layer after layer and sewed in place until the top edge of the barge is reached, when a



Fig. 2—One of the front gables in the Fox and Hounds, Hants, England

cover board is fixed to cover the joint between the straw and barge.

The illustration of the half-timbered house with cement panels shows the extent to which the old time builders sometimes applied their craftsmanship.

Lime and Fire Protection

A report by the National Board of Fire Underwriters on the recent fire in the brick and reinforced concrete warehouse of the Imperial Tobacco Company, of Norfolk, Va., which resulted in a total loss, has a very direct bearing on the use of lime in concrete, according to the Staff Committee of the National Lime Association. Among other faults the quality of the concrete was poor, the mixing was carelessly done, the placing of reinforcement was faulty, and its protection was inefficient.

Any one who has seen the complicated mats of steel bars which are laid in the

bottom of concrete beams will appreciate how difficult it is to insure that the concrete will perfectly surround and enclose each bar, but that it should, is vitally necessary in order that the intense heat of a fire may be kept as long as possible away from the steel which, by its quick and extreme expansion, would burst the concrete and destroy the building. Ordinarily large amounts of water are added to concrete to increase its flowability and aid in complete filling of the forms, but this water easily separates from the rest of the batch, forming pools at the most unexpected points in place of the concrete which should occupy the space. Recent inspection of a new concrete building revealed that in one-third of the beams the steel rods were visible after the forms were removed. It is impossible to repair such a condition, and the building is permanently rendered less safe.

Hydrated lime added in the recommended proportions, however, gives the necessary



Fig. 3—Country house in Scotland showing stone gables of various outlines



Fig. 5—Gate lodge showing gable end of thatched roof

plasticity and ease of flow through chutes, around steel reinforcement, in complicated forms with an actual reduction in the ten-

dency to segregation, smoother surfaces, lighter color and no measurable decrease of strength either in compression or in bend-

ing, while its alkalinity inhibits rusting of the steel. Surfaces protected with lime plaster will not rust.



Fig. 4—A cement cottage with crow-stepped gables on the front and ends



Fig. 6—The cement and timber gables of town architecture

"Colonial Terraces"

"COLONIAL TERRACES" situated in Newburgh, N. Y., is a beautiful hillside on which a group of dwellings for workers was erected under the direction of the U. S. Shipping Board. The architects for this development were Ludlow & Peabody and C. H. Sparry. We are indebted to the builders, the T. C. Desmond Company, for the following description of the property:

Attention is first called to the communal garages that are indicated by the dotted lines in the block plan. This method of grouping of garages saves money for the owners, makes a good appearance and also utilizes the more or less worthless space at the rear of the lots. One driveway serves all, thus avoiding the waste space that results from separate driveways through each yard. The shaded buildings in the block plan are to be added as the need arises.

"This development consists of about twenty acres on which were placed sixty buildings. Thirty of these are frame semi-detached houses of several different designs. The remaining thirty buildings are divided into thirteen apartment houses, containing apartments of three and four rooms each, and seventeen buildings containing groups of five and six room houses.

"The streets are laid out in such a way that each building has light and air on every side, thus providing for the health of the occupants. Each street is flanked with numerous shade trees and the lawns and shrubbery make this spot the show place of the beautiful Hillside City.

"The architecture of the buildings is of a simple Colonial type and was designed with due regard to the locality, and provide modern, comfortable and yet not too expensive homes. The houses were carefully planned and are arranged in groups of two, three and in a few cases, four houses in a row. Each house has a well built fire wall between it and its neighbor. They are planned with six rooms and bath and some few with five and bath to provide for the smaller families. In the six room houses the first floor consists of a living room, dining room and kitchen, and the second floor of three bedrooms of ample size and bath. The five room houses have one bedroom less.

"The interior of the houses is either tastefully stained or painted in the usual Colonial white woodwork. The walls are all papered in good taste with exceptionally good quality paper. The plumbing is all of the first quality, the kitchens are provided with enamel sinks and two stationary laundry tubs and a gas range with oven. Hot water is supplied by a large boiler in the kitchen with a gas hot water heater along-

side, supplemented by a unique piping connection made with the furnace in the cellar so that during the winter months hot water may be secured at all hours without additional expense. The bathrooms are finished in white enamel and the fixtures are of the most approved make. A large furnace which supplies heat to every room is located in the cellar of each house. Each room and hall is equipped with electric light fixtures of simple, yet pleasing design.

"The apartment houses are arranged in suites of four rooms and bath, with a few exceptions of three rooms and bath. Each apartment consists of a living room, dining rooms, bedroom, kitchen and bath, all complete and decorated and finished to the last

detail in a similar manner to the houses. A very interesting feature and one worthy of note is the loggia or piazza which opens from the living room and bedroom of each apartment. The loggias are finished in brick and stucco and have cement floors all finished in attractive colors, so that each tenant has a pleasant outdoor sitting room entirely to himself. The apartment buildings are heated by a large steam heating plant. A hot water boiler cared for by the janitor, furnishes an unlimited supply of hot water to the tenants at any hour of the day or night.

"In addition to the lawns surrounding each and every building there are several parks which lend to the beauty of this development. Attractive tennis courts have

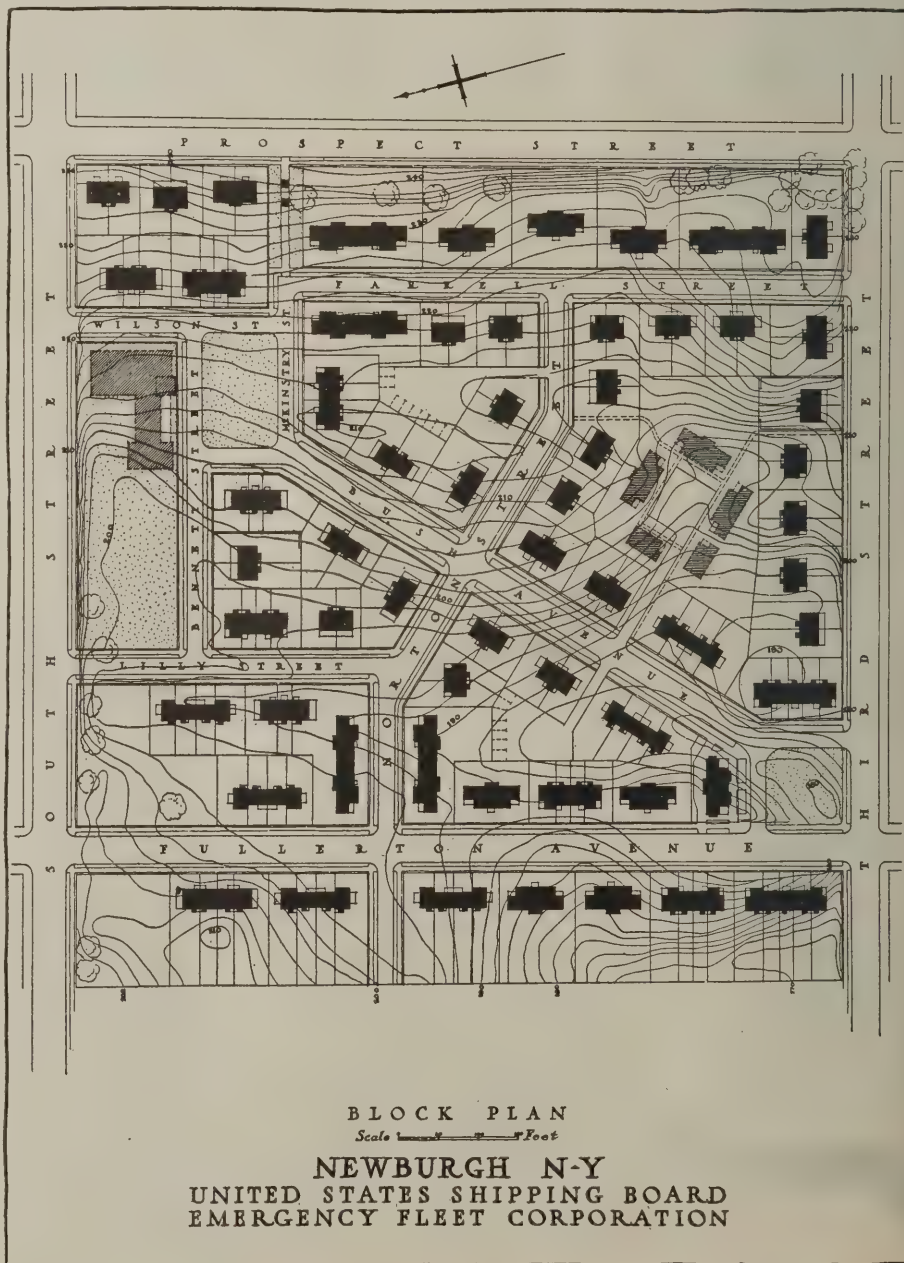




Fig. 1



Fig. 2

Fig. 1—The Colonial type houses and the terraced slopes on which they are built gives "Colonial Terraces" a true meaning
Fig. 2—A view of one of the small park spaces



Fig. 3



Fig. 4

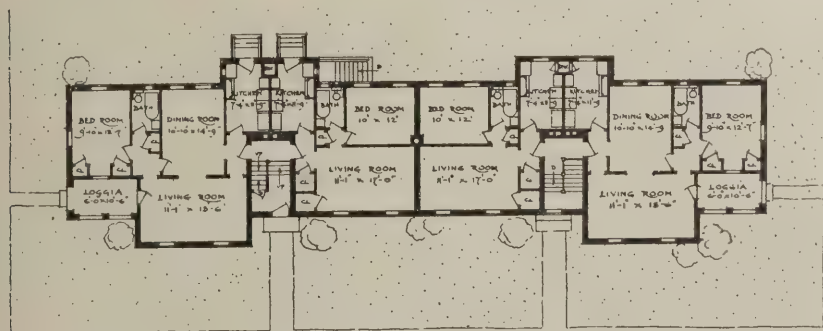
Fig. 3—The apartment houses are of brick and all houses have slate roofs. Fig. 4—Apartment house in left foreground. Three-family house in middle distance

been erected and also playground fitted with swings, teeters, slides and sand boxes. The playground provides healthful recreation for the children and at the same time pro-

Coloring Concrete

J. T. writes: "Will you kindly tell me what should be used in the cement mixture

of the booklet, "Recommended Practise for Portland Cement Stucco," issued by the Portland Cement Association, 111 W. Washington Street, Chicago, are given directions and suggestions for the use of coloring materials in stucco. Mineral coloring materials suitable for this purpose can be obtained from a number of concerns, and a list of them has been mailed to you. Coloring material is usually needed only in the finish coat of stucco work. Estimating this finish coat to be of the proportions one part cement to three parts of sand, and that it is $\frac{3}{8}$ inch thick, then $1 \frac{1}{10}$ sacks of cement and $3 \frac{5}{10}$ cu. ft. of sand would be required for each 100 square feet of surface. If a bright shade of color is desired, the amount of coloring material would be possibly 10 per cent of the weight of the cement as described in the above mentioned booklet, and about 10 pounds of coloring would be required for each 100 sq. ft. For a softer shade of color, the amount of coloring material would be less, say 5 per cent of



FIRST FLOOR PLAN

SECOND FLOOR PLAN

Plan of apartment house in Fig. 3

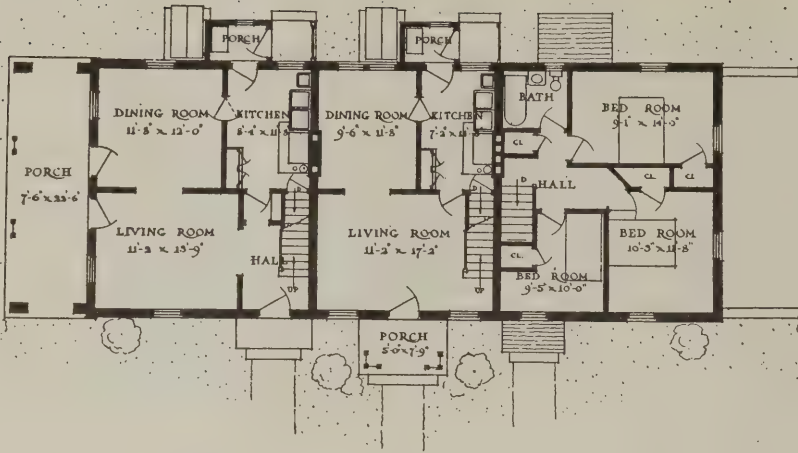
fects the lawns and shrubbery from accidents due to children playing in and about them."

for coloring stucco buff color and how much should be used per hundred square feet?" Answer—On pages 10, 16, and 25

the weight of the cement, in which case about 5 pounds of coloring material would be required for each 100 sq. ft. of surface.

Use of Lime in Portland Cement Stucco

The effect of hydrated lime in cement stucco has been given considerable attention, and the conclusion which is forcing itself upon the committee is that hydrated lime does not improve the structure of the stucco, but by imparting better working quality to the mortar reduces the cost of application. On the other hand, there is evidence that not more than 20% hydrated lime, by volume of the cement, should be added to cement stucco if the best results are to be obtained."—*Recommended Practice for Portland Cement Stucco.*



FIRST FLOOR PLAN SECOND FLOOR PLAN
Plan of three-family house in Fig. 4

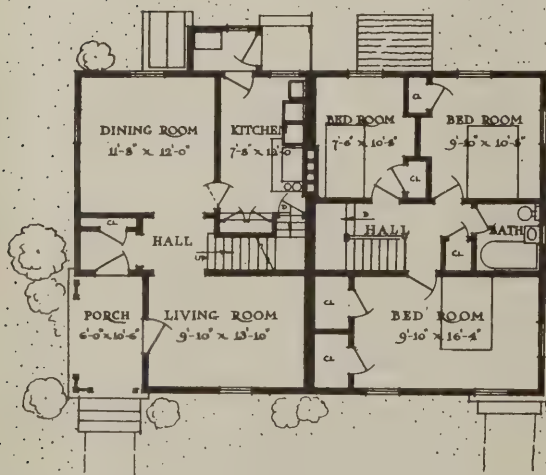


Fig. 5

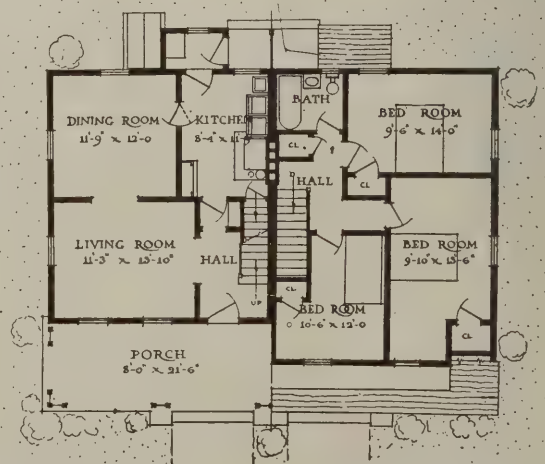


Fig. 6

Fig. 5—A six-room double house in the left foreground. Apartment houses in the distance
Fig. 6—Rear view of another type of six-room double house. Note the terraced steps leading to the next street



FIRST FLOOR PLAN SECOND FLOOR PLAN
Plan of double house in Fig. 5



FIRST FLOOR PLAN SECOND FLOOR PLAN
Plan of double house in Fig. 6

A Remodeled School

A REMODELED school at Grand Prairie, Texas, for which H. A. Overbeck was the architect, is here illustrated and described.

The portion shown in the photograph is entirely new, the old building consisting of the portion at the rear which now forms the auditorium, together with the class rooms above.

The exterior walls throughout are of

brick trimmed with cement stone. The stucco panels of the porch are especially interesting and reflect the growing tendency to obtain simple decorative effects by combining these materials.

The unilateral system of lighting class rooms from windows on only one side is used throughout, resulting in large, unbroken wall surfaces which add much to

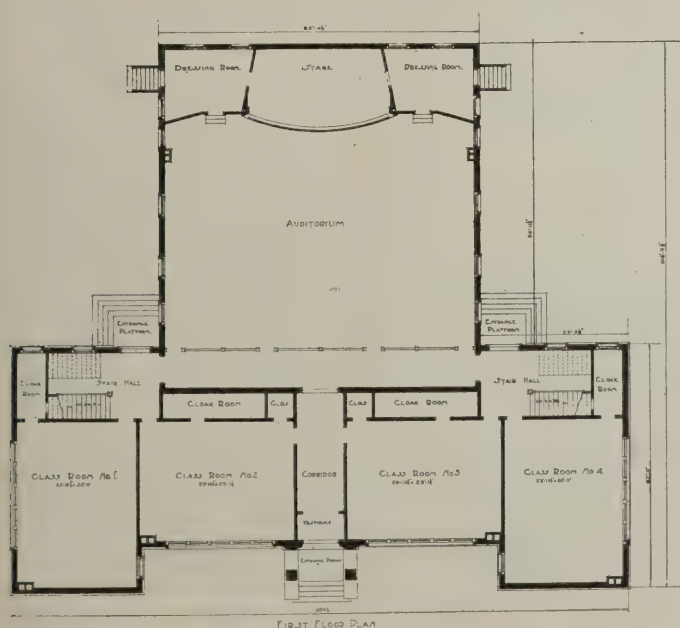
the distinctive character of modern American schools.

The toilets, heating and ventilating equipment, storage rooms, and so forth, are located in the basement.

The main entrance is through a vestibule into a corridor which leads to the auditorium. Across the rear of the auditorium a passage has been formed by a low par-



A remodeled school at Grand Prairie, Texas. H. A. Overbeck, Architect



tion. This passage leads to doors which open into the stair halls at the ends of the building. The stair halls have direct exits to the exterior and also open into the first floor class rooms, making it unnecessary for the students to pass through the auditorium to reach their rooms.

In remodeling the old building the former class room partitions were removed

and the first story was made into an auditorium. Cast iron columns and steel beams furnish the second floor supports formerly supplied by the partitions. The auditorium contains a stage, separate dressing rooms with direct exits and is lighted by windows in each side wall.

The building thus is supplied with five exits on the first floor, providing an ample

safeguard in case of fire or other need for clearing the building rapidly.

The second story contains eight class rooms, a small library, a principal's room and a teachers' room, all connected by cross corridors. All class rooms have cloak rooms and several have separate closets for the use of the teacher. Two janitor's closets are provided on the second floor.

A Dutch Colonial House

By Charles Alma Byers

HERE is an especially good example of the popular Dutch Colonial style. The lines are well balanced and graceful and the detail work is particularly effective. Note, for instance, the artistic little entrance porch, with its latticed sides, the rose-ladders at the front corners, and the flower boxes at the second floor front windows. Moreover, outwardly considered, there are two delightful porches—one on the left side, off the dining-room, and the other on a rear corner, accessible from both the living-room and the breakfast-room. The latter porch provides a second floor

balcony, adjoining a sleeping porch. Incidentally, it is glass doors that in each instance give interior access to these features.

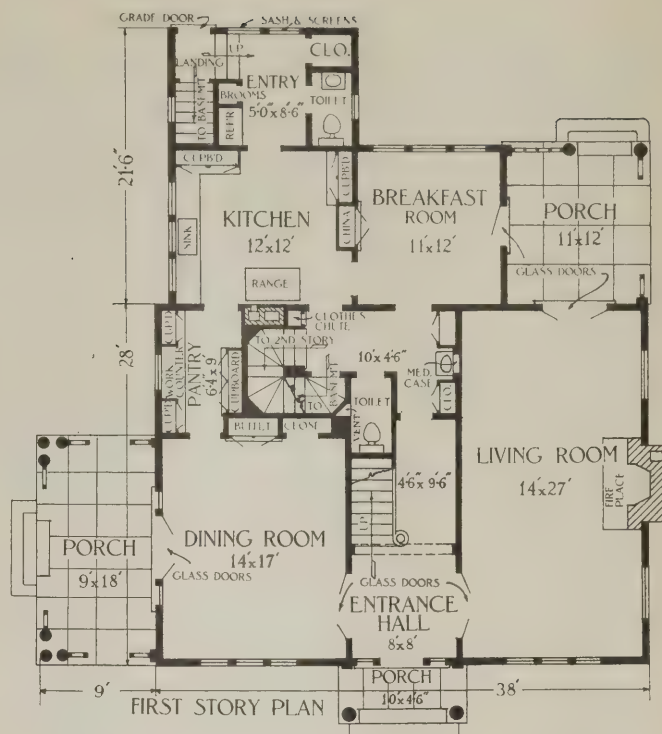
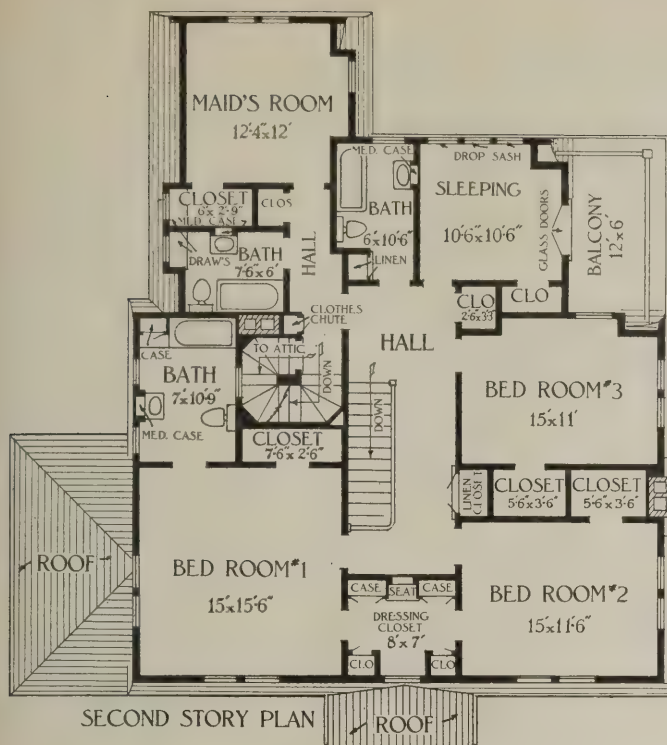
The exterior walls of this house are of shingles, which are also used for the gables and the roof; and both walls and roof are painted a medium shade of French gray, while all trimming is done in white. The side chimney is of brick, and brick is further used for paving the front entrance and for edging the cement floors of the two porches.

The front door opens into a small staircase hall, to the right of which are glass

doors leading to the living-room, and to the left are similar doors opening into the dining-room. The floor plans are especially deserving of study—not only in respect to the rooms provided and the convenient manner in which they are laid out, but also with reference to built-in features, closets, and so forth. Particular notice should be taken of the pass-pantry and the washroom, each with its built-in conveniences, on the first floor, and of the small dressing-room and the three bathrooms, with their features, on the second floor.



A Dutch Colonial house



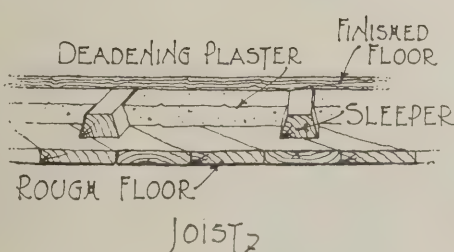
The interior finish is in Colonial style, and carried out in unusual effectiveness. The woodwork in the entrance hall, living-room and dining-room is in old ivory and mahogany; in the breakfast-room and two of the bedrooms, as well as the second floor hall, it is in old ivory alone, eggshell finish, and in the remaining rooms it is in either white paint or white enamel. All principal rooms, including the halls and three bedrooms, are papered, and their floors are of hardwood. The walls of the kitchen and bathrooms are finished, to the top of the windows and doors, with a smooth, hard plaster coat which is enameled like the woodwork, and the floors of two of the bathrooms are of tile, pine being used in the other and the kitchen. The fireplace in the living-room is of tile, finished with a wood mantel-shelf, in Colonial design.

The house has a large basement, partitioned into storage room, fuel room, and so forth, which is reached by both an inside stairway and a grade stairway. There is also a roomy, unfinished attic, with a stairway reaching thereto. The house is equipped with a good furnace and all other conveniences. It is located in Los Angeles, Calif., and the plans are by E. W. Stillwell of that city.

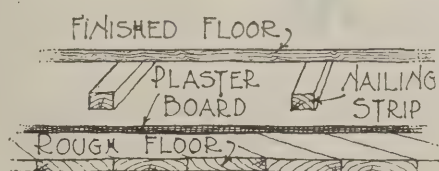
Sound-Deadened Floors

F. M. asks for methods of sound-deadening wood joist floors for small apartments and flats:

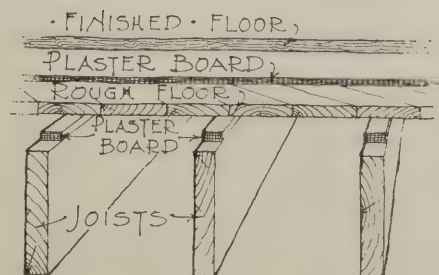
Three methods are shown. In Figure 1, 2-inch sleepers are laid on the rough floor and the space between is filled with plaster or cinder concrete, the finished floor is then placed in the usual manner.



• FIG. 1 •



• FIG. 2 •



• FIG. 3 •

In Figure 2, plaster board is laid on the rough floor; 1 1/2 by 2-inch nailing strips

are placed on this to receive the finished floor. Care should be used to prevent the nails used in the finished floor from passing through the plaster board, as in that case the nails will form a direct connection between the two floors and thus lessen the efficiency of the method.

Figure 3 shows a method in which the tops of the joists are covered with strips of plaster board. The rough floor is then laid and covered with plaster board. The finished floor is laid directly on top of the plaster board, no attention being given to the puncturing of the latter by nails. It is not considered so efficient as the second method.

Send in your experience in sound-deadening floors.

Estimating Quantities in Mixing Concrete

W. M. writes: "Should like to know the simplest and easiest way to estimate the exact quantities of the different materials for different mixes in concrete; for the cubic foot and yard." Answer—On page 23 of the booklet, "How to Make and Use Concrete," you will find a table which will be helpful in estimating the amounts of sand, cement and pebbles required for various concrete jobs. For instance, suppose you wish to estimate the amount of sand, cement and pebbles required for building 100 square feet of dairy barn floor, using a 1:2:4 mixture, the floor to be six inches thick. From the table it is seen that this job will require 11.1 sacks of cement, 22.1 cubic feet of sand, and 44.2 cubic feet of pebbles of crushed rock. In a similar way you can ascertain the materials required for almost any piece of concrete work.

The Home-Building Company of Connersville, Ind.

A HOUSING development at Connersville, Ind., illustrates the methods employed by a small community to solve its housing problems. The plan in this instance is to build houses to sell to workers of limited means at a very small per cent above cost and on the easy payment system.

The project, its desirability, and its effect upon the prosperity of the community, and the method of financing was put up to the community. The money was raised by popular stock subscription in monthly pay-

is subjected to rigid architectural inspection, and no unfit labor or material is allowed. The selling plan is 10 per cent down and 1 per cent per month payment, thus paying off principal and interest in eight years and four months. No selling organization is necessary as the houses sell themselves.

Mr. Griffen says he has no comment to make upon the difficulty of obtaining supplies as the company did not encounter any great difficulties last year, but this year the

A Bitter Experience

The following is a letter recently received by NATIONAL BUILDER. Comment is unnecessary:

"You know, I'm not able yet to write in English, although I understand most everything what I read in NATIONAL BUILDER.

"I started last year to be a contractor. Of course, I bought a lot, built and sold. Last spring I took some contracts to build houses. Two men came to my house. They saw my houses which I sold, and



Built by the Home-Building Co., of Connersville, Ind. H. M. Griffen, Architect

ments. Sixty per cent of the stock was taken up by manufacturers and the remainder by merchants, professional men and private citizens.

The company was organized with a board of directors, treasurer and secretary. The secretary is the only salaried officer and is the active member of the company. His duties are to carry on the affairs of the company as a general manager, subject to the approval of the board of directors. As the company gives full architectural service and supervision on all work, an architect is engaged—H. M. Griffen of Connersville—whose designs are shown herewith.

The operation of the company is similar to that of any realty company. All work

has been slowed down owing to inability to obtain money—which is the big problem today, as Mr. Griffen sees it. "Numberless persons wish to build, but cannot," he says, "because they cannot get money; or if they can, are afraid to invest at the present high cost for fear of a great decrease in prices, which would leave them with a debt and a poor investment with which to pay it.

"The remedy," says Mr. Griffen, "must first be a loosening of money, and second, a stabilization of prices upon the present or some other level. If this is accomplished you will see the greatest building boom ever heard of."

The present difficulties are due to cost variations and the fifty-cent dollar.

asked me if I would erect any houses for them. I said yes. I made plans, they accepted them, and I told them prices.

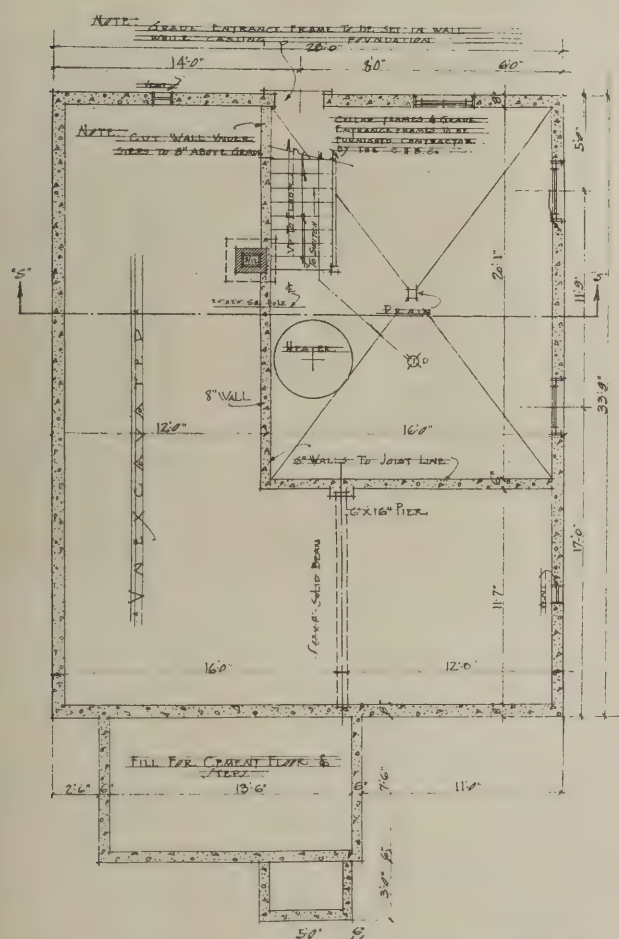
"But I did not know the prices the day I signed the contracts. I was figuring the prices which were 2 months old. I took two more houses. After, when I digged 2 cellars it became clear to me that I made big mistake. I was \$1,100 in the hole.

"I returned contracts on houses I did not started yet.

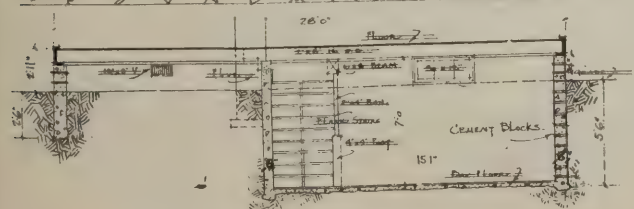
"Then I had to complete those two.

"I called lawyer to help me against those people, because they did not want pay even for the extras. I won and dropped the business.

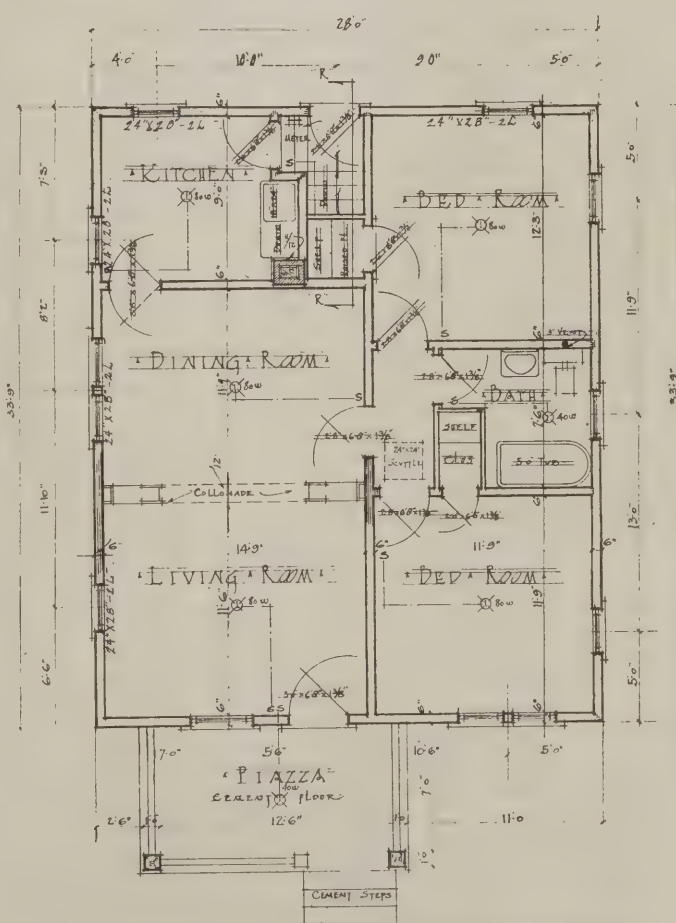
"I will learn first in the NATIONAL BUILDER and then start once more."



F V N P A T I N . P L A N .



CROSS SECTION (5-5)



FLOOR PLAN

QUANTITY FOR FOUNDATION & EXCAVATION					
EXCAVATION - NORMALLY			CUB YDS	80	
CONCRETE IN WALL			CUB YDS	1578	
CELLAR FLOOR			SQ FT	200	
PARCH FLOOR			SQ FT	116	
CEMENT STEW			LIN FT	15	
FOUNDATION FINISH COATS			SQ FT	142	

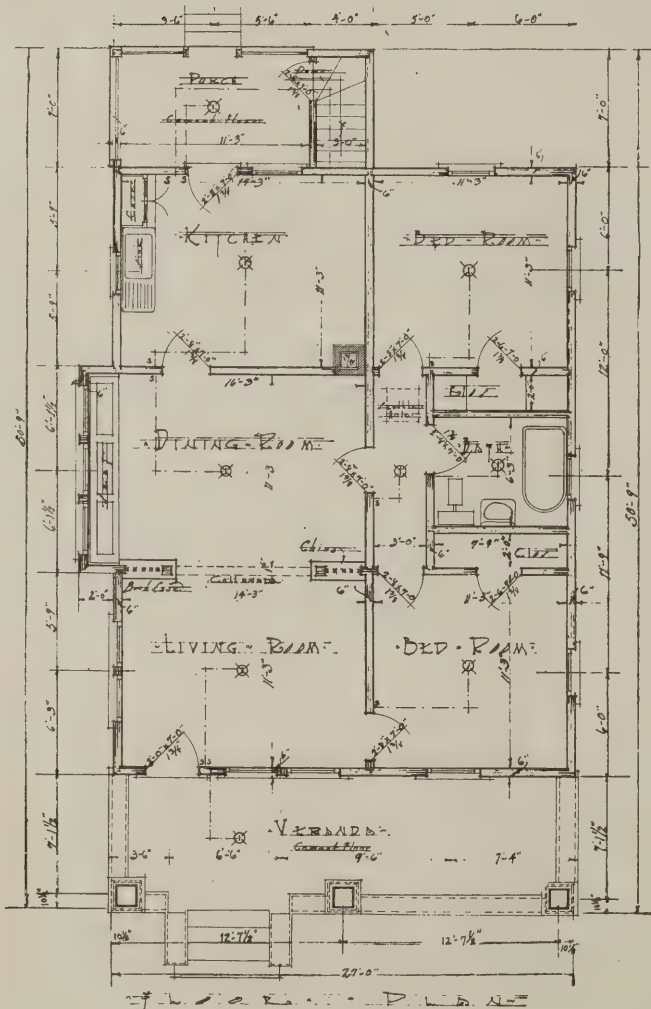
Fig. 2



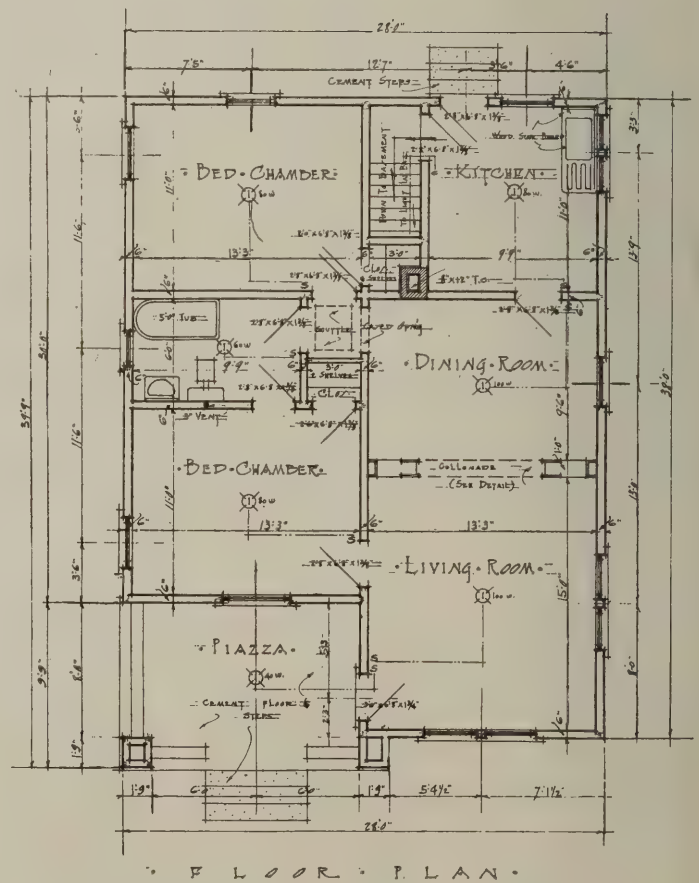
Fig. 3



Fig. 4



Plan of Fig. 3



Plan of Fig. 4

Types of houses built by the Home-Building Company of Connersville, Ind., and sold on 10 per cent initial payment and small monthly installments. The company is financed by popular subscription

Building An Open Newel Stair

By John Y. Dunlop

IN building a stair the first facts to be ascertained are the exact locations of the first and last steps and the height of the story from floor to floor.

A large scale sketch should be made of the plan of the stair space including all doorways, branching passages and windows which can possibly interfere with the proper placing of the stair.

The height of the story is next to be exactly determined and marked on a rod.

and from this we may deduct a rule of proportions as follows: The product of the height of a step when multiplied by its width should be about 72 inches. The height is from top to top of heads, and the width is from face to face of risers.

Of course don't expect to get the proportion exactly every time, but it should never fall below 70 nor exceed 75. Never build flights with steps of different proportions in the same stair. Such variations may result

stair as shown on the drawing it will be alright. In many cases it will be, but the man who takes nothing for granted and can intercept the mistakes of himself or others before they become serious, is the man who is apt to be busy when the careless are loafing. It is worth while cultivating the habit of knowing where to look for the weak spots in a stair design.

The next piece of work is to put up the framing for the landings. The main

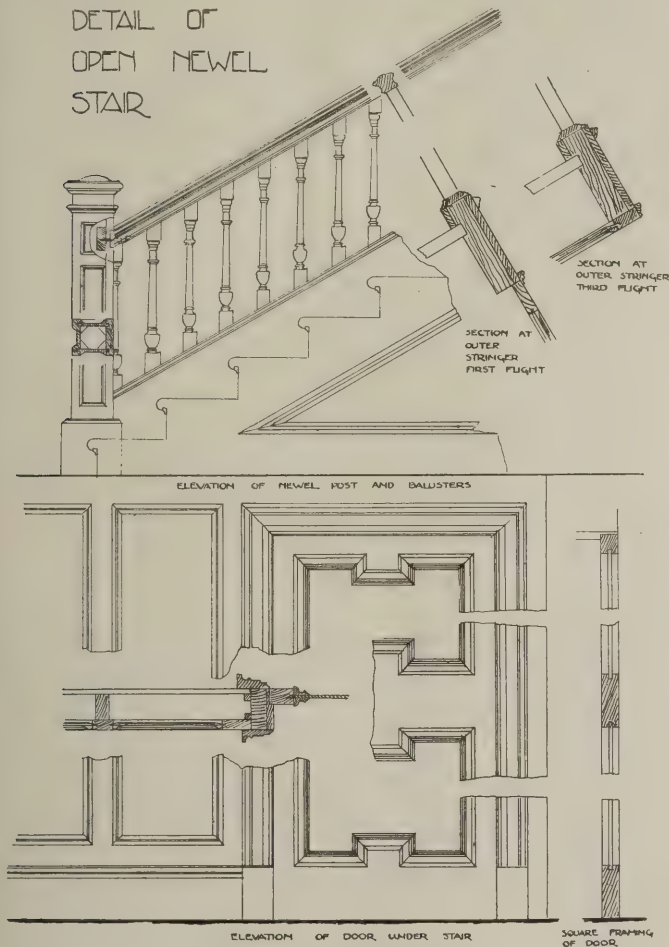


Plate 1

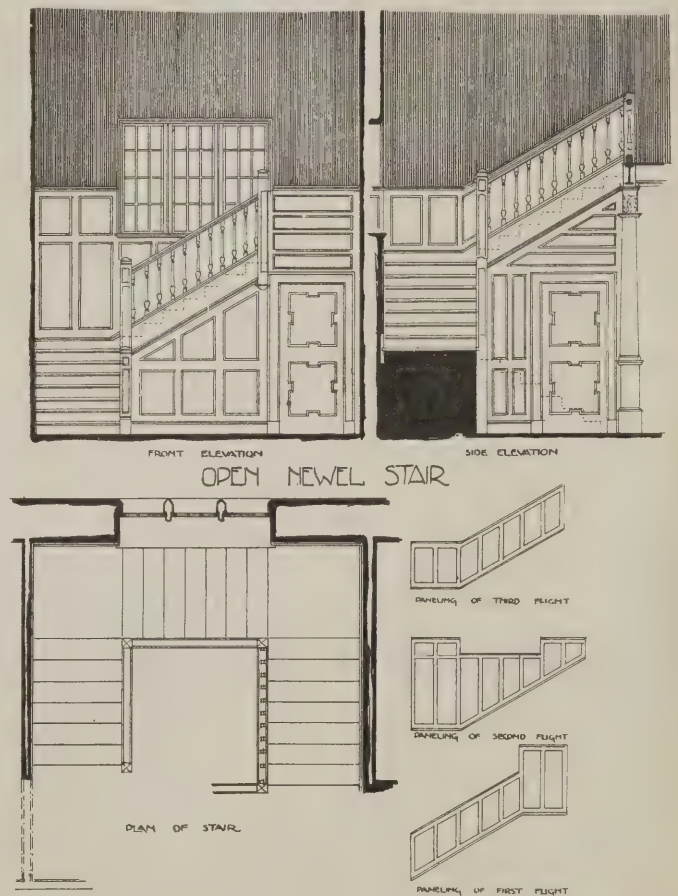


Plate 2

Then assuming a height of riser suitable for the type of building, a trial is made by division how often this height is contained in the height of the story. The quotient, if there is no remainder, will be the number of risers in the stair. These riser heights are then set off on the story rod.

The next operation is to arrange the risers on the plan and when doing so keep in mind the general maxim that the greater the height of the risers the narrower the breadth of the step.

In America a step $10\frac{1}{4}$ inches wide and 7 inches high may be taken as a standard,

in serious accidents. The sketch may now be completed, drawing in the exact location and size of each step in plan.

In starting to build a stair first test the space in which the stair is to be built, as it is better to know the exact lie of the enclosing walls and not begin to build up the framing assuming the walls to be at right angles, when perhaps they are not true. Next, if any of the flights pass under a part of the second floor, see that the amount of headroom required can actually be obtained.

Of course, you might say if I build the

trimmer is set at a distance from the back wall equal to the width of the stair over the stringers. The joists would then be placed at right angles to the same wall and would be notched onto the trimmer on the outer ends. The height of the landings should be obtained from the story rod so that they will lie at the exact level required. Once the landings have been framed and temporarily supported, it is usual for me to set off the lines of the treads and risers on the walls which are to bear the wall stringers. With the path of the stairs thus set off, I draw the line which is tangent

BUILDING AN OPEN NEWEL STAIR

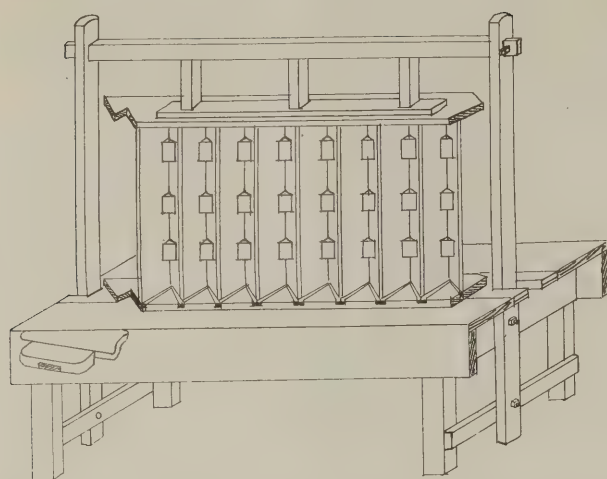
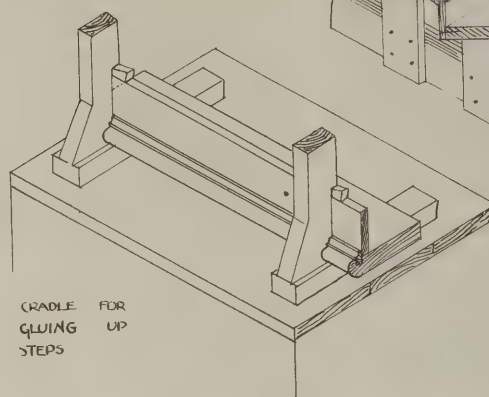
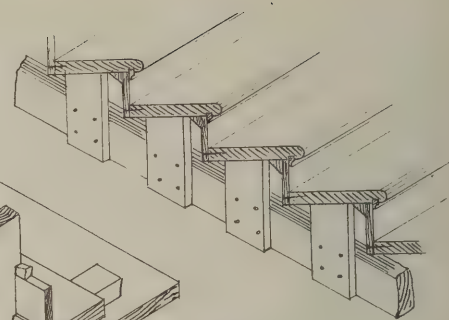
BENCH FITTED WITH
SADDLE CRAMP FOR
PUTTING STAIR
TOGETHERCRADLE FOR
GLUING
STEPSCARRIAGE WITH
BRACKETS FOR
SUPPORTING STEPS
BETWEEN OUTER STRINGERS

Plate 3

to the rising of the steps and then I set up the line of the wall stringer which may be $1\frac{1}{2}$ to 2 inches higher up, as is shown in the drawings.

All this gives me a general idea of the path of the stair and I can now examine with some certainty the relation of the stair and the window sill and I can also set off the line of the top of the wood paneling. Plate 2.

Returning to the stair I would make a template or pattern of the wall stringers. The templates should be about 12 inches broad and have the top edge in line with the line of stringer that has been marked on the wall. They should have their ends checked into the landing or the floor, all as intended for the ends of the flights of the stair.

On each template should be drawn the lines of the treads and the risers, and the actual width of the stair should also be written on clearly. The templates are now sent on to the shop or mill and meantime the walls should be grounded for the plaster work which should be in progress during the time the flights of the stair are being made.

When the templates arrive at the shop they should be accompanied by the details of the steps and the specification giving the finish of the handrail, newel posts and so forth. A pair of stringers is cut from each template, following the lines drawn on the templates at the job. The housing for the ends of the steps, including room for the wedge grip, is then laid out on the stringers.

In cutting housing by hand first bore out the space to take the nosing of the steps. Using one hole, or better, two holes in line with the head and connected by cutting out the wood between them. The housing is then sawed in on both sides, as the square notch in front allows the saw to work freely. Then the notches are taken out with a chisel and finished with a router. All this may, of course, be greatly simplified

by a woodworking machine. Next the moulded head, the risers and the cavetto mouldings should be worked up.

The material for the stair is now ready to be put together. In some cases this is not done until the job is reached, whereas in mills, or shops where they do a lot of this work, each flight would be cramped and glued up complete ready for lifting into place.

A general method of cramping and gluing steps together is shown on plate 3. A bench especially fitted for putting together a straight flight of stairs is also shown on this plate.

The newel posts are now prepared. They may be either built of solid timber or built up in pieces. The latter method is the most in use at the present time.

In either case after the newel posts have been prepared they have to be marked off on the proper faces to receive the handrails and the stringers. If the newels are entirely plain there of course is no hard problem, as the handrail and stringer can intersect against any part of the side, but if the newels are paneled it does not look well to find the handrail striking in the center of a panel.

Thus to determine the length and position of the panels on the newels the line of the handrail and stringer must be set off full size. The panels as a rule are not the same size on all sides of the newel. The bottom newel usually has three sides the same, while the panel on the handrail side is always shorter at both top and bottom.

With angle newels there is a double



Fig. 1—Top landing of an open newel stair, showing the newel post panelled and carved, and with volute top balusters

problem which can be solved only by drawing onto the post the line of the top end of the bottom stringer and the bottom end of the upper stringer. The corresponding lines of the handrail should also be marked off on the angle newel. The panels may then be arranged so that they do not interfere with the handrails nor with the stringer.

After the stair has been fitted in position on the job, there often comes a very interesting part of the finish of a staircase. That is, taking the exact size and arrangement of the paneling. In a job similar to that shown on plates 1 and 2 we have the panels on the walls, and the panels on the spandrel and the soffit of the stair.

These sizes and shapes should all be measured and conveyed to the bench. My experience has been that where the job is within a reasonable distance from the shop it pays to make a template or pattern of each part of the panel framing which has an angled side. The advantage of this method is that it saves a great amount of laying out in the shop, as on this template the stiles and rails can be marked off without drawing the framing full size. It also allows the machine man to get the size of his stuff without waiting, and the man at the bench can set out his framing and test the final shape all from the templates. With the completion of the paneling the finishing of the stair can be completed in easy stages.

In wide stairs it is always advisable to have rough carriages between the stringers of the stair. The carriages should be about 5 or 6 inches deep and 3 inches thick and their use is always advisable where the stair is over 3 feet wide. They should extend the full length of each flight landing and forward to the upper and be inclined so that the steps rest upon them.

By securing them to the floor and to the landings additional strength is given to the latter while the treads receive further support by brackets which are nailed to the side of the carriage, as shown on plate 3.

The ends of the handrail are tenoned into the newel posts as shown on plate 3, and is further supported by the balusters.

Balustrades offer considerable variation in their size and design.

In the photo of the top landing we have an example of balusters which are of oblong shape at the top and are carved on both sides with the Ionic volute.

The photograph of the bottom flight of an open newel stair shows balusters that are both square and raking which means that the two opposite sides have raking moulding.

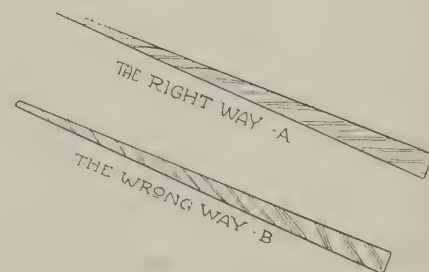
In the remaining photograph is shown one of those rare examples of the stair builders' art in which the balustrade is carved by hand from a solid slab of oak.



Fig. 2—Bottom of flight of an open newel stair, showing molded and carved newel posts and with square and raking balusters supporting the handrail

Warping of Thick and Thin Shingles

P. P. Johnston, carpenter and building contractor, Millerton, Iowa, writes: "In looking over my copy of NATIONAL BUILDER for November I found and read the discussion on thick and thin shingles, and shall try to tell what, from my own experiences, I believe to be the main cause for the warping of shingles whether thick or thin. All wood cut to show what is known as 'flat grain' is more likely to warp than is 'edge' or 'vertical' grain. I find that edge-grain shingles seldom warp or cup to speak of. While flat-grain shingles, if laid right side up (see sketch below) so that the water will run over the grain instead of into it, will not only last much



longer but will be less likely to warp than the reverse way. One layer lapped over another as shown in the sketch A will hold its shape better than one under another as at B; for when wood warps or cups, the grain generally opens instead of closing."

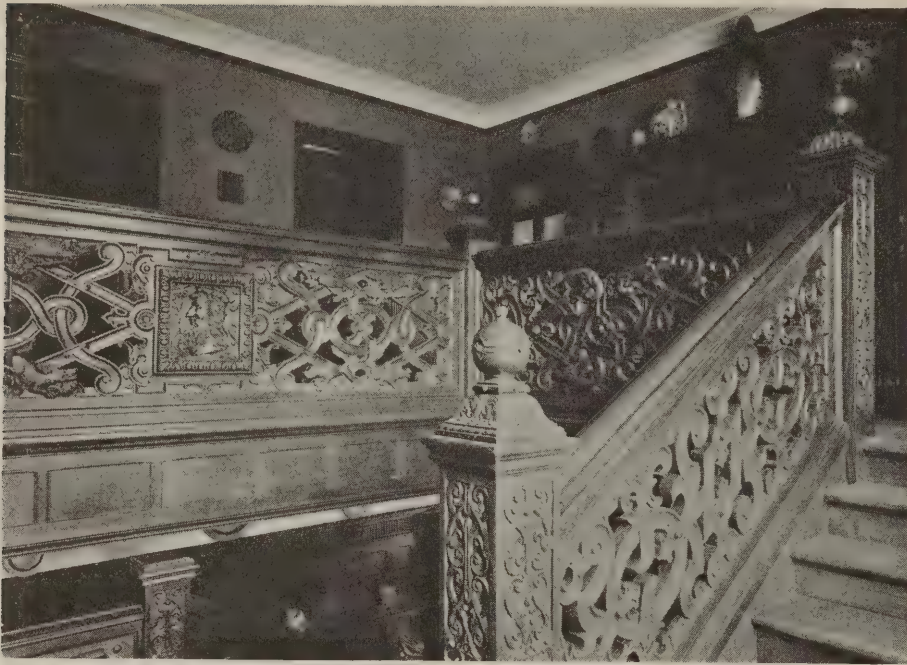


Fig. 3—Open newel stair showing carved and turned newel posts and a fret and carved panel balustrade

Water Solubility a Necessary Property of Wood Preservatives

That any substance to be an effective wood preservative must be soluble in water at least to the extent of producing a toxic water solution is the basis of a theory now being developed at the U. S. Forest Products Laboratory. It would seem reasonable to expect that any material which is poisonous enough to kill an organism of any kind must necessarily be soluble in the body fluids of that organism; and the chief body fluid of timber-destroying fungi and wood borers is water. With very poisonous materials this solubility need not be great; in fact, 1 part in 1,000,000 may be sufficient if the material is poisonous enough.

Wood preservatives now in use are of two distinct types—inorganic salts, such as zinc chloride, which are very soluble in water; and oils, such as the creosotes, which are generally considered to be insoluble. The solubility of creosote is usually considered so slight as to be neglected, but experiments indicate that certain constituents of creosote are sufficiently soluble in water to make it poisonous for wood destroyers. Creosote oil may, therefore, be considered as consisting of two groups of compounds, one of these being sufficiently soluble in water to render it toxic, the other insoluble in water and hence not toxic. The non-toxic oils act as a reservoir for the toxic oils and feed them slowly to the moisture in the wood.

The difference between oil preservatives and inorganic salt preservatives, as far as this theory is concerned, is in their method of retaining the reserve supply of poison.

Zinc chloride has no reserve supply, all the material being soluble in the usual amount of moisture present in air-dry wood. Sodium fluoride may have a reserve supply in the form of solid crystals, if applied in a saturated solution. Creosote oil may have a considerable reserve supply stored in the oil itself, this supply being fed to the wood as needed.

Largest American Cities

According to the new census, there are 68 cities in the United States with populations of more than 100,000, and 33 with populations of more than 200,000. Following are the cities that now have more than 200,000, with their relative standing at the last two census periods:—

City	1910		1920	
	Rank	Populat.	Rank	Populat.
New York	1	5,621,151	1	5,621,151
Chicago	2	2,701,212	2	2,701,212
Philadelphia	3	1,823,158	3	1,823,158
Detroit	9	993,739	4	993,739
Cleveland	6	796,836	5	796,836
St. Louis	4	772,897	6	772,897
Boston	5	747,923	7	747,923
Baltimore	7	733,826	8	733,826
Pittsburgh	8	588,193	9	588,193
Los Angeles	17	575,480	10	575,480
San Francisco	11	508,410	11	508,410
Buffalo	10	505,875	12	505,875
Milwaukee	12	457,147	13	457,147
Washington	16	437,571	14	437,571
Newark	14	414,216	15	414,216
Cincinnati	13	401,247	16	401,247
New Orleans	15	401,247	17	401,247
Minneapolis	18	380,582	18	380,582
Kansas City, Mo.	20	324,410	19	324,410
Seattle	21	315,652	20	315,652
Indianapolis	22	314,194	21	314,194

Jersey City	19	22	297,864
Rochester	25	23	295,850
Portland, Ore.	28	24	258,288
Denver	27	25	256,369
Toledo	30	26	243,164
Providence	23	27	237,595
Columbus	29	28	237,031
Louisville	24	29	234,891
St. Paul	26	30	234,595
Oakland, Calif.	32	31	216,361
Akron, O.	31	32	208,435
Atlanta	31	33	200,616

To Prevent Concrete Floor Slab from Cracking

A subscriber asks: "How may a concrete floor slab for a porch twelve feet wide be prevented from cracking? It is to be finished with tile." Answer—Design the floor to carry the loads to which it will be subjected and use the proper materials and good workmanship in the construction. If this is done the concrete will not crack.

Water-Proofing Concrete Block

A subscriber asks: "What is the cheapest and best method to make a concrete block wall damp-proof?" Answer—In case the concrete block are very porous so that water penetrates through them during a driving rain, the best treatment is to apply a coat of portland cement stucco to the exterior, preferably placing the lath on furring strips so as to leave an air space between the stucco and the block. The application of stucco was fully covered in the booklet, "Recommended Practise for Portland Cement Stucco." Usually, however, concrete block are so well made that there is little likelihood of water penetrating through them. Sometimes the block are laid up in the wall without being wetted thoroughly first, in which case the dry block absorb more or less moisture from the mortar in which they are laid up, thus preventing the mortar from setting properly. In such cases raking the mortar out of the joints, wetting the joints thoroughly with water, and then pointing them up with fresh mortar will usually stop any penetration of water through the joints. Occasionally there is no penetration of water either through the concrete block or through the mortar joints, but moisture condenses on the inner surface due to the difference in temperature between the outside and the inside faces of the block. In such cases the application of a coat of portland cement stucco on the exterior in such a manner as to secure an air space between the stucco and the block will overcome the difficulty. It may also be overcome by plastering the interior of the building, leaving an air space between the plaster and the block.

The Store Front as a Business Builder--By Wm. O. Potter

BUSINESS SENSE joined to building knowledge and skill, shows the builder that business can be created and that it is folly simply to wait for it to come and knock on the door. How to go after business is one of the first lessons in business success.

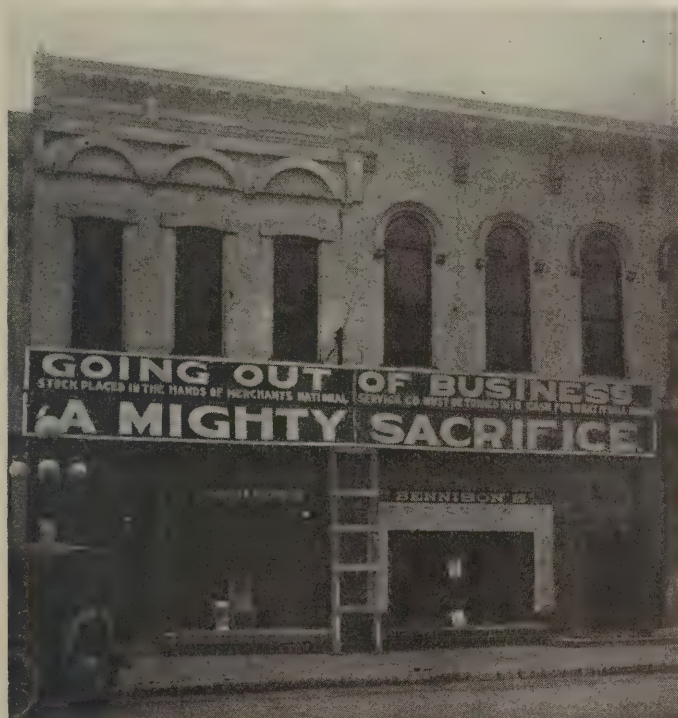
One of the greatest opportunities at this time, and at most times, to get something

tire face of the structure in this instance. Steel girders spanned the enlarged opening, and no obstruction was left to interfere with the new store front.

Where street frontage is limited the demand for greater display space is met by the employment of the arcade type of store front construction. Where 36 feet of street frontage with shallow windows and

the value of such a store front as a business pulling power as proved by the increased volume of business and increased profits of the Yetter Dry Goods Co. It is a capital investment and will stand for years.

Much time and thought has been placed upon this comparatively new branch of the building industry and the work of specializing store front manufacture has added



The old front



The new front

started is along the line of remodeling stores and store fronts. The time is now upon us that merchants must use every effort to push the sales of their goods and no influence is more potent in attracting custom than a suitable store front.

One illustration shows an old-time store with an old-time window front—"going out of business." Look at the remodeled building and the new store front. One is a business killer and the latter is a business builder.

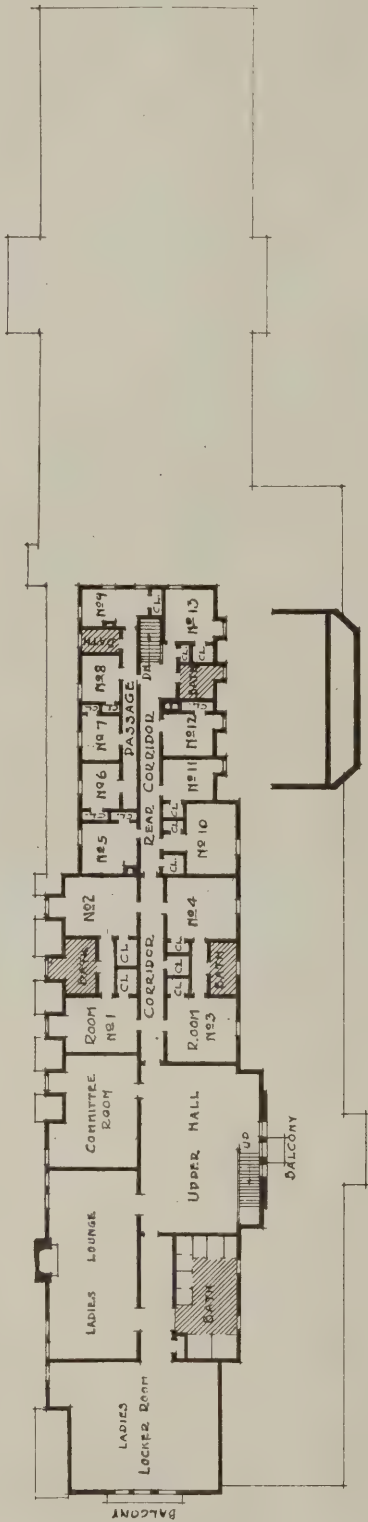
This project involved the changing of two store rooms, each with an 18 foot frontage into one large store. Cumber-some columns and pillars used as supports for the old building fronts, obstructing the view and interfering with making attractive displays, were torn out. This was accomplished by the removal of the old fronts and putting in temporary supports, following with the remodeling of the en-

uninviting exterior formerly appeared, an attractive front with a total display frontage of 76 feet now takes its place. And, what is of great importance to the merchant, this frontage provides separate and well proportioned show windows for the grouping of individual displays and so meets the urgent needs of the many special lines carried. In a lay-out of these dimensions it is possible to provide from six to eight separate compartments in which can be made from 12 to 16 units of display. This additional space means a great deal to the merchant from an advertising standpoint. The power of the "silent salesman" is growing greater every day.

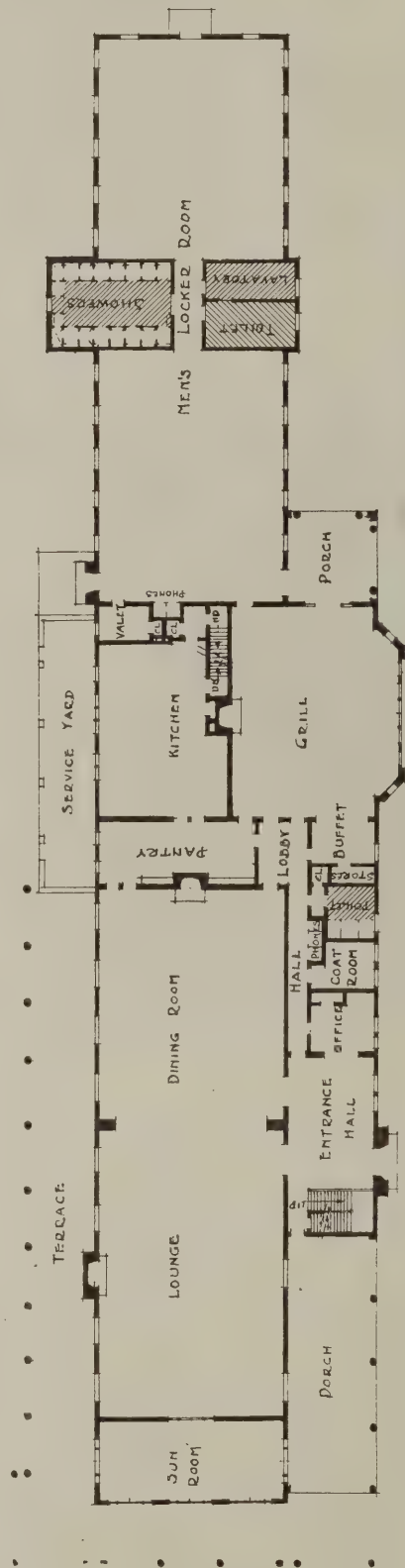
Another noteworthy and rather uncommon feature is the balcony running the entire width of the structure serving the double purpose of adding attractiveness to the building and as a canopy to the window shopper. There can be no doubt of

much. The contractor and builder who becomes capable of analyzing the particular needs of the merchant he is about to serve is building not only for the success of that merchant but for his own as well. Every builder and contractor should determine to capitalize his opportunity to spread the gospel of "Business Creating Store Fronts" backed by the slogan of "Made to Fit the Business."

The enterprising builder and contractor can make business by selecting the stores that show possibilities and make propositions to the proprietors, either directly or by having photographs made and using the printer. It is up to the builder to take that hazy, procrastinating idea in the merchant's mind that "something must be done some time about that window" and drag it into definiteness and action by a definite proposition.



PLAN OF SECOND FLOOR



PLAN OF FIRST FLOOR

CLUB HOUSE FOR ANNANDALE GOLF CLUB - ANNANDALE CALIFORNIA
REGINALD D. JOHNSON - ARCHITECT - PASADENA, CALIFORNIA



Home of the Annandale Golf Club

By Charles Alma Byers

ILLUSTRATED herewith, by exterior photographs and floor-plan drawings, is the new club house of the Annandale Golf Club, of Annandale, California. Suburban to Los Angeles but located even still closer to Pasadena, the club home is beautifully situated on a rather commanding eminence, with a wall of hills and mountains for a

the pergola and porch columns, and olive green for the roof and window shutters, while a limited amount of trimming is done in rich brown.

Exclusive of the pergola-covered terrace, the building is about 280 feet in total length by approximately sixty feet wide. The arrangement of its interior may be studied

other divisions, including five various-sized bath-rooms.

Hardwood floors prevail throughout the first floor, while pine is used for the second-story floors except in the bath-rooms, shower-rooms, and so forth, which are tiled. The interior woodwork consists principally of Oregon pine, although a considerable



Annandale Golf Club, Annandale, Calif.

background and a view of valleys and the wooded Arroyo Seco spread out before it. The building's immediate setting consists of an attractively arranged planting of trees and shrubbery, still in a somewhat embryonic stage of growth, and hard-by is the eighteen-hole golf course.

The club house, which, because of its elevated location, may be seen for a considerable distance, is an unusually handsome building. In style, it is an interestingly handled modification of modern domestic English architecture. The outside walls are of cement-stucco, applied by the so-called "cement-gun process," over metal lath and frame construction, and the roof is shingled, while the foundation is quite naturally of concrete. Across the forward end and for some distance along the back extends a deep cement-paved terrace, enclosed and covered in pergola fashion, and on the front are two roomy porches, roofed in the usual way, which are also floored with cement.

In color scheme, the exterior is especially attractive, yet very simple. It consists of light tan for the stucco work, as well as for

from the accompanying floor plans, but there are several points about the planning to which attention perhaps deserves to be particularly invited. Note, for instance, that the large lounging-room and the almost equally large dining-room are, joined together by an especially broad open arch, which arrangement enables the two rooms to be thrown into a single great and delightful ball-room whenever occasion makes desirable a room a hundred feet long by more than thirty feet wide. And off one end of the lounging room is a most inviting sun-room, possessing French doors and windows giving directly onto both the porch and pergola-protected terrace. On this floor are also a roomy grill-room, a large kitchen and an especially commodious locker-room, besides the several small divisions and necessary adjuncts.

Except for the men's locker-room wing, the building is two-stories high, and on the second floor will be observed both a lounging-room and a locker-room for ladies, besides a total of thirteen chambers for members and employees, a committee-room and

amount of oak finish is used in several of the first-floor divisions and in the ladies' lounging-room on the second floor. There is a fire-place in each of the main lounging-room, the dining-room, the grill-room and the ladies' lounging-room.

The building is provided with a large basement, walled and floored with concrete, which is partitioned into fuel-room, furnace room, storage, and so forth, and a good furnace supplements the fireplaces for furnishing the necessary warmth.

This club house, built about three years ago, was designed by Reginald D. Johnson, architect, of Pasadena, California. It is picturesquely located, attractive in exterior color scheme, conveniently planned and quite substantially constructed.

Tallest Concrete Structure

A subscriber wants to know of the tallest concrete building in the world. Answer—We are reliably informed that the Arcade Building of St. Louis is the *tallest concrete building in the world*, being seventeen stories in height above ground with two additional stories beneath the surface.

Bricklaying

By William Carver, Architect, and Andrew Pentland, Mason Contractor

Good Practice in Bricklaying is of Interest to All—Apprentice, Bricklayer, Contractor, and Architect—and the Examples of Actual Practice Here Shown have Therefore a Manifold Value

IF the apprentice to any of the building trades should be more generally encouraged by the contractor to acquire a broad knowledge of building construction, in addition to learning his own particular trade, it would benefit the contractor, the apprentice, and result in better work and more effective co-operation between the various trades on any building operation. Many contractors, realizing this, urge their apprentices to study plan reading in the evenings, and to get some idea at least of how to estimate work. Some boys will even be found ambitious enough to study architectural drawing. There are great op-

men, but even a small amount of technical education will make any man more valuable to his employer, and a better understanding of the contractor's problems and responsibilities would undoubtedly help to smooth over many labor problems. It is evident, in fact, that a contractor who does not show his apprentices how to read plans actually loses money because of it. If a workman knows the function of the particular part of the structure on which he is working he may be able to save material for his employer in places where extra material would be a waste. Besides, even on the best regulated jobs, a window open-

supervising the laborers. The work which a laborer performs is vital to the progress of any job, and he is entitled to proper consideration. If the apprentice, in the exuberance of youth, becomes arrogant and overbearing he will find in the natural course of events that the laborers will begin to dislike him and fail to place materials where they could be used to the best advantage, and to passively annoy him by not giving his section of the work proper attention. In such cases the apprentice generally makes a lot of noise trying to get material, makes himself conspicuous, and causes dissatisfaction among the labor-



Fig. 1

Fig. 1—Laying a "soldier course." View from above. Note the neat, well-kept scaffold and correctly arranged mortar board and brick piles. New Masonic Hall, Cleveland; Hubbell & Benes, architects



Fig. 2

Fig. 2—Backing up behind a soldier course panel

portunities in the building industry for anyone who can measure up to them, and many of the apprentices of today will be the successful contractors of tomorrow. The contractor, while helping the boy along, will also be doing himself a good turn, for if a boy's interest and ambition can be stimulated he will be a better workman even while learning. In fact, an ambitious apprentice who takes pains may easily be worth two apprentices who do not show the proper spirit. Some apprentices will, of course, respond to friendly suggestions along these lines, will improve every opportunity to learn, and will develop into first class workmen, dependable foremen, and make themselves indispensable to the contractor. Following the law of averages, others will not have the capacity to become more than good work-

ing or a pipe chase may be occasionally overlooked; but the chances for such mishaps would be reduced if the men, taking an occasional glance at the blue prints lying on the scaffold, could understand them readily.

Last month's article dealt with the advisability of the bricklayer's apprentice learning how to handle men, and also suggested that he would find it well worth his while to establish himself on friendly terms with the bricklayers with whom he is working. Referring again to the subject of the relations between apprentices and laborers, it will be recalled that the apprentice was advised to assist in overseeing the laborer's work. A word of warning on this subject is necessary, however, for some apprentices unfortunately err on the side of being too zealous in

ers, which interferes with their efficiency. The contractor, too, may decide that an apprentice of this kind is a nuisance; and that really constitutes one reason why some contractors are prejudiced against apprentices, forgetting that while some boys may act in this way, the majority will have better sense, and even those few who apparently haven't, will soon learn in the hard school of experience.

As stated before, the first job of an apprentice when he is put on the wall is to lay the backing, the work of the more experienced and higher priced men being thus conserved for the facing. The apprentice should bear in mind, however, that while his portion of the work will probably not be seen when the building is finished, it is none the less just as important and should be handled just as carefully as the facing,



Fig. 3



Fig. 4

Fig. 3—Apprentice "backing up" at a corner

Fig. 4—The apprentice has finished "backing up" at this corner. Note how well the bond is handled. The facing bond is "Double Flemish;" backing, "Common Bond." New Masonic Hall, Cleveland; Hubbell & Benes, architects

for the brick he is handling will have to bear its full share of the load and thus be just as vital to the stability and integrity of the structure. He should be, therefore, just as careful, and watch his bond just as closely as though his work were to be seen of all men. Remember that one quarter the length of the brick is the minimum overlap.

Generally speaking, it is considered better practice to lay the brick "frog down,"

slow. Of course, we do not mean to say that a mason will not now and then have to tap a brick to get it into place, but the natural tendency for a beginner, if he does not watch himself is to contract this habit, which is extremely hard to break when once formed. The proper method of laying a brick to a line is to push it into place. There are times, however, when, if the mortar is a little stiff or is setting fast, the workman will not have strength enough in

cheap, however, the individual workman will often neglect to replace his line after it has been in use for so long that it has become rotted by the mortar. Such line breaks easily and often and while it is being tied up again and set correctly the men are naturally losing time. It is obviously a pound foolish policy for the contractor to run the risk of this, and he should see that his men are well provided for in this respect. It will save him money.

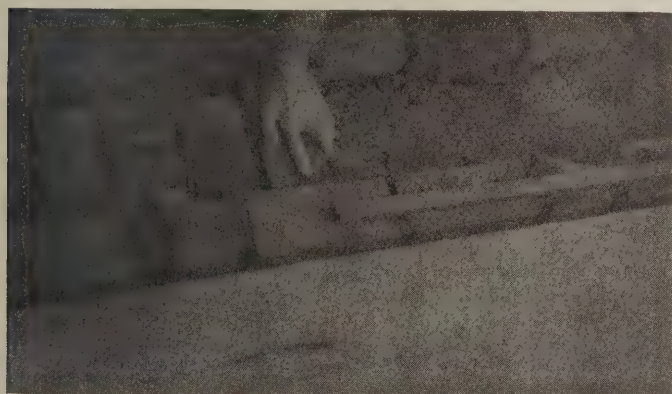


Fig. 5

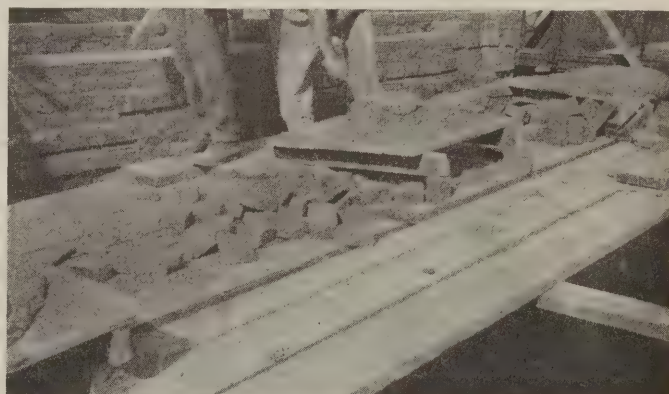


Fig. 6

Fig. 5—Apprentice laying backing with "shoved" joints. Note how the brick are squeezed together and the mortar forced up into the vertical joints

Fig. 6—Encouraging waste. These broken bricks should be in the wall, not on the scaffold. Note the difference between this untidy scaffold and that on Fig. 4

although this rule is often not closely adhered to. When laying exposed brick the apprentice should learn to instinctively select the hardest brick for exposure to the weather.

The apprentice should be careful not to fall into a habit which many masons have—that of doing an excessive amount of tapping to get the brick properly down to the line. Some mechanics have this habit so badly that no matter what class of work they are engaged upon, they will lay a string of bricks a little distance from the line and then proceed to tap them all down into place. Such men are called "woodpeckers" by the rest of the masons, and this method of laying brick is invariably

his hand to place the brick, and in such exceptional cases it may be necessary to do some tapping. Also on very fine work it may be necessary to tap the brick, but not on ordinary work under ordinary conditions. The foreman should watch his apprentices carefully to see that they do not get such habits, which mean wasted movements, reduced efficiency, and a handicap on the boys' efforts to become first-class mechanics.

A word here might not be amiss as to the policy which a few contractors still have of requiring their men to provide their own line. The line which bricklayers use is of linen and costs but a few cents per pound. Although it is comparatively

Answers to the Questions in the November Issue

(1) A header is a brick placed at right angles to the length of the wall.

A stretcher is a brick placed lengthwise of the wall.

(2) To develop its full strength, a wall must be so thoroughly bonded together that it will act as a unit in supporting a load, each portion of the wall bearing its proper share. This can only be accomplished by the use of a sufficient number of headers.

When the facing brick is attached to the backing by means of metal ties the supporting strength of the backing only should be figured when computing the compres-

sive strength of the wall, as metal ties cannot be relied upon to equalize the load and to cause the facing to carry its proper share. Metal ties are also likely to rust in time. It is far better to use headers. The wall will be stronger and stiffer and structurally correct.

(3) Although there is a popular impression that an air space helps to prevent the passage of heat and cold through a wall, this is not substantiated by scientific research. The most effective insulation known is composed of air spaces, but these must be microscopic in size. No type of wall in general use has spaces which are small enough and in which the air is confined and sealed. Consequently such air spaces do not aid insulation, and a solid brick wall, with its myriads of tiny air cells

in the brick, cannot be excelled as insulation against heat and cold.

(4) Although some enthusiasts claim on behalf of various types of construction that it is unnecessary to use furring with the particular kind of masonry which they advocate, the fact is that many homes have been built in all types of masonry construction, plastered directly without the use of furring. Some are successful and some prove troublesome, again irrespective of the material used; the difficulty being chiefly in respect of condensation, in which the factors of the relative warmth and coolness of the exterior and interior atmosphere, the humidity of the air, and conditions of occupancy all play an important part. Generally speaking, it is safer to furr the inside of any masonry wall of

whatever kind the construction may be.

Questions

Every contractor and builder should be familiar with brick and brick construction. If you desire any information on brickwork, the authors will do their best to answer your questions.

(1) There are many conflicting opinions regarding the relative effectiveness of a square flue, say 8-in.x8-in., and a rectangular flue, say 8-in.x12-in. This is a much discussed matter among contractors, and we would welcome an exchange of views on this subject.

(2) What is a damp course?

(3) What does the term "hog" mean, used among bricklayers?

(4) Why are brick wet before laying?

Are Most Architects Impractical?

By F. W. Fitzpatrick

This Article was Contributed Recently to the Evanston (Ill.) News-Index by the Writer and is Republished in Order that its Statements May be Substantiated or Qualified by Our Readers

NEAR my home they started months ago building a rather pretentious house, a stucco on wood affair. I noticed that work lagged, then ceased altogether several weeks ago. Not being overly curious, I paid no further attention to it, supposing money had run out or that there was some other good reason for the stoppage.

Then one day, coming into town, I noticed renewed activity and that there was a lot of a certain much advertised metal lath being delivered. Then I was curious and asked the contractor what the delay had been. Why, of course, the metal lath had just arrived. The architect would have no other, and they wanted to do the plastering and stucco work at the same time, hence the absolute stoppage of building for six weeks of the best building weather.

Gave Him Theme

This started me as a text to a sermonette to my brethren, the architects.

We hear much lament about the architects not receiving the consideration that is their due; the usurping of their power, prestige, authority, popularity and what not by the engineers; the awarding of building contracts direct to big construction companies with an architect as an adjunct rather than a monarch of all he surveys, as of old. This lament was especially loud and insistent during the war. To put it plainly, the government gave all the plums to the engineers and flatly ignored the architects.

Well, is not the reason fully illustrated in this little episode of the delayed house?

Our profession is one in which art and

business should be most intimately linked, and, by jingo, few of us ever dream of the linking. We are hide-bound in our ideas, non-progressive, ultra-conservative and absolutely non-adaptable to varying circumstances. And of all times when we needed and need versatility and adaptability it was during the war and is now.

In Respectable Way

Our friend of the house made his plans, wrote his specifications and awarded his contracts in the old and easy and eminently respectable way. He specified what he knew or had been told was good and let it go at that. Did he find out if this or that material was immediately available and at what price? Not he. There was his specifications and it was up to the contractor to get what was specified. What wotted he?

Curiosity being well aroused, I've been inquiring among friends, architects, engineers, contractors, here and in many of the other cities, about this matter of delay and of high cost and have come to the conclusion that the architects are blameable for a very considerable share of both evils. Their cursed non-adaptability.

Why didn't that chap of the delayed house use some other metal lath? Why, bless you, a live fellow would have put on three or four layers of chicken wire rather than waste a summer waiting for that particular order of stuff.

Sits in His Office

The average architect sits serenely in his office and writes specifications and never

flickers an eye as to whether he can get this, that or other thing. And was there ever a time when more things were off the market?

Perhaps because I'm more engineer than architect, but I can't write a specification in the solitude of my study. Hang it, I have to go down into the marts of trade and see what is obtainable and at once and then I buy it and build with the stuff and forget all about the ironclad specification of yore. Result: in a pretty busy time of it I've not been delayed a day for material.

I may like such or such texture brick for such or such a building, but if it's not easy to get—not promises, but real brick that I can see—then we'll use something else. Why fuss about it or why pay exorbitant prices for special stuff when ordinary things are high enough? Heaven knows!

Embargo on Freight

We're doing some building in a lower lake city. A while ago there was a railroad embargo on freight. All the fellows sat around with their tongues out, they couldn't get cement through and not a bit of it in town, all their work tied up, and that city was building right merrily. We chartered a boat and shipped a boat load of cement from another lake city, kept our building going and indeed sold some cement to the local supply company that had a contract to furnish us with it! Why couldn't the other fellows do the same? First and foremost they didn't think of it, and secondly, in many instances, the cement specified was not gettable where we got ours. Blamed old inelastic specifications.

The architects do not seem to have wakened up to the fact that these be new times, a new era, conditions we've not been up against before. They would love to do things the old way, but somehow or other conditions and times refuse to be molded into pre-cast architectural forms to suit our conveniences. The writing on our wall is "Switch over, wake up, realize these are new times, or go into the discard!"

Cost of construction has jumped up amazingly, even in the past few months, freight rates up, wages boosted a couple of times, men doing less work for more pay, and all that, besides all of which money is not the same value it was some time back; the country is full of it and not full of the things it used to buy, so presto; its purchasing value has diminished muchly—as all fellows who had any savings or old money know only too well.

But, nevertheless and notwithstanding, there hasn't been the jump in building many of us think. Or to put it another way, one can build today, using the things of today, as artistically and well as of yore and at not as great a difference in costs as most of us imagine.

For instance, here's a bank building planned and estimated some months ago at \$860,000, then held up until lately when bids came in at \$1,158,000. That's a specific case where plans and all facts came to my attention. In a general way I know of scores of similar instances.

Well, now then, my contention is that in the first place the building more than probably couldn't have been built for \$860,000 when plans were made. We're all most hopeful estimators. Secondly, contractors are figuring abominably high right now for no one knows what may happen tomorrow or next week. Indeed, a man is a fool to enter into a contract except on a most princely margin for contingencies. Most of the big work is being done on cost-plus basis anyway for that very reason. And thirdly, I'll aver that as handsome and thorough a bank as planned can be built for very considerably less than \$1,158,000 today. The style of the work the materials specified, bronzes and fine marbles, are all of yesterday. To get them today is in some cases impossible and in others simply spells delay and costing more than the pesky things are really worth.

A Queer Lot

But do you suppose that that architect will resort to fresco and beautiful plastic decorations instead of marble? Oh, no. He'll have to pare down, but it won't be in the show places, the sacred front or the panelled walls. No, he'll slice down on the fireproofing, try to thin the walls, or something of that sort. Oh, we're a queer lot.

As a bunch we're impractical. And it's the fault of our schooling very largely, especially the higher schooling as we might call it. I suppose I'm a heretic for saying

it, but there's nothing that gives us a greatest contempt for the mere drudgery and details of building, particularly the dollar end of it all, than the beaux arts of dear old Patee. And it's so blamed silly to imagine that real architecture is merely the fiddling with but the one detail, Design, of our "art." When will we be grown up enough to realize that the construction, the business end, the fitting of our building to our client's real need, doing it for what he has to spend are all just as important, as noble, as necessary details?

Just now before me is an advertisement from the American Institute of Architects for its Handbook of Practice, and merrily in its very preface it sins in the differentiation it makes, a sort of aiding and abetting of this top-loft notion the architects have and that has been their undoing.

Called a Fine Art

Says the preface—"It is as a fine art that architecture has established itself in the hearts of men. If it had been merely the science of building or even of building well, its appeal would not have brought to it minds such as those of Ictinus and Michael Angelo. To good building, architecture ter

adds high qualities of the imagination. It disposes of masses and details in ways that arouse us by their beauty, power, or dignity. It writes the records of civilization."

Now, ding it all, right there is where all these wise ones fall down. Minds such as those of Ictinus and of Michael Angelo and the rest of the old boys were appealed to by the the science of building. Design to them was but a necessary part of building. They learned how to build and to build well and then were men enough to build beautifully and expensively, too, telling the story of their times. Something we're not doing with all our vaunted art, for, at best, ninety-nine hundred out of every thousand of us, we're aping those same old boys; we prattle art, but tell no story of today except to hand down to posterity that we of this day and age are a batch of abject copyists. And were there ever times when history was made so fast, when greater progress and changes were occurring, when, if we were built aright and taught aright or had genius in us, we could write that history in steel bound tomes every bit as beautiful, lasting and readable as those wonderful structures of antiquity wrought by the mas-

A Farm Shed of Concrete Construction

On the grounds of the Iowa Agricultural College is standing a concrete arch, built for the purpose of demonstrating to farmers a simple method of constructing a shed for the protection of tools and farm machinery.

The bases of the arch are 36 feet apart,

The forms for this construction cost \$100, and can be used for an indefinite number of such arches, so that cost of the forms for this particular arch was slight.

Only two panels were constructed, as this was enough to demonstrate the principle.



Arch demonstrating an economical form of construction for farm machinery sheds

and it is about the same distance from the ground to the center of the arch above. The three bands of concrete are each 10 inches wide, and the two panels of tile each measures five feet in width. The arch is reinforced throughout.

As many panels could be added as a farmer might desire.

The arch has several advantages over any other kind of structure. It is without doubt one of the cheapest permanent structures that can be erected.

Making Common Structures Attractive

AT Albert Lea, Minn., the representative of the NATIONAL BUILDER found a big municipal water tower in process of being constructed, with the work nearly completed. It was different from any other water tower he had ever seen, in that it was handsome. Its proportions were admirable, though it rose to a height of 150 feet above its foundations. The danger of

Tarnoski, and that the designing of the tower and reservoir was the work of Consulting Engineer, J. H. A. Brahtz. Later, in St. Paul, the writer heard of this engineer as "a man that is doing things out of the ordinary and who is making some of our common things beautiful."

Mr. Brahtz was visited and gave a general explanation of the methods employed

the tower are 6 inches thick, while the walls of the pressure tank at the top of the tower are 9 inches thick.

The piers, or supports, running up the sides of the tower are each 15 inches thick and 36 inches wide.

Getting a Foundation

"The first problem to be considered was



Fig. 1

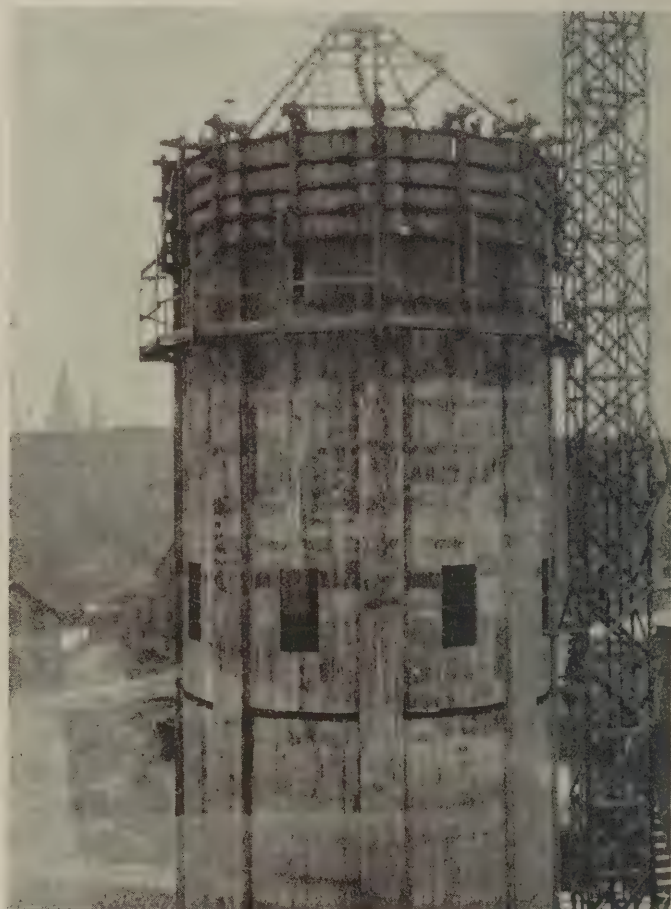


Fig. 2

Fig. 1—New style of water reservoir and tower just completed at Albert Lea, Minn.

Fig. 2—Tower in course of erection. This illustration is given mainly to show the longitudinal slits left in the concrete at the point where the reinforcing for the roof of the reservoir is to enter the walls of the tower. Note at the top of the construction the slip-forms in place for the pouring of a new course of concrete

its being a bare shaft unattractive to the eye had been obviated by the introduction of a girdle of arched openings at about two-thirds the height of the tower. These have the effect of adding interest to the tower, which effect is further heightened by the crinolated rims of the big reservoir and of the top of the tower, and the narrow slitted windows in the tower itself.

On inquiry, it was learned that the tower and reservoir were being erected by a firm of St. Paul contractors, McManis &

and materials used in the erection of the reservoir and tower.

"I started out to make it first serviceable, second, beautiful. Service must always come first," said he.

"The reservoir, at the foot of the tower, is 100 feet in diameter and 30 feet high, and has a capacity of 1,500,000 gallons. The tower is 30 feet in diameter throughout its full length. The material is reinforced concrete. The walls of the reservoir are 12 inches thick, and the walls of

whether the tower and reservoir should be on one foundation or on two foundations, that is, be built separately. We made an examination of the locality where the structure was to stand on the edge of the lake and found that we had the same kind of material gravel down for a hundred feet, which eliminated the danger that the whole structure would some day slide down into the lake. This condition also rendered the driving of piles unnecessary.

"So we made what is known as a mat-

tress foundation. We put in 1,400 cubic yards of concrete, reinforced. We had decided to erect both reservoir and tower on the same foundation, which is always a hard proposition.

The Footing Plate

"On this concrete foundation we put our footing plate, this plate being so abundantly knit with the foundation by the reinforcing that it has never shown a crack. The principal reinforcing here consisted of $\frac{3}{4}$ -inch and $\frac{7}{8}$ -inch square steel rods placed radially in diagonal veins, except in the center. When completed, the surface was just one foot above the lake level; so we have never had any trouble with the water.

The Problem of Slip-joints

"The next great problem was that of monolithic construction,—building the bottom, walls and top of the reservoir in one piece,—or constructing each of the three as separate parts. We decided to construct them as separate parts, for the reason that if the reservoir were to be in one piece throughout, the construction would have to be enormously heavy, with the use of a very large amount of steel, or the expansion and contraction under different temperatures would cause cracks between the footing plate and the walls, and between the walls and the roof of the reservoir.

"We had to do some experimenting to find out what material was best to use in the slip-joint. We tried cotton, lead and asphalt, and decided that asphalt (with burlap) was the most practicable, in spite of the fact that it would not last as long as some others. We knew that in about 15 years the oil would dissolve out of the asphalt and some repairing would have to be done, but, altogether, the asphalt was the best. We had made the tests with the object of finding out if some other substance would not be as good as asphalt and be more permanent.

"The slip-joint between the walls and the reservoir and the roof was made in the same way.

"The necessity for these slip-joints has been shown by experience. It might be thought that the whole reservoir would expand and contract equally, but this has been found not to be the case. The walls show no appreciable change summer or winter, as the mass of water keeps the temperature of the walls quite uniform, so that they remain cool in summer and comparatively warm in winter.

"But the roof of the reservoir becomes hot in the sun of midsummer and very cold in the coldest weather of winter. The top pushes out in summer with a terrific force, and in the coldest weather in winter it has an awful pull inward; and we do not want the walls to be exposed to any other strain than that of the pressure of the water.

"It might be thought that the bottom of the reservoir would not need a slip joint,

as it is protected from the heat of summer and the cold of winter. But the damage to this part of the reservoir comes when the water is turned into it, which results in the diameter growing about one-half inch in 100 feet, so that this footing plate, 100 feet in diameter, will be 100 feet and one-half inch in diameter after the water is turned in. With these slip joints in, all the water pressure comes on the horizontal steel rings that are reinforcing the walls, which we desire it to do, rather than on vertical steel rods connecting footing plate and walls, which would be the case if we had followed monolithic construction, as the ordinary amount of reinforcing used in such a case would not be enough to resist the strain.

"The walls of the reservoir, 12 inches thick, were reinforced more strongly on the lower portion than above, as the water pressure is greater. In the lower 15 feet of the walls we placed 37 double rows of steel bands, each $\frac{3}{4}$ -inch square, one band of each pair being on the outside and one

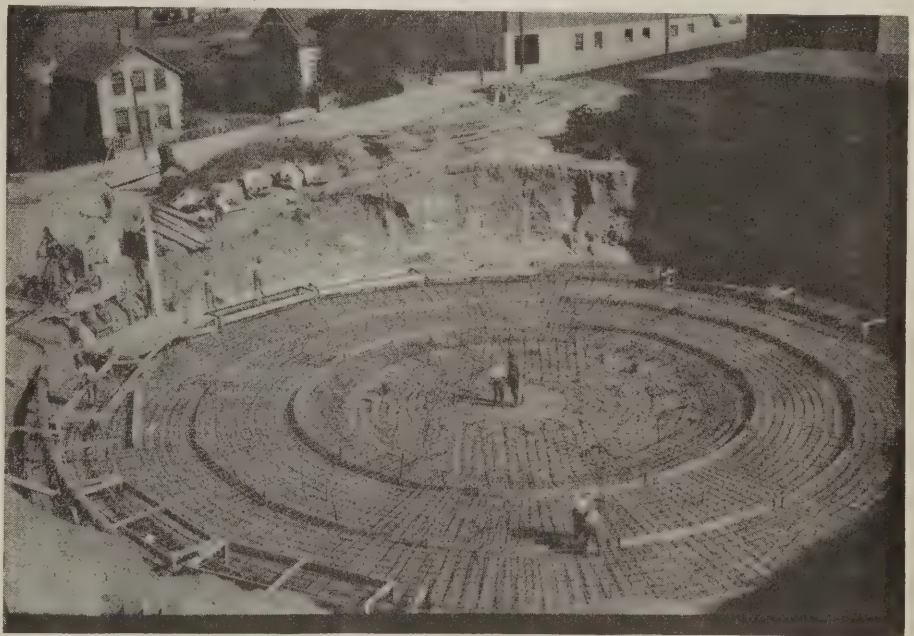


Fig. 3—The footing plate of reservoir. Note the abundant reinforcing. Note also the provision for the slip-joint on the outer rim of the footing plate

on the inside of the wall. In the upper 15 feet we placed 26 single bands, each $\frac{3}{4}$ -inch square. The vertical reinforcing consisted of $\frac{1}{2}$ -inch vertical steel rods placed about 18 inches apart.

Roof of the Reservoir

"The roof of the reservoir goes through the tower, and when the tower was being built we left openings in the tower at the point where the roof would penetrate it, for the reinforcing rods to enter. These rods are $\frac{1}{2}$ inch in thickness, radially placed. The tower thus forms one point of support for the monolithic roof, which is also supported by eight piers, each 18 inches square and reinforced with 4 one-inch rods.

Re-inforcing the Tower

"Between the piers of the tower we re-inforced the six-inch wall with half-inch round bar steel, placed vertically and horizontally about 18 inches apart. In each pier are 6 vertical rods each $\frac{7}{8}$ inches thick; and this reinforcing is continued to the top of the tower.

"In the picture of the tower it will be seen that there are two rows of very narrow slitted windows, these extending entirely around the tower. At each row is a platform on the inside of the tower resting on an I-beam.

The Belvidere Floor

"But at the arched openings, 8 in number and extending around the tower, is what I call the Belvidere floor. It is an 8-inch concrete slab resting on concrete T-beams. The openings are for ornamentation. Each of the openings is really 9 feet high, but, as will be seen by referring to the photograph, 4 feet of this height is taken up by a balustrade extending across

the opening, which is eight feet wide. These openings prove to the observer that the piers are carrying all the weight, which is true throughout the tower, the walls between the piers serving principally to brace the piers.

The Pressure Tank

"It is 10 feet from the Belvidere floor to the bottom of the pressure tank, which is built to hold 125,000 gallons of water. The bottom of the tank is two feet thick and is reinforced in four directions and in such a manner as to unite the tank walls to the bottom. The whole tank is of monolithic construction throughout.

"At this point we have not used the slip joints, as it pays better here to use more

steel, which amounted to only about two tons. I had figured on the cost and found that it would cost about \$1,000 more to make slip joints at the pressure tank than to use the monolithic method; for I would have had to put in a copper membrane all around.

"This bottom plate under the tank is carrying a weight of 675 tons, without intermediate support, and it is leak-proof without water proofing, which is accomplished by the correct placing of the steel in the concrete.

Uniformity in Walls

"One of the unusual things about this tower is that the walls are of the same thickness throughout, from bottom to top. This enabled us to use slip forms in the construction of the tower. We put the slip forms at the bottom, poured the concrete, let it harden and pushed up the forms, continuing thus to the top, which meant a great saving in expense. This is the point at which many engineers fall down, as they take it for granted that they must make the walls thick at the bottom and thinner as they go up. In this tower, all the up and down lines are vertical."

Mr. S. A. von Mehren, of St. Paul, the engineer of construction in the erection of the reservoir and tower, says that the placing of the tower inside the reservoir and building both on one foundation is a new departure in water tower building, and that in several ways this structure at Albert Lea is entirely unique.

Climate and the Dairy Barn

The committee on ventilation of farm buildings of the American Society of Agricultural Engineers is making a study of the proper housing conditions for stock in different parts of the United States and Canada.

As the cow is the source of heat in the dairy barn it follows that the construction and ventilation of the barns must be different in the northern part of the country than in the southern to maintain the proper temperature and sanitary condition of the air.

An article under the head of "Climatic Dairy Barns," by W. B. Clarkson and C. S. Whitnah, appears in the October number of the society's journal, *Agricultural Engineering*. The authors have divided the country into four well defined zones, based on sustained low temperatures in the winter months, and outline the proper type of barn in its relation to the temperature of the different zones.

Sublime

"Yes, I have studied architecture amid the palaces of Venice and the minarets of Spain."

"Good enough, son. Now let's see what you can do in the way of designing a tin garage."—Judge.

Concrete Grain Elevators

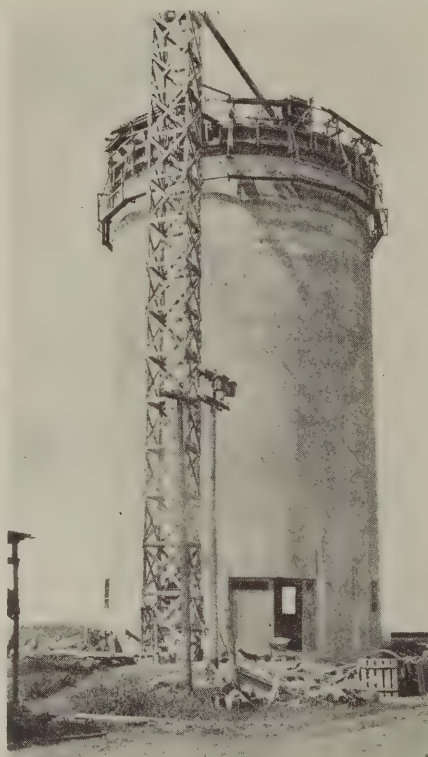


Fig. 1

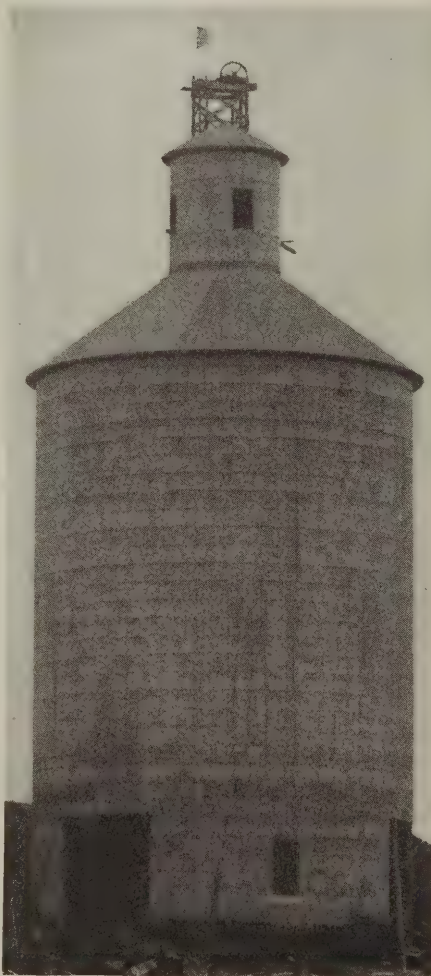


Fig. 2

The storage of grain and other farm produce promises to become increasingly active as the farming communities are discovering that co-operation will enable growers to have more to say about the prices and the influences of demand and supply. Two concrete grain elevators are shown in the illustrations. Fig. 1 shows an elevator at Kathryn, North Dakota, and Fig. 2 an elevator at Alpha, Minnesota. A cross section, Fig. 3, shows the bin arrangements of both elevators and some of the details of construction. These structures were designed by J. H. A. Brahtz, engineer, St. Paul, Minn.

How to Estimate Yardage for Plastering

C. W. Chamberlain, of Columbia, S. C., writes: "Referring to the inquiry of H. M. G. in 'Questions and Answers' of the NATIONAL BUILDER for November, 1920, tables for estimating the yardage of plastering on walls and ceilings of rooms are contained in the Red Book published by the United States Gypsum Company, 205 West Monroe St., Chicago. Similar tables can be obtained from the Southern Gypsum Company, North Holston, Va."

"The above tables make no deductions for openings. The amount to be deducted for openings depends upon their size and the character of the work, and there is no fixed rule governing such deductions. The 'Building Estimator's Reference Book,' third edition, by Frank R. Walker, gives the following rules: 'Openings in plastering are to be measured between grounds and no deductions made for openings less than two feet wide. One-half of the contents are to be deducted for all openings over two feet in width. The complete contents of all store front openings are to be deducted, and the contractor is to be allowed one foot six inches in width for each jamb by the height of same when the reveal or return is less than one foot.'"

Cheap Houses That Are Very Expensive

Peter Linhoff, an architect of St. Paul, Minnesota, tells the NATIONAL BUILDER, that "some of the people that are having very cheap houses built for them, or are buying such houses built to sell, are getting houses that are so expensive to keep up that the loss, if figured as interest on a certain amount of capital, makes the houses very costly. There are a lot of those cheap houses being built in St. Paul, story and story-and-half houses. I know of a man that bought such a house a year ago. He burned 16 tons of coal in it last winter, when not more than eight tons could have been burned if the house had been properly built. He moved out in the spring, saying the house was too expensive for him."

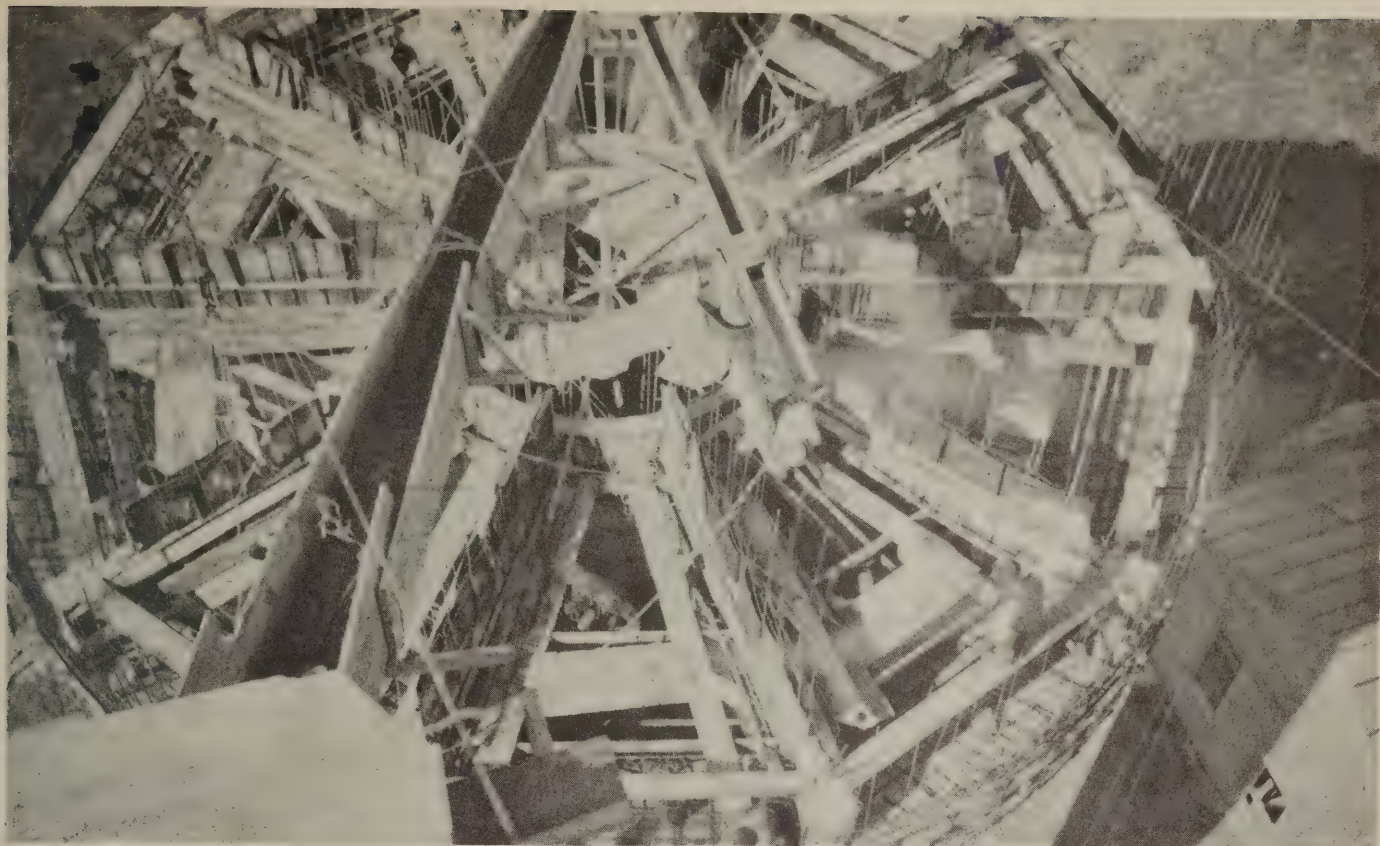
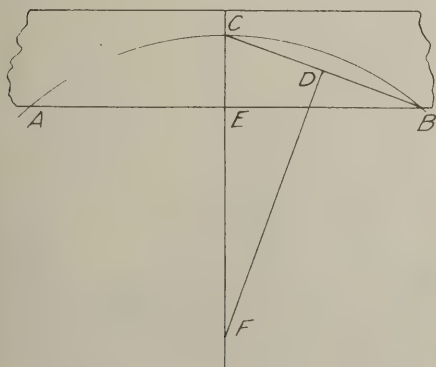


Fig. 3—Cross section of bin arrangement of concrete elevators

Laying Ribs for Centers

For your Information Department and Round Table I am enclosing a method for laying of ribs for centres. Often in detail work or in repair work we have the width of opening and spring of centre given, but must find the radius ourselves. Mark the width of the opening on the board, A-B; get the exact centre, E, square across the board and out the floor, C-F. Draw the line C-B, and from the exact centre of this line, D, square a line until it intersects the line CF. At the point of intersection set the trams and strike a circle.



I have seen many good carpenters simply use a lath or strip, bending to the points; but any one having occasion to follow up this work later will find it hard to get two strips that will bend exactly alike.—John L. Eggiman, Bellaire, Ohio.

[Send in any of your kinks or descriptions of your methods of working. They may help some one, or some one may give you a better idea than yours. Remember

that you are talking to builders from Maine to California in NATIONAL BUILDER and you can help to bring out ideas by telling about your own.—Editor.]

A Complete Farm Group

The accompanying photograph shows the very complete group of buildings built by Ralph Coon for the Fisher Farms near New London, Ohio.

In the photo is included the barn, 36 by

84 feet in size; tool shed 22 by 84 feet, with the front all sliding doors; double corn crib 18 by 30 feet; hog house 16 by 36 feet, poultry house 14 by 42 feet and the garage 20 by 42 feet.



A complete farm group, built by Ralph Coon, New London, Ohio

A Potato Warehouse

THROUGHOUT the principal potato growing sections of the country a record breaking crop is predicted for this year. The prospect of a bumper crop has created considerable interest in potato storages or warehouses. Farmer co-operative associations are being organized among the producers for handling the crop. In the great potato growing district of the Red River Valley in North Dakota, South Dakota and Minnesota numerous warehouses are being rushed to completion to accommodate this year's abundant harvest. Potato growers in Maine, Idaho, Wisconsin and other potato producing sections are becoming interested in warehouses and there is an urgent demand for information regarding the design of these structures.

Potato growers have long felt the need of having suitable storage facilities where their crop can be held from time of digging until shipped to the market. Lacking a place of storage the producers are usually compelled to sell their crop immediately



Potato warehouse at Gary, Minn., built of cement block

though perfect storage conditions are maintained. Not only should the potatoes be free from disease of all sorts but they should also be handled in such manner

this is the temperature that is maintained in warehouses employing mechanical refrigeration. With an air cooled storage a temperature between 35 and 40 degrees Fahr. is considered satisfactory for preventing sprouting and arresting decay. In order to maintain a uniform temperature on the inside requires that the building be well insulated so as not to be subject to outdoor temperature fluctuations. As the winters are severely cold in most potato growing sections it is a wise precaution to install a heating stove for emergencies when inside temperature may approach the freezing point.

3. There should be sufficient moisture in the atmosphere to keep the potatoes crisp and plump and to prevent them from shriveling. The moisture content of the air should be governed closely at all times. If the air is too dry the potatoes will shrivel and if too moist they will rot. A method for regulating the humidity in a storage will be discussed in a following paragraph.

4. It has been found that potatoes will keep better and retain their flavor longer if stored in a comparatively dark place.

In order to determine what type of stor-



Concrete block potato, salt and flour warehouse at Detroit, Minn.

after it is harvested. At this time the demand is generally poor and low prices prevail on account of an overstocked market. In a properly designed and constructed warehouse, potatoes can be kept in good condition throughout the winter months and disposed of when the demand is brisk and prices are right. Transportation difficulties which seem likely to be troublesome this fall make it even more urgent for potato growers to be equipped with some kind of warehouse for holding their crop at least until cars can be secured for hauling it to market.

There are a number of factors which enter into the successful storage of potatoes.

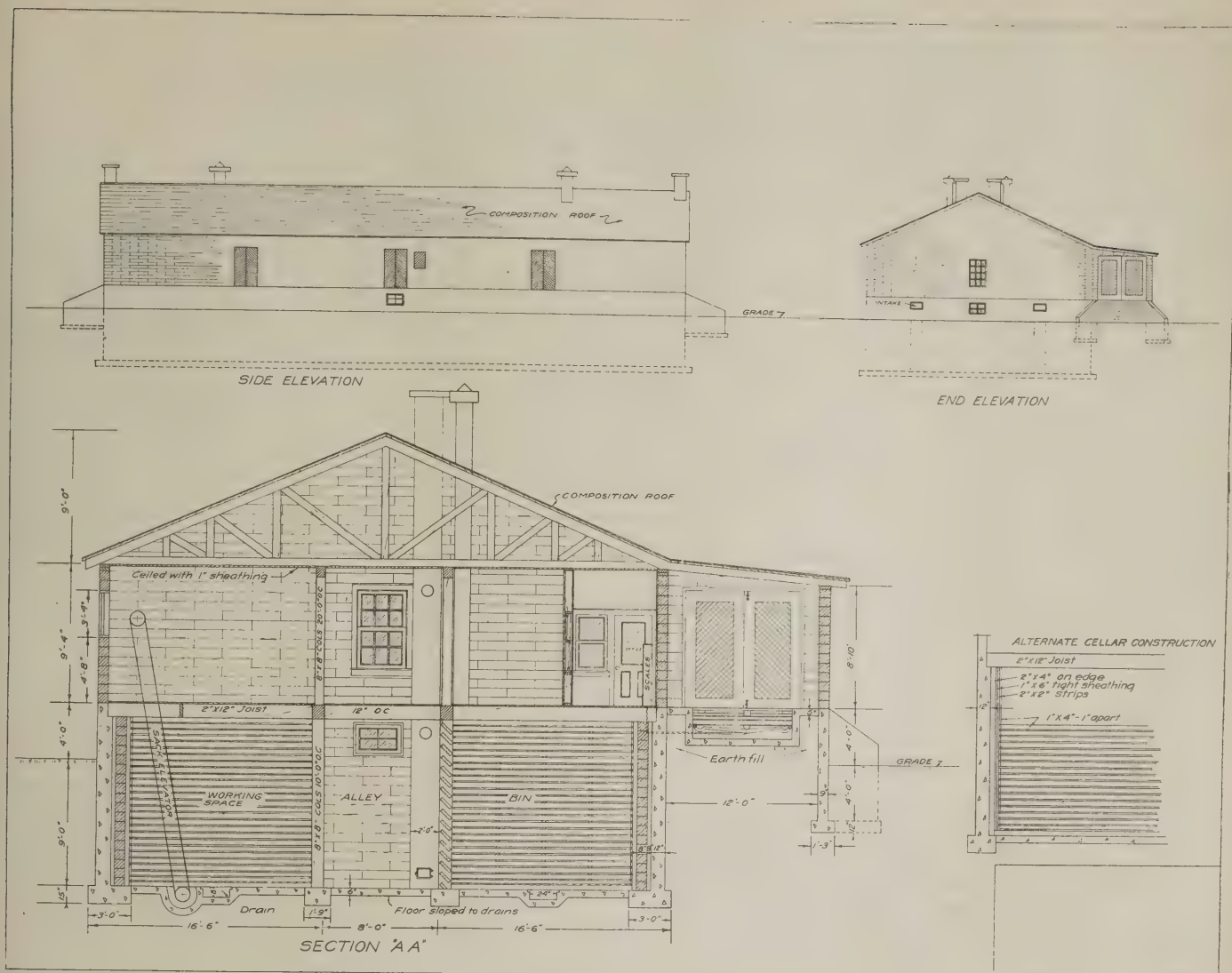
1. Potatoes should be handled carefully and be free from disease. It is unreasonable to expect that potatoes which are covered with scab or infected with dry rot or some other disease will keep well even

that they will not become bruised.

2. Potatoes require a relatively low and uniform temperature during the storage period. A temperature just above the freezing point will keep potatoes best and



Clay brick potato warehouse at Hawley, Minn.



age would most satisfactorily meet the above requirements an investigation was made of a number of the warehouses in use in the Red River Valley. More than a score were inspected and the good points of each carefully noted. Warehouse managers were interviewed and their ideas secured. These notes and ideas were incorporated in the potato warehouse plans shown herewith. As operating conditions and storage requirements are practically identical in most potato growing centers this design will be found suitable for use in regions outside of the Red River Valley. The capacity may be altered to suit the needs of any particular locality by lengthening or shortening the structure.

Potato storages are built partly underground where the soil is well drained and will permit such construction. The earth then serves as an insulator and helps to maintain a uniform temperature on the inside.

A desirable location for the warehouse is near a railroad siding and preferably on the north side of the tracks. This makes possible a south exposure which is desirable as it is seldom possible to bank up the cellar wall with earth on the track side.

The probability of inside temperature going below freezing is thereby lessened.

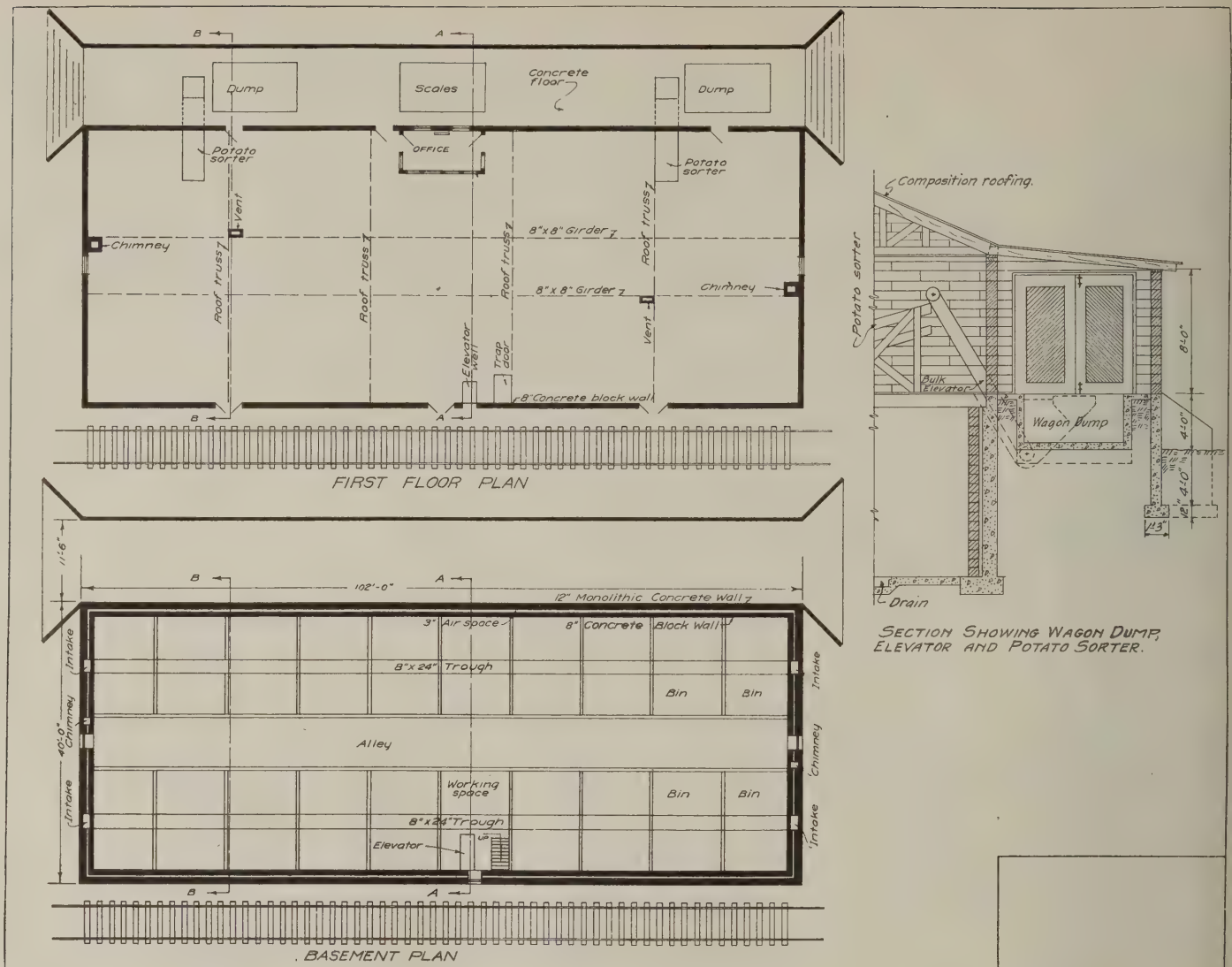
A warehouse having a capacity of 25,000 bushels was found most adaptable for average conditions. This requires a structure 40 feet wide by 100 feet long and a basement 12 feet deep in the clear. Including the sacked potatoes which may be stored on the working floor over the basement, a warehouse of these dimensions will take care of at least 35,000 bushels.

Potatoes are brought to the warehouse and unloaded by gravity into the two wagon dumps located in the driveway which extends along one side of the building. From here they are elevated to the sorters. The usual custom is to sack the potatoes or to fill baskets which are trucked to trap doors over the bins and emptied. This practice will probably be discontinued and mechanical conveyors installed in the future for carrying the potatoes direct from sorter to bin. When it is desired to remove potatoes for shipment several of the lower planks on the front of the bin are removed, allowing the potatoes to roll into the alleyway where they are forked into bags. An elevator conveys the filled bags to an overhead chute where they

slide by gravity directly into the car.

The foundation wall is of monolithic concrete 12 inches thick. It extends 4 feet above grade. To assure water tight construction the concrete mixture should be proportioned at the rate of one sack of cement to two cubic feet of sand to four cubic feet of pebbles or crushed rock. Sand should be clean, hard, and uniformly graded in sizes from fine particles to those that will pass through a screen having meshes one-quarter inch square. Pebbles should be clean, tough, and range in sizes from $\frac{3}{4}$ to $1\frac{1}{2}$ inches in greatest dimension. A batch type of machine mixer is recommended. Form should be substantially constructed and it is advisable to use plank for this purpose. Depositing of concrete should be carried on continuously if possible so as to eliminate construction joints.

As it is desirable to provide construction which will afford protection against frost without using artificial heat, an interior wall of concrete block is shown. It is located about 3 inches from the outer wall. The intervening space is filled with clean cinders in order to break it up into countless minute air spaces. Circulation of



air between the walls is thus prevented. These spaces together with the air spaces in the inner concrete blockwall provide effective insulation.

The basement floor is constructed of concrete of the same specifications as used in the basement walls. A trough 8 inches deep and 24 inches wide runs the full length of the building under each row of bins. This trough serves as a drain in case water gets into the cellar and it is also useful as a humidifier when the potatoes become shrivelled on account of insufficient moisture in the air. Water is then poured into the trough and allowed to evaporate and thus regulate the humidity. This trough is also a part of the ventilation system and furnishes a passage for air under the bins.

Potatoes are often quite moist when first placed in the warehouse in the fall, and if no measure is taken to remove the excess moisture by ventilation, rotting will occur. Warehouse keepers are in accord that ventilation is essential in every warehouse. Air enters the warehouse described through 4 intakes, two at each end of the building, and passes along the troughs under the bins. A false floor is built over

the concrete floor to permit air to circulate freely under the bins. This floor is made of 2 by 4's on edge covered by 1 by 4 boards spaced $\frac{3}{4}$ inch apart. The bin walls and partitions are also constructed so that the movement of air will not be impeded. In the fall before severe cold weather arrives, the ventilation system is used for lowering the temperature on the inside to a point where potatoes will keep well. This is done by opening all ducts on cool nights and closing them during the day so as to retain the cold air. Dampers are provided on all intake and out-take openings so that they may be closed up tight in severely cold weather.

The walls above the basement may be constructed of concrete block, brick or lumber. Concrete block is specified on the plans. These units provide a wall reasonable in cost, durable, satisfactory in appearance and on account of the air cells in the wall afford that protection against heat and cold so necessary in a structure of this kind.

SEND in your problems to NATIONAL BUILDER as well as the kinks you have found successful.

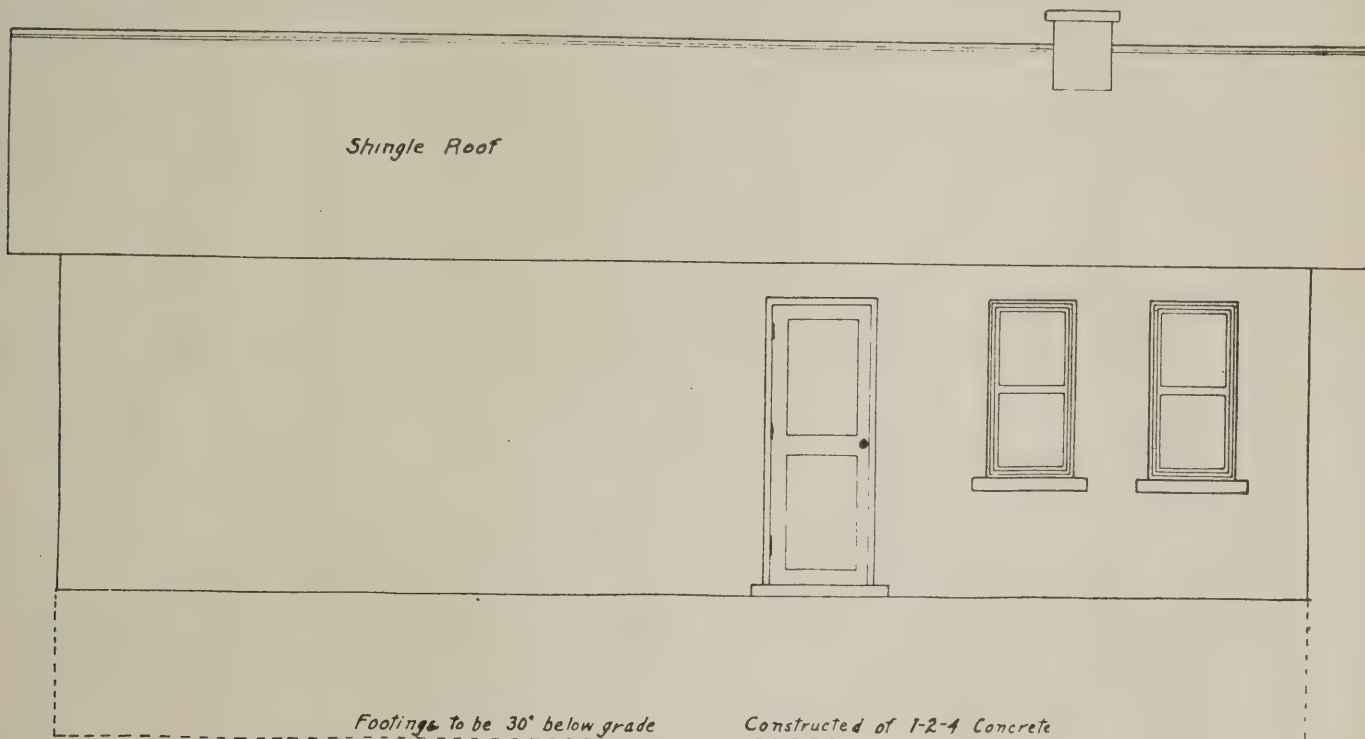
Methods of Mixing Cement

E. T. S. writes: "Is it all right to mix dry cement, sand, and gravel; then without mixing water with it put it in a hole or foundation dry and let the water therein soak in and wet it?" Answer—We certainly would not recommend this procedure as it is very necessary that all the materials which enter into the concrete mixture be thoroughly mixed together. If a dry mixture of cement, sand and pebbles is deposited in a hole it is very doubtful if water would ever reach the center of the mass. To illustrate our point, let us compare the dry mixture to a quantity of flour and water. You know from observation that if you place a quantity of flour in a pan and pour water around it, the water would never reach the center. A dough would be formed around the surface which would prevent water from penetrating very deeply into the mass. For further information in regard to the proper methods of doing concrete work, we refer you to the booklet "How to Make and Use Concrete."

This booklet is issued gratuitously by the Portland Cement Association, 111 West Washington Street, Chicago.

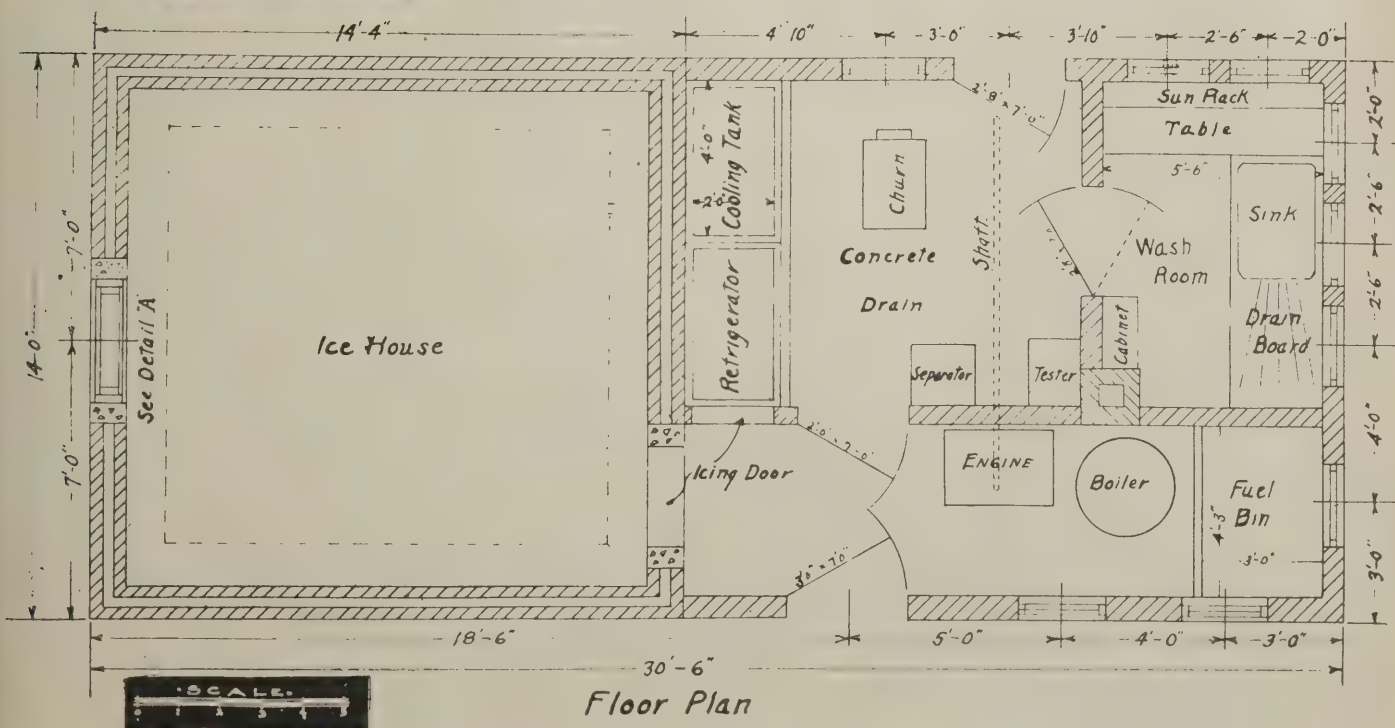
By The Agricultural Engineering Company

should be determined after a careful study of convenience to the dairy and dwelling and of drainage. On a sandy or gravelly soil the drainage question will take care

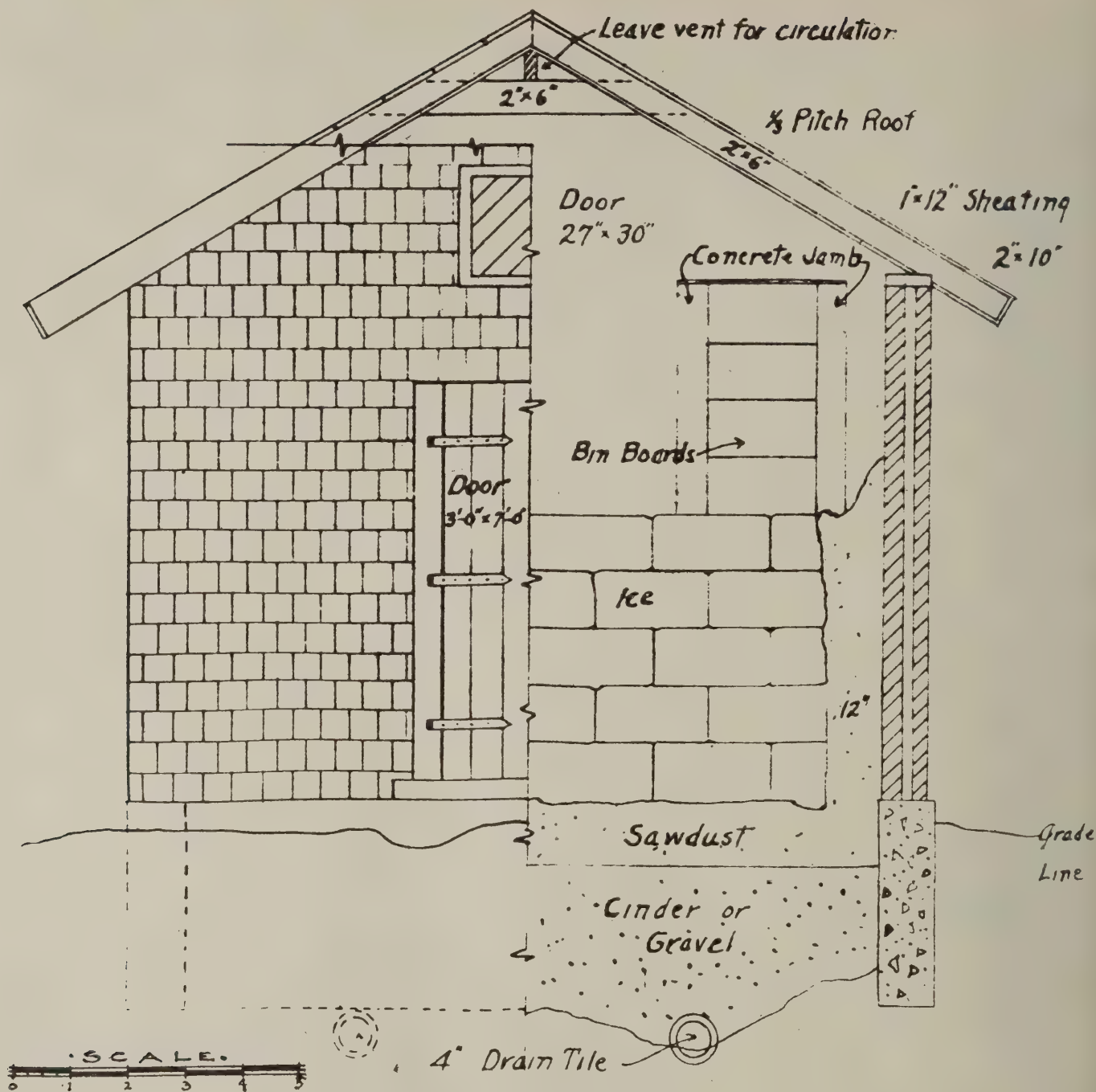


SCALE

1 2 3 4 5



Floor Plan



of itself; on a heavy clay soil that does not drain readily, it will be necessary to excavate to the foundation footing, lay four inch lines of tile as shown in the elevation and then fill with gravel or cinders to a depth of at least a foot over the tile. Traps should be provided at the ends of the tile lines to prevent air circulation under the ice. This particular building should probably be located near the dairy for the maximum convenience in order to save labor in carrying milk. The amount of ice used in the household is relatively small when compared with the amount used in cooling milk and cream. It is also a good plan to locate the building to take advantage of natural shade, giving due consideration, however, to other advantages.

Size

It is not advisable to store ice in less than eight foot cubes on account of the loss from shrinkage and waste. It is better economy to store in as large a bulk as possible. No matter what kind of construction is used a shrinkage of from 15% to 20% is bound to occur. Many dairymen make a practise of storing 50% more than they really need. For cooling milk and cream it is advisable to allow 2 tons of ice per cow. A storage space, 10x10x11 ft. is provided in this structure or approximately enough for 27 tons of ice. The ice compartment of the building may be lengthened, however, if more ice is to be stored. If one wishes to build a larger house, allow 40 cu. ft. for a ton of ice.

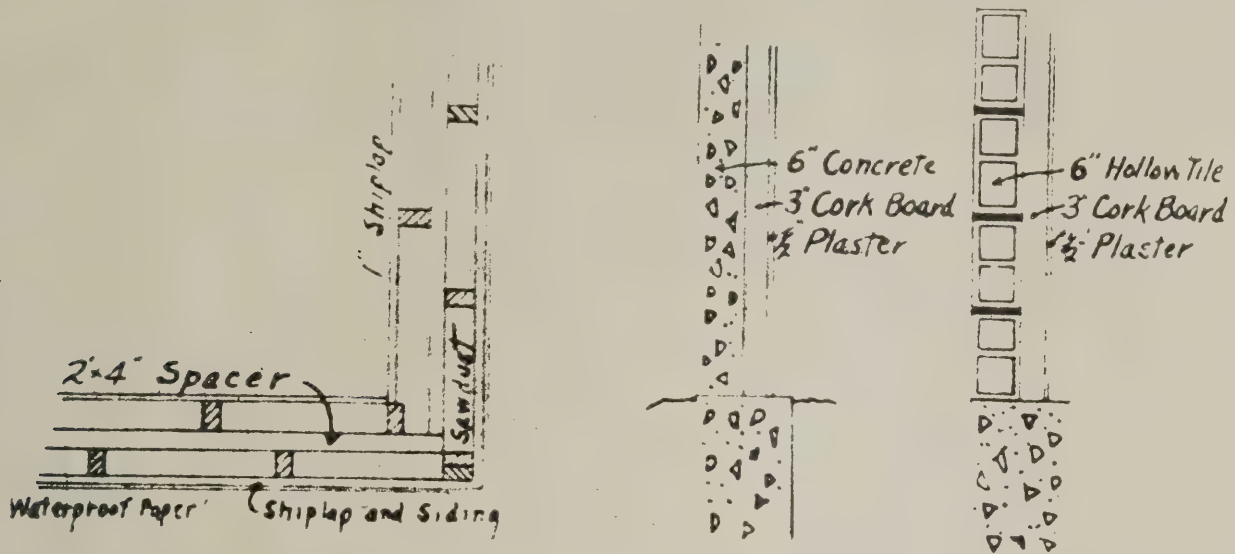
Plan

The plan of the structure is simple. A milk house conveniently and compactly arranged is provided at one end. Ice taken from storage can be placed in the refrigerator or cooling tank with a minimum of labor. The engine and boiler room is separated from the milk room proper so that it is free from dirt and odor. The wall construction called for by the plan consists of a double row of hollow tile building blocks separated and insulated by a layer of cork board. This arrangement undoubtedly gives the greatest insulating value possible. Two dead air spaces with an insulating layer are provided. Alternate wall details are also given. The timber frame construction has merit. It is

cheap, easily constructed, gives good heat insulation and if properly waterproofed and painted will last for an indefinite length of time. The monolithic concrete construction is often used. When covered with cork board and waterproofed with cement

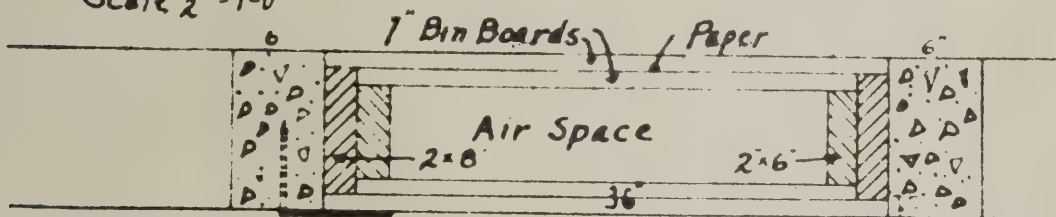
of ice, no matter what the construction of the walls may be and this will cause moisture to settle on the roof and walls. Ventilation not only helps to lessen the presence of moisture but also starts air circulation which tends to break up heat radiation

through the roof and walls. For this reason, a rather large opening should be left at one end of the ice house or better still a large slat ventilator should be constructed at the cone of the roof. Air circulation over the ice does little harm but



Alternate Wall Forms.

Scale $\frac{1}{2}'' = 1'-0''$



Detail 'A'

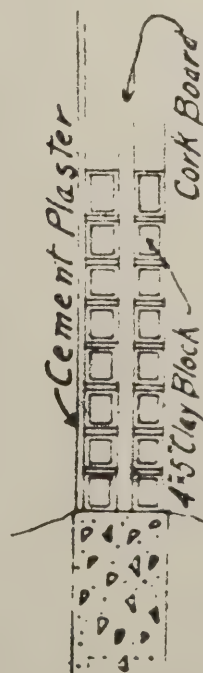
Scale 1"=1'-0"

plaster it has good insulating qualities, and at the same time forms a permanent and fireproof structure. The use of a single layer of hollow tile building blocks covered with cork board and plaster is to be recommended. In general the use of insulating material such as cork board, dry sawdust or shavings or hair felt is necessary to secure the greatest heat resisting qualities. Dear air spaces are also good insulators and their incorporation into ice wall construction are good features. The wall construction of the milk house proper consists of a single layer of building blocks. No provision is made here for heat resistance. Inside walls, however, should be free from cracks and crevices in order to facilitate cleanliness.

A 2x10 plate is laid on the wall for support for the rafters. The roof has a one-third pitch and is constructed of 2x6 rafters, 24-in. on centers, sheathed inside and out and covered with shingles.

Ventilation

Ventilation is essential in an ice house. There is bound to be more or less melting



Permanent Wall.

that on the sides or bottom of the ice cube produces undesirable results. To prevent this the packing material should be carefully compacted and a trap provided in the drainage lines under the fill.

Two doors are provided for the ice compartment. The inside of these doors consist of removable boards separated by a layer of waterproof paper. The door proper consists of a double layer of boards separated by paper, and is hung from hinges imbedded in the concrete door jamb. The ice house door which brings two flat surfaces in contact is superior to the bevelled door which is heavy and cumbersome and is bound to sag, thus making it impossible to secure a tight fit. Ordinary panelled doors are provided for the milk house. Seven windows in this part admit abundance of light and help in a large way to keep it clean and sanitary.

Storing the Ice

In filling this house, a layer of sawdust or shavings at least twelve inches thick is spread on the floor and well tamped down. The ice is packed closely on top of this,

breaking joints between the different layers as far as possible. Leave a space of about twelve inches around the outside of the ice pile. This twelve inch space should be

packed with sawdust as each layer of ice is put in place. With this form of filling care should be taken to prevent the formation of air pockets along the edge of the

pile or on top. Such pockets allow the passage of air and consequent loss of ice by melting. Care should be exercised and the aim to be accomplished kept in mind.

Questions and Answers

Send in Your Questions and Send in Descriptions of Anything You have Found to be a Better Way of Doing Things—This is a Mutual Service Department—Push it Along

An Irregular Roof

A. J. of Connecticut, wants to know the proper way to construct a shingle roof for a building of the shape and dimensions shown in Sketch 1.

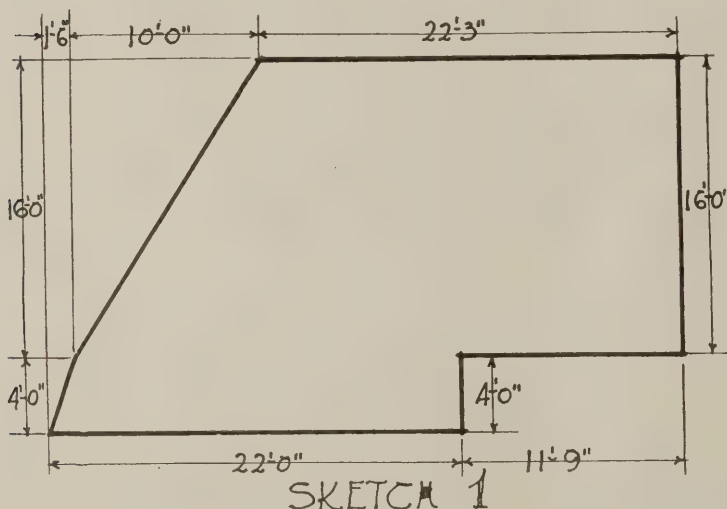
A solution is given in Sketch 2 in which a pitched roof hipped at the irregular end is used. The projection is covered by extending the rafters and carrying the roof slope down over it.

Perhaps interested readers will send in other solutions or submit similar roof problems of their own.

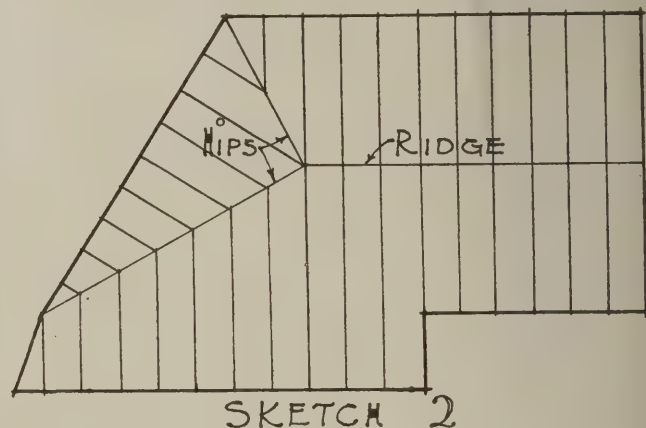
joint between the two leaves being rabbeted, the dead lock on the upper leaf serves to secure both. To secure the two leaves together, the best fastening is a mortise knob latch, rabbeted to correspond with the edges of the doors. This should have a knob on the inside only, whereby the latch can conveniently be withdrawn when it is desired to move the upper leaf separately from the lower leaf. Occasionally a quadrant or other clamping device is added to draw the two leaves tightly together.

pole, and it should be rigged with double blocks, with a four part manila line 1 inch in diameter. Catch the beam exactly at the center with a rope or chain sling, and hoist it to place. Bolt one end loosely, and then pull the other end in place. Then bolt each end firmly. Move your gin pole to the next span and repeat.

A shear frame of the proper length, composed of two 2-in.x12-in. planks, with a six foot base, and coming to a point at the top, may be used in place of the gin pole. It should be well braced both cross-wise and



An irregular roof



Dutch Door Hardware

A. E. F. of Michigan asks for a list of the proper hardware for a Dutch door. Answer—The following list is considered to cover standard hardware for such doors: Two hinges for each section. For the lower leaf the best fastening is a vestibule latch; that is, a lock having a spring bolt operated from either side by the knobs, and from the outside by the latch key. Frequently a store door handle with thumb-latch is substituted for the outer knob, in which case a special lock is needed. For the upper leaf a mortise dead lock is used, the bolt of which is operated from the outside by key and from the inside by thumb-knob or key as preferred. The

Hoisting Tackle—Gin Pole and Winch vs. Winches and Blocks

A subscriber wants to know how to raise the 18-in. I beams in constructing a mono-rail. Answer—There are two methods you can use, either of which will be satisfactory. First, by means of a gin pole and winch. You will require a pole about 40 feet long, and it should be about 6 inches in diameter at the top. A telephone pole will do. It should bear on a piece of heavy plank at the bottom, and should be guyed so as to incline slightly, the top being directly over the center of the beam in its final position. A double geared winch should be bolted to the lower part of the

diagonally. You will need only two guys on the shear frame.

Second. This method will need two winches, or else two six part lines with triple blocks. Carry a 6-in.x8-in. timber across the timber frame, resting same on the three-by-ten struts at the sides. It will be necessary to block these beams up high enough so that there will be room for your tackle above the steel beams, and below the bottom of the 6-in.x8-in. lumber. Rig your lines at each end of the steel beam. If you use double blocks, you will require a winch at each end. If you use triple blocks, you can hoist by hand power, using three men on each line.

On the whole, you will probably find the gin pole or shear frame the cheaper.

How to Make Holes in Concrete Floors

Crude and divergent methods still may be witnessed occasionally in the construction of the holes and ducts required for piping and conduits in concrete building floors.

It is not an infrequent sight to see workmen laboriously and expensively chiseling or drilling holes through floors already very hard. Painted, tapered wooden plugs are also seen occasionally in floor construction work, being inserted in the forms with the expectation of easy removal; this hope the fates favor only about once in a dozen times, necessitating heavy driving or drill-



Fig. 1. Forms for holes and small service openings in concrete floors. They are of light galvanized iron, rigidly attached to the floor forms.

ing in the corresponding eleven out of twelve instances. Of course neither of these methods leave a clean, true opening, depending on pipe flanges or other methods of hiding mutilations.

Perhaps the most convenient and practical method of forming floor holes where desired is by the use of galvanized iron tubes, as shown in Figures 1 and 2. These

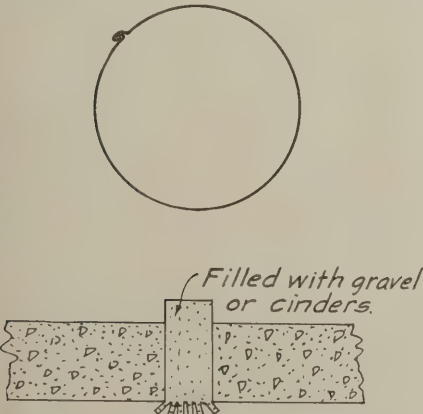


Fig. 2. The ring, above, shows the manner in which the forms are joined, so that ends may be easily disengaged to facilitate removal

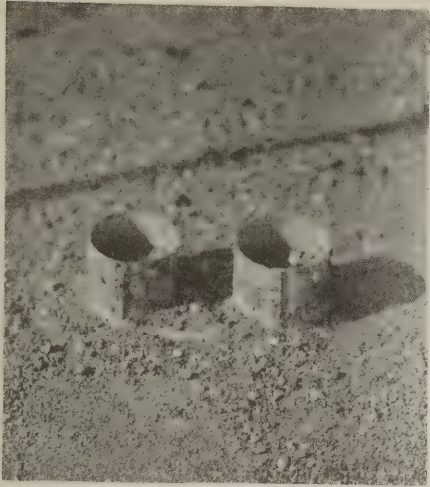


Fig. 3.—View of the forms in place immediately after floor was placed. The gravel on the floor surface is kept moist to assist proper curing. After removal of the supporting forms and the gravel, the forms for the holes may be removed or cut off flush with the floor surface

tubes are made of light weight galvanized sheet iron, with joint turned and rolled flat as shown in Figure 2. Under ordinary circumstances the tube is made round in section with parallel sides and ends, making a cylinder about three inches longer than the thickness of the floor. An inch of the lower end is slitted and bent down crow-foot fashion as illustrated in Figure 1, affording means for rigid attachment to the floor forms. This is a very essential requirement. The tubes are of various diameters as required to accommodate the



Fig. 4. Where it is desired to produce a plug of concrete in the floor, for removal later, the form is made in the shape of a truncated cone and filled with concrete. On completion of the floor the hole form is trimmed off flush with floor surfaces and left in place until it is later desired to remove the plug

various pipes and conduits. Before concrete is placed in the floor forms the tubes are filled with gravel or cinders to give the rigidity required for resistance to the pressure of the wet concrete. Tubes in place during the hardening of the floor slab are shown in Figure 3. The gravel or cinders run out when the floor forms are removed and the tubes may then be removed, first prying out lap joints with a screw driver.

Where it is desirable to provide for future openings through the floor the tube may be made in the shape of a truncated cone, as shown in Figure 4, with minimum diameter at the bottom, tapering outward from the top at the rate of 1/4-inch to the foot. The tube is oiled inside and out and filled with concrete wet enough to flow to

the same level as the surrounding floor. The protruding top portion of the tube is cut off flush with the floor surface. The tapered concrete plug may be driven out whenever desired.

Charring Does Not Preserve Wood

Charring is of little value in protecting the butts of fence posts and telephone poles from decay. This is shown by service tests made by the U. S. Forest Products Laboratory on fences of charred and untreated posts of various species. The charred posts proved in these tests to be even less durable than the untreated ones.

Theoretically, an area of charred wood around a post should prevent decay, because charcoal does not decay or encourage the growth of fungi. But the charred area around a post is not usually a solid covering. It is checked through in many places. If posts are seasoned before they are charred, the charring does not reach to the bottom of the season checks which are always present. If green unchecked posts are charred, checks will open through the charred part as the wood seasons. In either case the uncharred center of the post is exposed to fungus infection and will decay as rapidly as any untreated wood.

Charring deep enough to resist decay would undoubtedly weaken a post of ordinary size.

How to Tell Birch, Beech, and Maple Apart

Birch, beech, and maple are very similar in appearance, and have approximately the same weight. Hence it is comparatively easy to mistake one of them for another. A method which anyone can use to distinguish them is suggested by the U. S. Forests Products Laboratory. The method makes use of the relative width of the pores and medullary rays in the three woods.

If the end grain of birch, beech, or maple is cut smooth with a sharp knife and examined with a hand lens, the pores will be seen as tiny holes distributed fairly evenly over the surface, and the medullary rays will appear as narrow lines of a different shade running at right angles to the growth rings.

In beech some of the rays are very distinct even without a lens. The large rays are fully twice as wide as the largest pores.

In maple the rays are less distinct, and the largest are about the same width as the largest pores.

In birch the rays are very fine, invisible without a lens. The pores are several times larger than the rays, usually being visible to the unaided eye as minute holes on the end grain and as fine grooves on dressed faces of the board. The pores in birch are considerably larger than the pores in beech or maple.

The appearance of the medullary rays on a "quartered" surface is also distinctive. Here they appear in beech as distinct "flakes," the largest being between 1/16 and 1/8 inch in height when measured along the grain of the wood. In maple they are considerably smaller, rarely attaining a height of 1/16 inch. In birch they are comparatively inconspicuous.

Making Iowa Mining Villages Safe

Edwin H. Sands, housing commissioner, of Iowa, tells the NATIONAL BUILDER that the housing problem is immeasurably greater in the mining villages of the state than in any other kind of village or city.

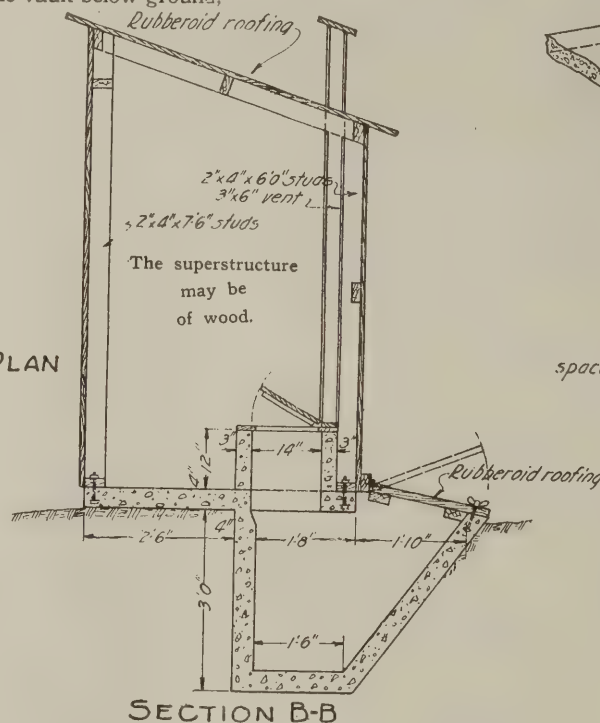
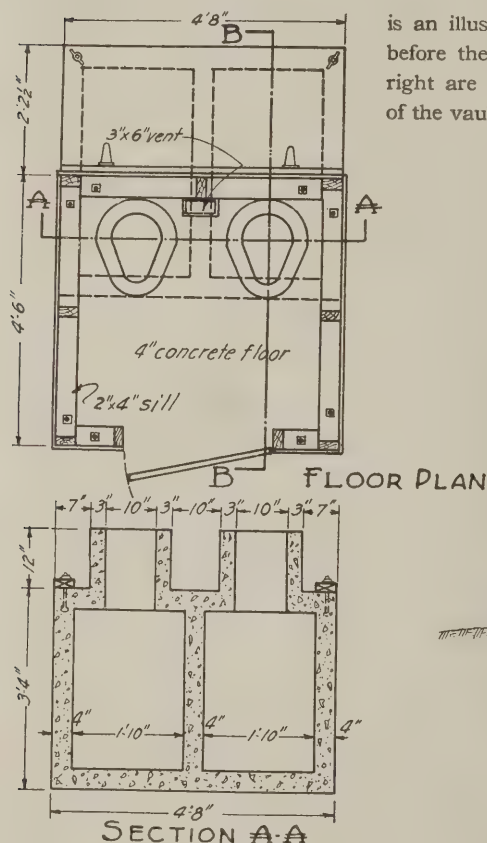
"This is not a temporary question," he

"The one great obstacle to getting permanent improvement lies in the fact all of these villages are temporary in character, so much so that they are designated as mining camps. The average life of such a village is about six and a half years. This makes impossible permanent sewers, water works, or paved streets.

"We cannot protect the wells by collars of cement, for the water could seep under them. We do what is better,—we surround the privy with cement on sides and bottom, so that nothing can get out of it. The cement privy is made absolutely water tight and has two compartments, with an impervious cement wall between. One side is used for six months, then its use is discontinued for six months, during which time its contents are thoroughly drying;

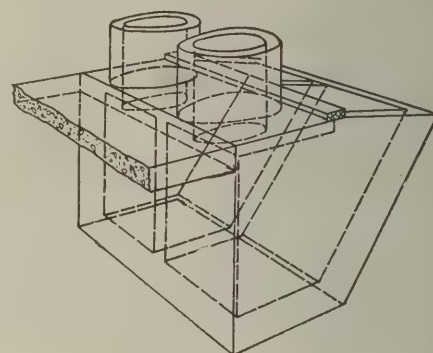
To the left

is an illustration of the concrete work of the vault before the superstructure has been erected. To the right are form sections used for building that section of the vault below ground,

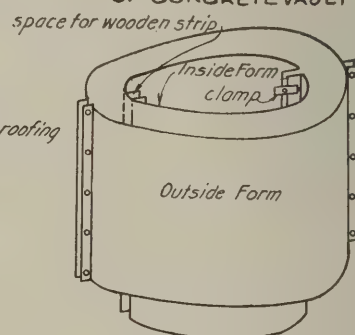


Coloring Cement and Stucco

C. F. Z. writes: "Can you give me any literature or refer me to anyone who can give me literature on the staining or coloring of concrete for face brick?" Answer—We presume you refer to concrete brick. Concrete brick, or in fact, any concrete or mortar surface can be given any desired shade of color by mixing a proper amount of mineral coloring material with the cement. This is taken up on page 10, 18 and 25 of the booklet, "Recommended Practise for Portland Cement Stucco," Portland Cement Association, 111 Washington Street, Chicago. Mineral coloring material suitable for this purpose can be obtained from a number of concerns. (The names of these concerns have been supplied to the inquirer.)



PERSPECTIVE OF CONCRETE VAULT



SHEET METAL FORM FOR HOPPER

Reasons for Stucco's Cracking

A subscriber wants to know why stucco cracks. Answer—There are several different causes which may be responsible for the cracking of stucco: settlement of the structure itself, the use of too rich a mixture of cement and sand, permitting the stucco to dry too quickly, the penetration of water behind the stucco due to poor flashing or faulty work, or failure to secure a good bond between the stucco and the masonry to which it is applied. These different causes are all described in the booklet, "Recommended Practise for Portland Cement Stucco," which gives the precautions which should be observed.

said, "but it is a permanent one. It has nothing to do with the inability of people to buy houses, for the houses are owned by the coal companies. They are small, often two-room affairs. They are very properly designated as shacks,—most of them.

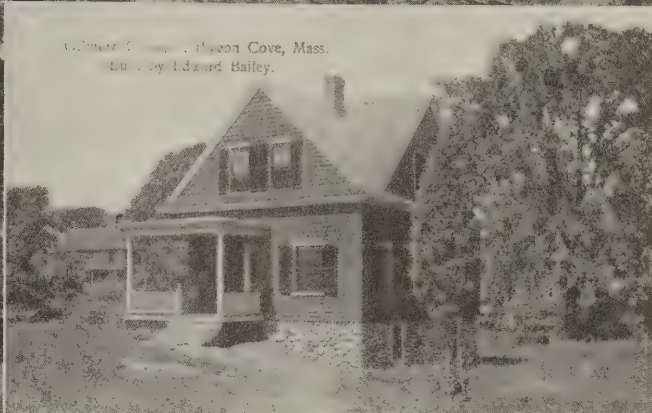
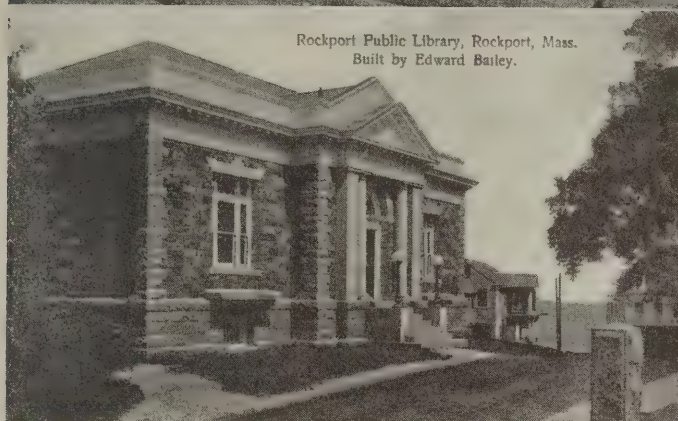
"We are making a fight to get good drinking water,—that is, water not contaminated with sewage. We found some wells located in low places while quite near them on higher ground were the privies. Not only was there a seepage through the soil from the privies to the wells, but in times of freshet the filth was actually washed from the closets, which were flooded, to the vicinity of the wells further down.

after which they are removed, and the same treatment given the other side; while the first compartment is again put into use.

"In making the concrete mixture, 1 sack of cement, two cubic feet of sand, and three cubic feet of pebbles from 1/4 inch to 1 inch in greatest dimension, are used. Only enough water is added to give a jelly-like consistency. After this is poured into the forms it is allowed to stand for 48 hours.

"I believe that if a concrete vault were used with every privy it would prove a great protection to the health of the people."

Such vaults can of course be designed by anyone, but the Iowa Health Commissioner has been sending out freely the accompanying design.



Postcard advertising by Builder Bailey

Post Card Advertising

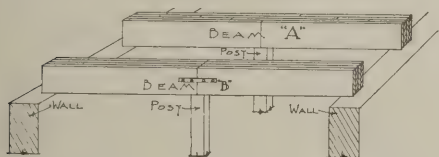
Edward Bailey, a builder, of Pigeon Cove, Massachusetts, uses post-cards to good effect in giving publicity to his work.

The accompanying illustrations are examples of the post-cards which Mr. Bailey uses to exploit his work. They are distributed where they will do the most good.

Built-Up Beams

G. F. B. of Michigan, says that he recently had an argument concerning the strength of built-up beams.

The question is this, is a built-up beam stronger with all of the joints over a support as shown for beam "B", or is it stronger with broken joints as shown for beam "A"?



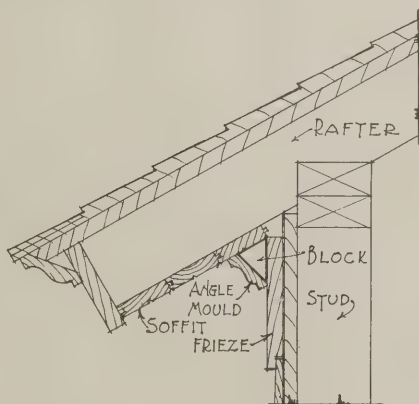
In reply it may be said that theoretically beam "B" should prove the stronger. From a practical standpoint, however, beam "A" would probably be as serviceable, provided that the members were properly bolted and spiked together.

[Editor's Note:—This sort of problem is always interesting—let's have one of yours.]

A Moulding "Kink"

E. B. K. of Montana says: "I have found more help in NATIONAL BUILDER than in any

other paper and have often wondered if I would be able to contribute anything to show my thanks.



"A few days ago while putting a moulding in the angle between the soffit and frieze, I was having trouble in keeping the angle mould in the proper position to meet the raking mould, so I set to work to overcome the difficulty. The accompanying sketch shows how I did it.

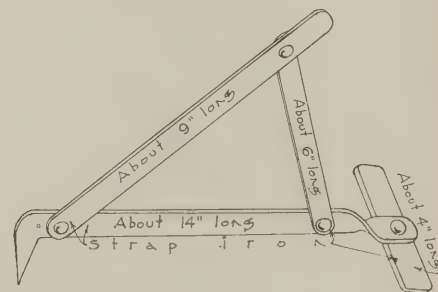
"I cut three-cornered blocks of inch stuff of such size and shape that when placed in position as shown, the angle moulding would fit up snugly against both soffit and frieze, and the upper edge of the moulding would fit the slope of the overhang. The blocks may be set five or six feet apart and still do the work."

[EDITOR'S NOTE—Wouldn't it be fine if every reader would send in his "kink," as E. B. K. has done?]

Roofing Bracket

The accompanying sketch shows a roofing bracket that was my patent, but it is outlawed and is anybody's now.

The brackets are easy to make and use. One can put them on the top edge of rafters or on the roof boards, pile on the roofing and stand on top to work. The sharp point driven into the roofing makes it a secure foothold.



To shingle, leave out a narrow shingle; lay one or two courses, and then drive the point of the bracket in where the shingle is left out. When the bracket is taken out, drive the missing shingle up to within 1/2-inch of its place; put the nails in close to the butts above, then drive the shingle up into place and the nail holes go under cover and there you are—no nail holes in the roof.

For slating, lay a board on the roof and put the brackets on that.—S. F. BLACK, New London, Ohio.

If any reader thinks he has a better method, let him send it along.—Editor.

(Continued from page 13)

In June, 1918, the freight rates on building materials were increased on an average of 50 per cent, while freight rates on other commodities were increased on an average of 25 per cent.

In September, 1918, the War Industries Board inaugurated a system of permits through which construction was brought to a standstill.

It was not until March, 1919, that the Treasury Department released restrictions on credit for new construction.

In March, 1919, the Department of Commerce inaugurated a system for fixing prices which halted construction work.

In April, 1919, the Director General of Railroads refused to purchase cars, rails and coal at the prices approximated by the Department of Commerce and to this action may be traced a part of our present transportation difficulties.

In the winter of 1919 and the spring of 1920, the demand for luxuries and consumable commodities was so great that the price of building materials and labor was raised above the purchasing power of the construction industry.

In the spring of 1920, transportation of building materials became increasingly difficult.

On June 2nd, 1920, priority orders were issued reserving open top cars for the use of coal. These priority orders have succeeded one another until the 20th or 21st was issued on October 8th, canceling permits for the movement of any materials save coal to the northwest. Within two weeks most of these orders were cancelled, and yet the coal shortage persists in certain sections of the country and it is still most difficult to move building materials.

On August 26, 1920, the freight rates on building materials were increased an additional 40%.

During the war, no extensions were made to our railroads and rolling stock was allowed to become depleted and scattered throughout the country.

Since the beginning of the war, the cost of transportation to the building industry has increased about 140 per cent, the cost of fuel some 300 per cent and labor 100 per cent.

Coastwise rates were raised higher than all-rail rates, our railroads are overburdened and our coastwise shipping left idle.

During the past two years, as well as during the war, no effort has been made toward the development of inland waterways and terminals.

Regular and irregular strikes and "vacations" had added to the transportation congestion.

After the Fuel Administration was discontinued on April 1st, 1920, restrictions on the export of coal were released simultaneously with the beginning of the coal year and with the beginning of an abnormal foreign demand.

Priority car service orders without adequate police supervision and without regulation of price or export, have permitted coal speculation of an unprecedented character. It is the opinion of many that the anti-profiteering laws have not been wisely enforced. A meeting of the coal operators was held in Cleveland at the suggestion of the Attorney General on Tuesday, October 26th, with certain limitations and assurances, and resulted in a resolution of the coal operators to co-operate with the Attorney General in the enforcement of fair practices.

Unlike some foreign countries, the United States has no long term banking system to supplement its short term commercial system. During the war, long term securities were forced upon commercial banks and long term deposits were used by commercial banks for short term loans.

During the war, tax-exempt securities increased two and a half times and they now amount to nearly 14 billion dollars. The greater attractiveness of these tax-exempt securities has drawn credit from its former capital investment.

During the war, our taxes were greatly increased and excess profits taxes were placed to check war profiteering and these excess profits taxes were not repealed at the time governmental regulation of prices was discontinued.

Private, as well as governmental, action is necessary to reverse this chain of events. Business must play fair, labor must be efficient and the citizenry must be thrifty, buying only essential commodities and investing in things that have lasting value and earning power.

There is no royal road by the way of governmental subsidy and regulation. Rent regulation will not build houses and governmental subsidy cannot absorb ever increasing costs due to inefficient labor, irregular transportation, and coal and material speculation. The Government is not capable of supporting its citizenry. Police power and subsidy which are necessary in an emergency must be resorted to only under extraordinary circumstances lest part of the people be made dependents. The building industry may be likened to a man who has been jostled into the quicksand by his companions—his companions may pull him out but cannot be expected to support him ever afterward.

We had willing buyers and renters of houses and we have willing sellers of land and raw materials, and we have land and raw materials in abundance; but transportation, fuel and labor are costly and scarce and capital is looking toward more promising investment.

The Government may remove some of the barriers which keep buyers and sellers apart. In fact, this is an obligation upon the Federal, state and municipal governments, each within its own jurisdiction.

As a primary undertaking, the govern-

ment may insure the regular and cheap delivery of raw materials necessary to reduce the cost of the manufacture of building materials, by bringing about continuity in manufacturing processes and reduction in the cost of fuel. Prompt and cheap delivery of the finished product would enable the contractor to bid by assuring him of stable deliveries and stable prices.

Through governmental action, organized co-operation may be brought about between our coastwise shipping, our inland waterways, our terminals and our railroads, so that the people may enjoy the full advantage of their entire transportation plant.

Through legislation, a curb may be placed upon tax-exempt securities or mortgages for the building industry may be made tax-exempt.

Legislation may be passed revising the excess profits tax.

Governmental consideration may be given to a system of long term banking in which long term deposits may be used for long term loans. Such a system need not in any way compete with the Federal Reserve System, but should supplement it. We have the precedent for such systems in successful operation abroad.

The Federal government could establish a bureau as a clearing house of building methods and standards.

Finally the Federal government could enforce anti-profiteering laws against gross offenders, particularly in coal profiteering.

In answer to the question "What can be done about the housing crisis?" I would also reply, "Keep general business healthy." Bad housing is an index to rather than a cause of unsound industrial conditions. If business is bad, people will have little money to buy houses or to pay rentals and we may have willing but no longer able buyers. General prosperity and ample housing go hand in hand.

If we continued to waste our energy through slacking and hoarding and to waste our earnings on playthings, we may bring on hard times while we are trying to profiteer and tax one another.

May we not direct our energy and credit to the development of means of production and distribution and enter upon an era of national expansion even greater than the era which followed the Civil War, when we changed from hand methods to machine methods and from pound production to tonnage production, and when we opened up half a continent and developed the manhood of our citizenry through the Homestead Laws?

If we can direct a larger percentage of our energy and credit to the production of capital commodity and less to the production of consumable commodity, industrial conditions will be sound and housing will be ample, but if we continue to search for open sesame, we may drift into a more serious housing crisis and into an industrial crisis as well.

NATIONAL

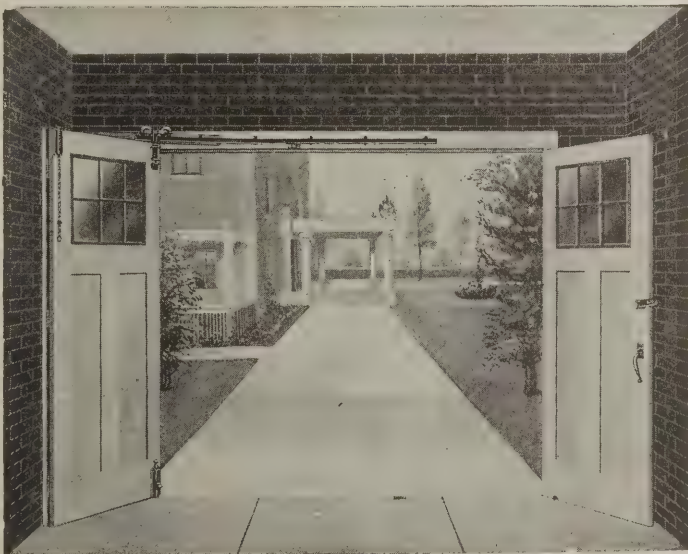
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One feature of the sliding and swinging garage door set that is worthy of serious consideration during the cold weather, is that one of the doors is so hung that it will open without disturbing the other doors, affording free access to the garage.



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(Continued from page 15)

year whereby the Employers' Association bound its members to employ only union men in their work in and around New York. Donnell-Zane, however, refused to submit to this, and on a certain job in New York used non-union labor for which violation Robert P. Brindell, president of the Building Trades Council, ordered a strike also. Donnell-Zane admit the making of the contract and their refusal to abide by its terms, because as they claim, it was *ultra vires* the Employers' Association to bind the Iron League and its members, restricting them in the selection of their workmen to members of organized labor, because it was in contravention of public policy, and therefore unlawful.

The court took up first the question of a sympathetic strike and declared that "It was their (the union workmen's) privilege to use the strike in sympathy with the endeavors of their New York brethren, and to advance the cause of organized labor, provided the motive—that is, the object sought to be attained—was not an unlawful one;" and "the lawfulness of the motive must, then, be sought in the New York situation."

New York Contract Between Employers and Labor Illegal

The Court then proceeded to an analysis of the contract between the employers and the labor unions of New York, and said:

The closed shop feature obviously bears no relation whatever to the other and legitimate purposes of the contract, and it is plain that the primary and ultimate thing organized labor sought was the monopolization of labor in all lines of the building trade within the territory to which the contract applies.

Regarding this aim the Court said:

The principle of the closed shop, *i. e.*, the monopolization of the labor market, has found no judicial sponsor. In whatever form organized labor has asserted it, whether to the injury of employer, or to labor, or to labor unions outside of the fold, the judiciary of the country has responded, uniformly, that it is inimical to the freedom of individual pursuit guaranteed by the fundamental law of the land, and contravenes public policy. On the other hand, public policy favors free competition, and the courts have been keen to recognize the right of organized labor to compete for work and wage and economic and social betterment, to use its weapon—the strike—to realize its lofty aspirations, but none has gone to the length of sanctioning a strike for a closed shop, which has for its object the exclusion from work of workmen who are not members of the organization.

The Court cited many authorities and discussed the leading cases of *Folson v. Lewis*, *Connors v. Connolly*, *Curan v. Galen* and *Berry v. Donovan* in detail and then stated as its conclusion:

The conclusion upon the case as presented is, that the New York contract violates public policy, and that the sympathetic strike is without just cause or excuse, and is unlawful.

The Contractor's Responsibility

It is charged that the contractors themselves are to blame for the situation revealed by the Lockwood Committee, and it is difficult to disprove that charge. Enough has been shown already in the present investigation to demonstrate that the extortionate methods of labor leaders could not have been carried on without the knowledge and at least tacit consent of those contractors' associations already investigated. Many of the members in those associations were not in sympathy with the methods, but found themselves helpless as individu-

National Builder



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- 6 Theatres
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als. They had contributed to the erection of a system that eventually involved them all in the disgrace now inflicted on the entire construction industry. Every contractor is now looked at askance, and it is their problem to re-establish themselves in the public confidence. The investigation will fail of its object if it results merely in sending some labor grafters to jail. The inner ring which sanctioned the blackmail, and themselves profited under the arrangements, must be exposed and punished. There must be a new deal—an end to the use of marked cards stacked against the owner, or contractors cannot hope to regain the good opinion of the public.

Resolutions by the General Contractors

THE action of the Lockwood Committee now investigating the building situation in New York was endorsed at the meeting of the Executive Board of the General Contractors of America in Washington, November 6, by resolutions adopted unanimously.

Plans were laid for securing the cooperation of the United States Chamber of Commerce and other employers' associations in urging the Lockwood Committee to "pursue its investigation without fear or favor to the end that all guilty be exposed and punished, and that justice thereby be done to those who, condemning the purchase of immunity from labor troubles by the corruption of labor officials, desire an honorable settlement of the labor problem based upon fair dealing."

The resolution follows in full:

"Whereas, The Lockwood Legislative Committee has uncovered a corrupt state of affairs in New York City in which a group of owners and contractors has sought to prevent and settle dispute with labor organizations by the payment of tribute or so-called graft to certain labor officials and

"Whereas, The same condition of affairs may exist in other lines of industry and

Whereas, This condition reflects discredit on the whole construction industry and until the matter is entirely sifted and the names of all of the guilty parties disclosed the whole industry, the second largest in the United States, is on trial and stands discredited in the eyes of the public, and

Whereas, Former legislative committees, operating under similar lines, have not always carried their investigations to the ultimate conclusion so that the guilty ones were exposed and punished.

"Therefore, be it resolved,

1. That the Associated General Contractors of America is in entire sympathy and accord with the investigations of the Lockwood Committee.

"2. That the Associated General Contractors of America invites The Chamber of Commerce of the United States, other organizations and employers generally throughout the country to join with it in asking the Lockwood Committee to pursue its investigations without fear or favor to the end that all guilty be exposed and punished and that justice thereby be done to those who condemning the principle of the settlement of, or purchase of immunity from, labor troubles by the corruption of labor officials desire an honorable settlement of the labor problem based upon fair dealing.

"3. That a copy of these resolutions be sent to the Lockwood Committee, be given publicity through the Press, be spread upon the minutes and sent to members of the association."

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National Builder

For the Contractor. For the Architect. For the Builder.

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VOL. 63 • NUMBER 12

With the Season's Greetings to our Subscribers and Advertisers we have pleasure in announcing that the services the National Builder has rendered the Building Industries during the past year will be still further enlarged in 1921. The January issue will be a Special Number ~ in size, attractiveness and practical worth ~ an indication of the valuably informative numbers that will follow to aid in the vast building program now before the Nation.





Walter Concretile Roofs Are Fireproof

Report from State Fire Marshal's office of Indiana on fire loss for the year 1919 says:

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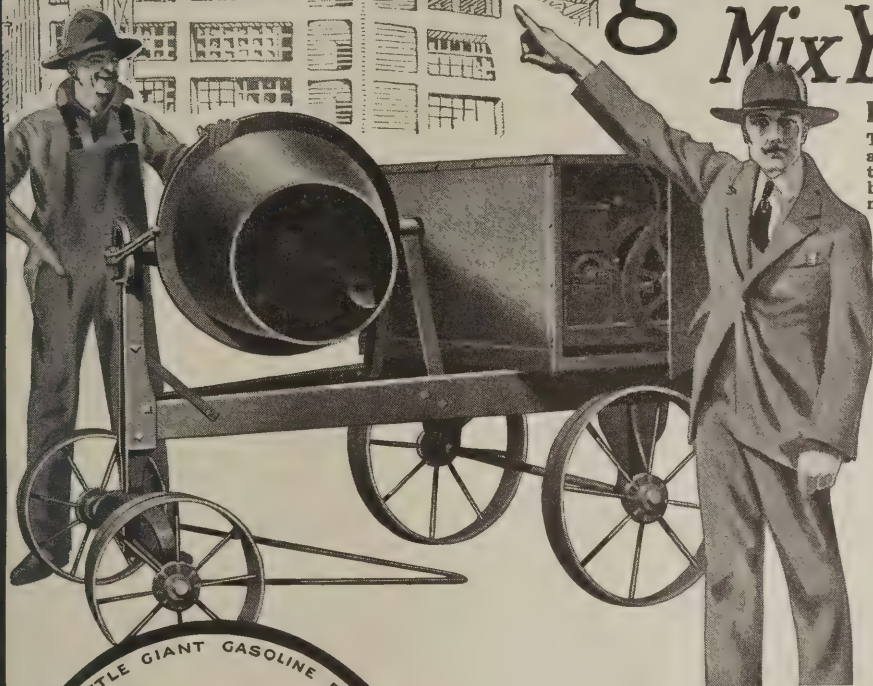
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Does it faster—better—cheaper

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With this wonderful machine and two men you can do as much work as you formerly did with six men. And you can do it easier, quicker and better, producing an absolutely uniform batch every time. It will mix $4\frac{1}{2}$ to $5\frac{1}{2}$ cubic feet per batch—can be speeded up to a batch every minute—over 2,000 cubic feet per day. It is the most practical and efficient mixer made—scientifically constructed of the best materials—light in weight, portable, simple and durable. Backed by the Aloe iron-clad guarantee to give the utmost service and satisfaction.

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FREE
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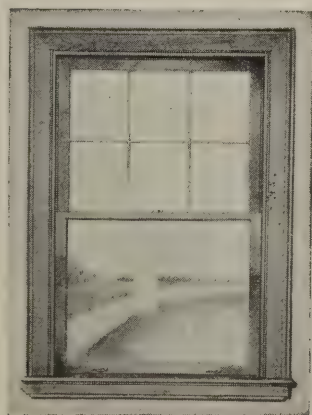
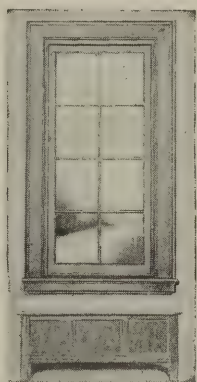
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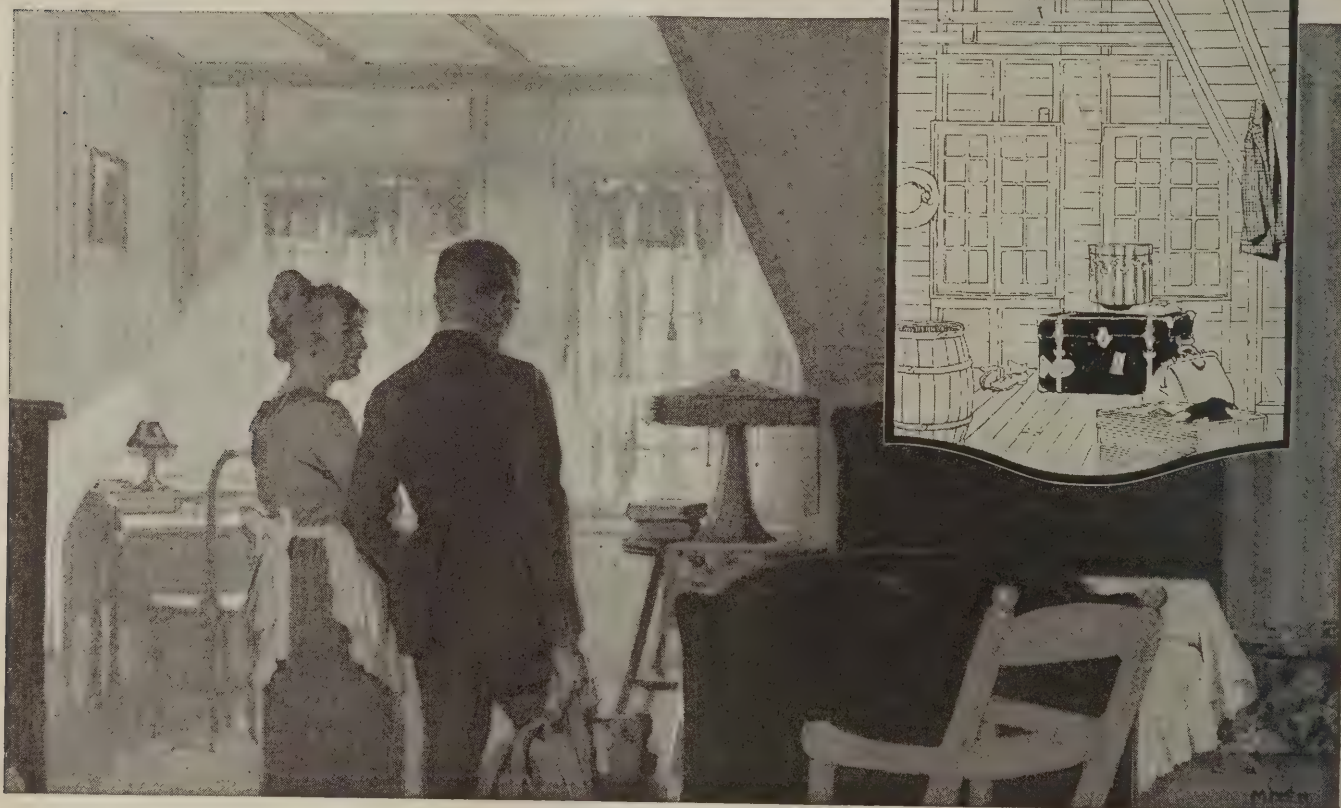
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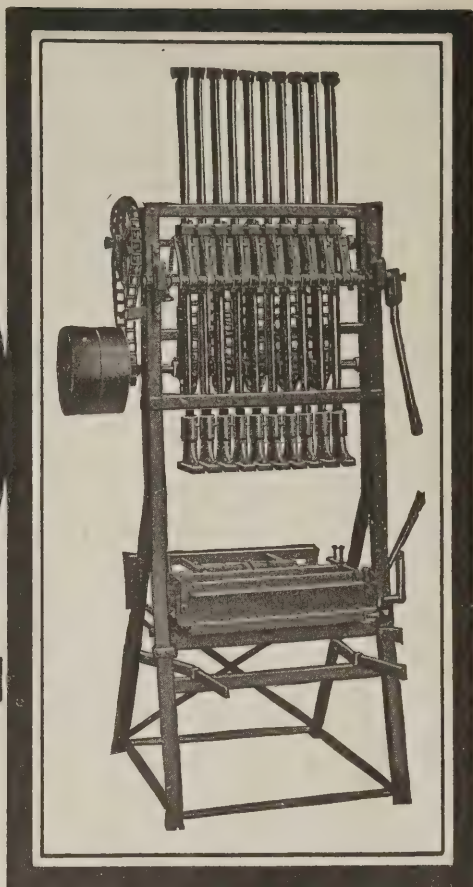
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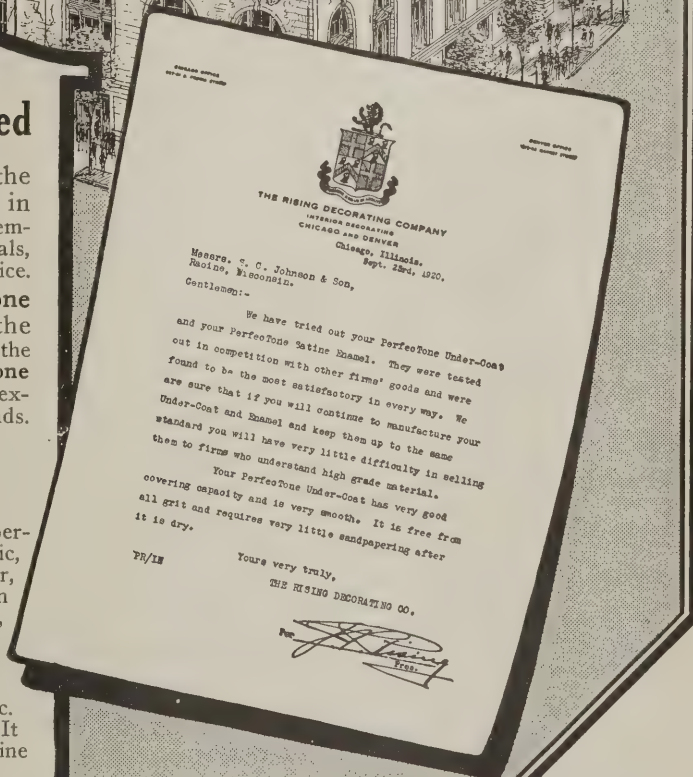
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Announcements and Publications

New York Highway Transportation Show—An exhibition of motor trucks will be held January 3 to 8 inclusive under the auspices of the Motor Truck Association of America, Inc., at the 12th Regiment Armory, New York City, to further demonstrate by discussion and display the necessity for a national highway system to support the general and economic use of the motor truck.

Reduction in Prices by the Flintkote Company—Substantial price reductions ranging from 25 to 31 per cent, effective November 16, are announced by the Flintkote Company, Inc., of Boston, manufacturers of asphalt shingles and prepared roofing, operating four plants and affiliated with several other plants. The reduction plan is to reach a price level from which further movement should be upward.

A. C. Horn Co. Opens Western Sales Office—This company, manufacturers of waterproofing compounds and technical paints, Long Island City, N. Y., announce the opening of a western sales office, room 1104 Chamber of Commerce Building, Chicago, with Howard L. Fisher as sales manager.

"Southern Pine"—What it is and What it is Used For is the title of a new pamphlet issued by the Southern Pine Association, New Orleans, La., which as its name implies give a general knowledge of the product and its uses.

"General Fireproofing" for October, the organ of the General Fireproofing Co., Youngstown, Ohio, presents, as usual, valuable and interesting construction features and citation of instances of how costs have been cut and construction improved by the use of the company's products.

Clinton Mortar Colors is the title of a handsomely printed booklet issued by the Clinton Metallic Paint Co., of Clinton, N. Y., in which the methods of using metallic colors and proportions are given with a color card made with the actual pigments.

Frame Construction Details have been issued in book form by the Architectural and Building Code Service of the National Lumber Manufacturers Association, 750 McCormick Building, Chicago. The plates are 8½ by 11 size, convenient for filing and handy reference. Copies may be obtained at a cost of \$1.00 each at the above address. Of the value of this contribution to better building the service department says: "Frame construction, unlike the various other types of construction used in the erection of smaller buildings, has grown from the various miscellaneous types which were developed by necessity in the days of our forefathers to the three distinct types, 'balloon frame,' 'braced frame' and

'Western frame,' each of which predominates in certain sections of the country. These plates supply a great demand—a great need which has long existed, as they fully show the proper use of lumber in the three types. The valuable principles of economy and safety in construction of frame buildings are illustrated. Specific methods of fire stopping recommended as necessary to prevent the rapid spread of fire in buildings are also illustrated. These principles and standards of construction when applied in practice will serve not only to reduce the wrong use of lumber, but encourage its proper use. This volume is invaluable to architects, engineers, draftsmen, and students of architecture, as it shows in large scale details the relationship of the various structural members and their function. It is also of great value to contractors, carpenters and builders and the principles shown should decide many questions which are raised as to the proper method of framing a building. Lumber merchants in developing the market in their respective localities can make valuable use of this volume as it shows correct and economic types of frame construction. A man with slight experience should be able to take this book and list the framing lumber for a building, as the relationship of one structural member to another is clearly shown. It is a volume which should be in the hands of every one who is interested in the erection of frame buildings, as well as in the hands of every one who contemplates entering into the field of construction."

Hewitt & Brown, architects and engineers, announce removal of their new building, 1200 Second avenue South, Minneapolis, Minn.

Hart Modern Farm Elevators is a folder catalogue illustrating and describing the various forms of grain-handling machinery and appurtenances manufactured by the Hart Grain Weigher Co., Peoria, Ill.

A Canadian Plant—Why? is the title of a booklet issued by the Union Bank of Canada, 49 Wall street, New York, giving a survey of the opportunities Canada offers the American manufacturer.

Telescopic Hoists for industrial plants are illustrated and described in a new booklet just issued by Gillis & Geoghegan, manufacturers, 537-539 West Broadway, New York.

Better Built Homes, volumes 6, 7 and 8, issued by the Curtis Service Bureau, Clinton, Iowa, are contributions to the building arts that it would be difficult to commend too highly as an influence in educating to better taste, the consideration of household convenience, and common sense in build-

ing. In contents, style of presentation and fine typographic taste the works are entirely praiseworthy.

The Chain Belt Company, Milwaukee, Wis., announce that L. C. Wilson, for the past two years general sales manager for the company, has been elected secretary of the Federal Malleable Company, West Allis, Wis., and will be succeeded as sales manager of the Chain Belt Company by Clifford F. Messenger.

Worm-Drive Available Trucks, manufactured by the Available Truck Company, North and Kilpatrick Avenues, Chicago, Ill., are showing remarkable efficiency in overcoming transportation problems, according to specific instances recorded by the company's safety, research and transport bureau.

Prudential Steel Buildings is the title of a handsome catalogue describing the steel buildings manufactured by the Blaw-Knox Company, Pittsburgh, Pa. The work is freely illustrated and standard specifications are given.

Blue Print Reading, or Interpreting Working Drawings, by E. M. Wyatt, Supervisor of Manual Training, Houston, Texas. 86 pages, 6x9 inches. Price \$1.00. By mail, \$1.10. The Bruce Publishing Co., Milwaukee, Wis. This is a complete manual and has been developed as the result of the author's experience in teaching classes of carpenters, masons, electricians, machinists, etc., the fundamentals of interpreting working drawings. The book is provided with 29 full page drawings, treating mechanical objects, sections of machinery and architectural conventions. Each chapter is provided with a series of questions and problems to be answered by the student.

Bangor Cast Stone Products Company, First National Bank Building, Bangor, Maine, issue a loose leaf portfolio illustrating the various building units of every description in marble, limestone, and granite faced cast stone manufactured by their processes, with descriptions of the methods employed and tests applied,

The American Truck Body Company, Inc., Martinsville, Va., exhibit in an illustrated folder the details of the Fontaine equipment by which brick or similar material is delivered in a stack on pallets, under the operation of one man.

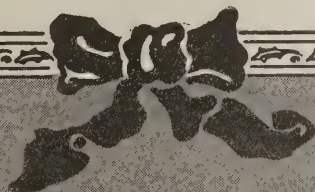
The Portland Cement Association announce the opening of a Canadian office in the Birks Building, 718 Granville street, Vancouver, B. C., in charge of A. E. Foreman as district engineer, formerly of the firm of Dutcher & Foreman, consulting engineers, of Vancouver.



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The sincere wish of this organization is that during the year 1921 our customers will enjoy the same pleasant business relationship with us as we have had with them the passing year.

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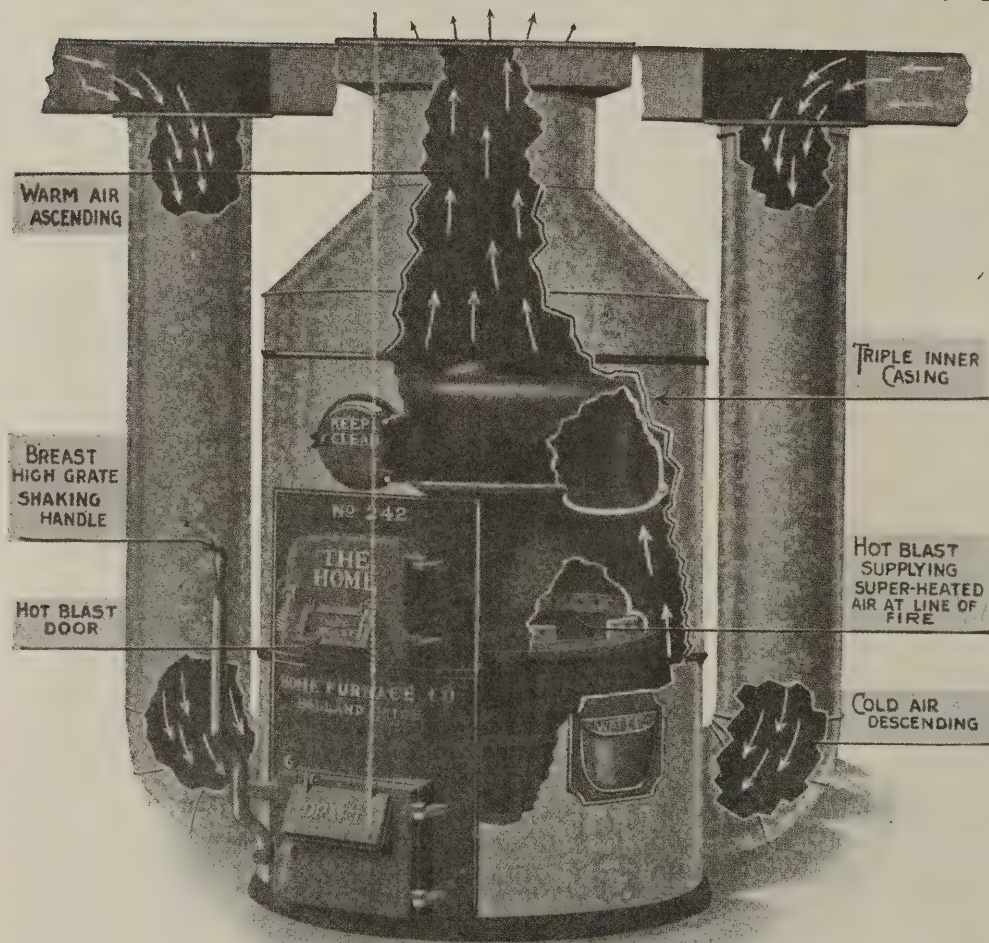
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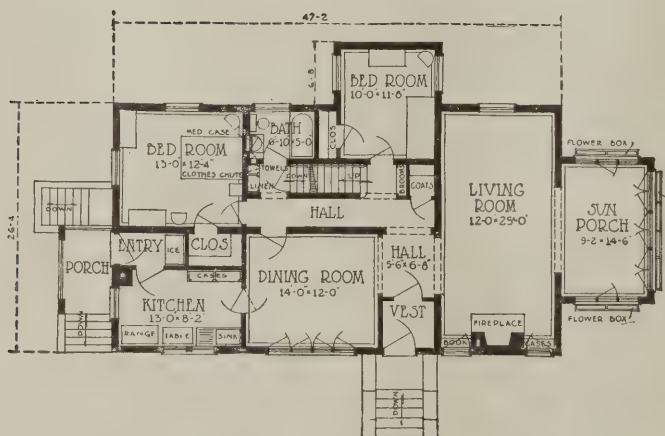
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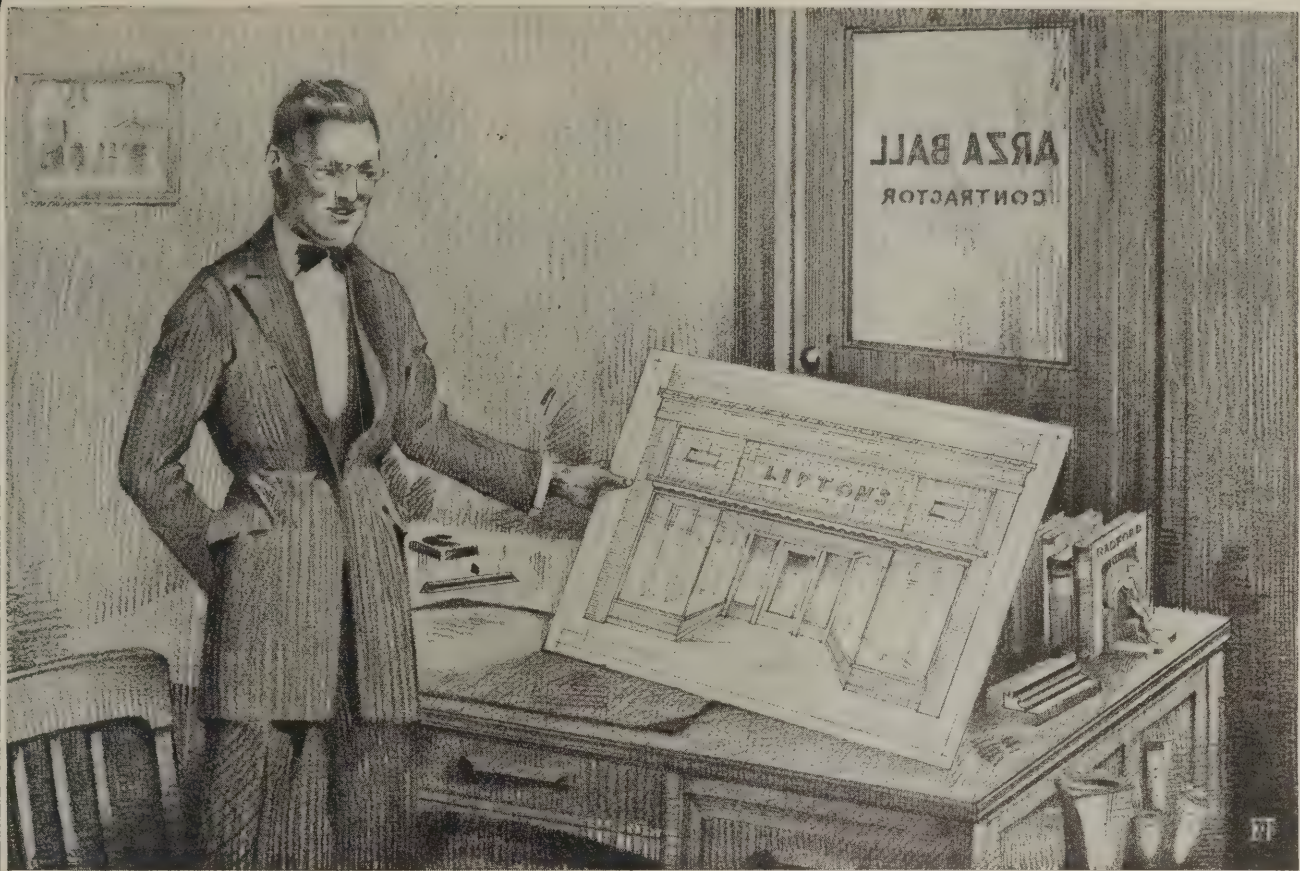
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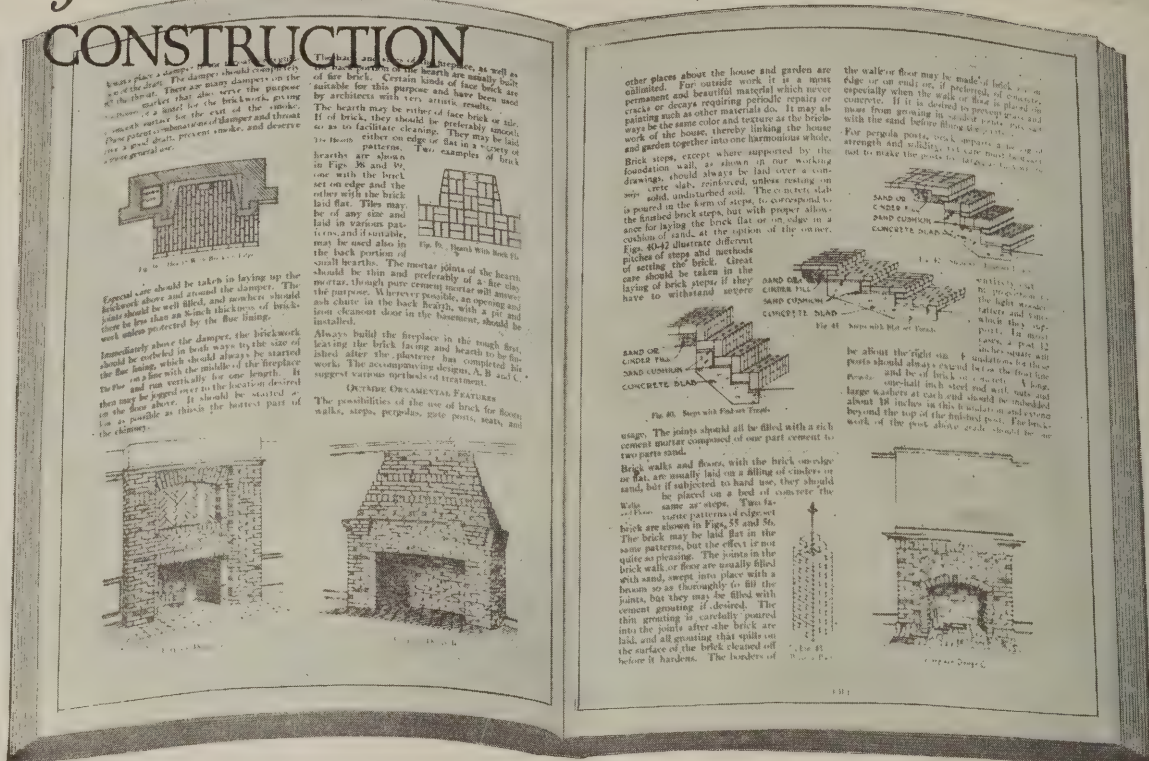
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Why not tie up your roofing business with our publicity and our policy, and thus handle the roofing that makes your customers come back for more? You'll get more repeat orders on a "service rendered" basis than any other way. And furthermore, you are protected in the sale of Johns-Manville Asbestos Roofings in a manner that makes a big difference in your profits.

Write to the nearest Johns-Manville Branch for the details of our trade policy.

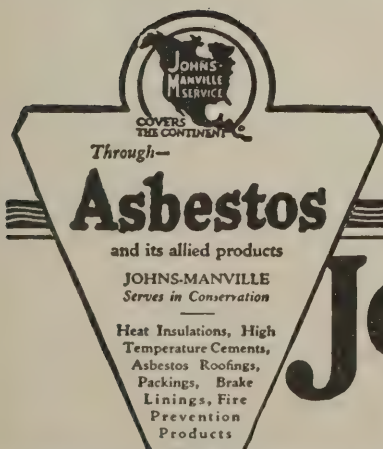
If you sell roofing you can do better if it's Johns-Manville Asbestos Roofing.

JOHNS-MANVILLE
Inc.

Madison Ave. at 41st St., New York City

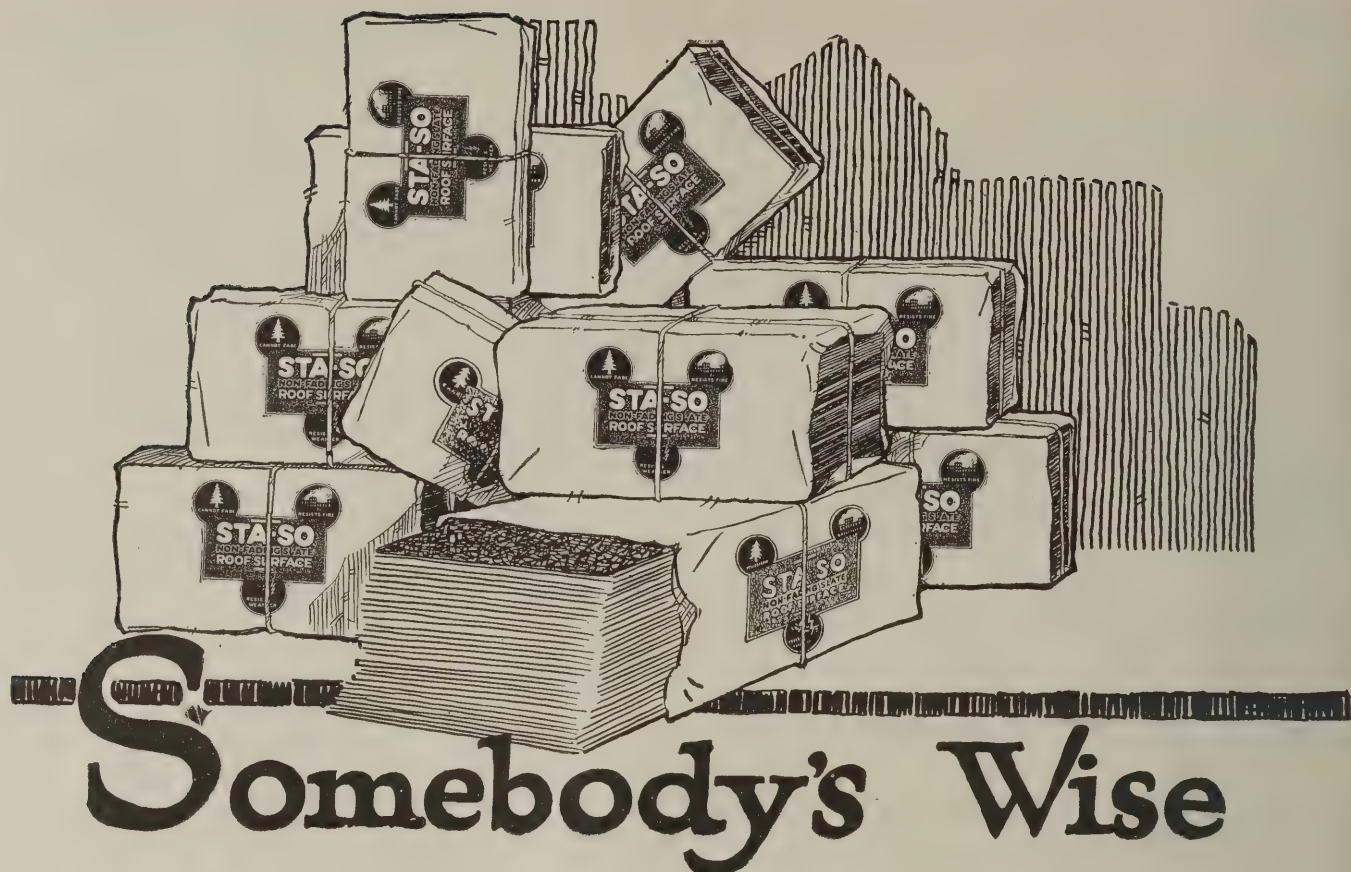
10 Factories—Branches in 64 Large Cities

For Canada: Canadian Johns-Manville Co., Ltd., Toronto



JOHNS-MANVILLE ASBESTOS ROOFING

When writing advertisers please mention National Builder



AND that's the dealer who is getting this shipment of slate-surfaced shingles. For notice—each bundle bears the Sta-so label.

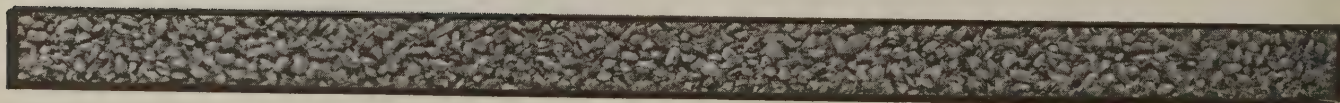
This dealer is protected—his customers are protected—the Sta-so label protects both of them from slates that fade or imitation slates that trade on the reputation of genuine, non-fading Sta-so laminated slate.

The Sta-so label guarantees to dealer and consumer the unique granular texture of genuine Sta-so; guarantees the genuine rich color tones of deep Indian red or cool sage green—colors that defy even the sun to fade them.

If you're a wise builder or contractor, you will protect your customers and yourself, by insisting that the Sta-so label appear on bundles and rolls of slate-surfaced roofing which you buy from the manufacturers listed at the left.

Amalgamated Roofing Co. Chicago, Ill.
 Barber Asphalt Paving Co. Phila., Pa.
 Barrett Co. New York, N. Y.
 Beckman-Dawson Rfg. Co. Chicago, Ill.
 Bird & Son, Ltd. Hamilton, Ont., Can.
 Bird & Son, Inc. East Walpole, Mass.
 Philip Carey Mfg. Co. Cincinnati, Ohio
 Flintkote Co. Boston, Mass.
 Ford Rfg. Products Co. St. Louis, Mo.
 The Heppes Rfg. Division
 The Richardson Co. Chicago, Ill.
 Keystone Roofing Mfg. Co. York, Pa.
 McHenry Millhouse Mfg. Co. South Bend, Ind.
 National Asbestos Mfg. Co. Jersey City, N. J.
 National Rfg. Co. Tonawanda, N. Y.
 B. F. Nelson Mfg. Co. Minneapolis, Minn.
 Pioneer Paper Co. Los Angeles, Cal.
 Reynolds Shingle Co. Grand Rapids, Mich.
 Richardson Co. Cincinnati, Ohio
 Safepack Mills Boston, Mass.
 Si Fo Products Co. St. Paul, Minn.
 Standard Paint Co. New York, N. Y.
 Usona Mfg. Co. Aurora, Ill.
 H. F. Watson Co. Erie, Pa.
 A. H. White Rfg. Co. New Orleans, La.
 Wilberite Rfg. Co. Cleveland, Ohio

Below: Photographic reproduction showing texture of roofing surfaced with Sta-so laminated slate



90,000 Square Feet of Floor Space

Treated with

GF No. 145 Crystalrox



A concrete hardener that insures your floors against crumbling and dusting.

Sperry Flour Company treated the floors of their new building with Crystalrox in March, 1918. It has proven successful.

1 GF No. 145 prevents all concrete surfaces from dusting and crumbling.

2 GF No. 145 is a concrete floor insurance. It insures a perfect floor for years.

3 GF No. 145 can be applied after a day's work is done and the floor is ready for use the following morning.

4 GF No. 145 is a perfect hardener. Satisfied customers are the best proof. Read the letter of one of the many satisfied users.



GENERAL OFFICES
SAN FRANCISCO

CABLE ADDRESS "SPERRY"
AB CODES 4th and 5th EDITION
LITERS STANDARD CODE
1920 CODE

PLANT MORE WHEAT

SPERRY FLOUR CO.

Spokane, Washington,
October 26th, 1920.

D. E. Fryer & Company,
Paulsen Bldg.,
Spokane, Washington.

Gentlemen: Attention: Mr. Hoffman.

In response to your request for information as to the service that the floor hardener which was used in this building was giving us, will reply as follows.

The writer, while not actually here during the building operation, is thoroly familiar with the fact that Crystalrox as manufactured by the General Fireproofing Company and sold through your concern was applied over some 90,000 sq. ft. of floor area in this building. This material was applied in March, 1918, and the floors have given excellent service since that time and upon inspection on this date, over two and one-half years later, find that they are in perfect condition in spite of the heavy trucking over certain areas.

Consequently we do not hesitate to recommend Crystalrox as an excellent floor hardener.

Yours very truly,

SPERRY FLOUR COMPANY.

By J. K. Smith

MILLS
TACOMA, WASH.
CRESTON, WASH.
BOZEMAN, CAL.
VALLEJO, CAL.
CHICO, CAL.
MARTINEZ, CAL.
PACIFIC, CAL.
SALINAS, CAL.
PASO ROBLES, CAL.
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THE GENERAL FIREPROOFING COMPANY

YOUNGSTOWN, OHIO

BUFFALO
OMAHA

CHICAGO
ATLANTA

NEW YORK
MINNEAPOLIS

BOSTON
SAN FRANCISCO

MILWAUKEE
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KANSAS CITY
BALTIMORE

*Douglas Fir
Northern White Pine
Idaho White Pine
Western Soft Pine*



*Western Hemlock
Washington Red Cedar
Red Fir and Larch
Norway Pine*

HOW THIS TRADE-MARK FIXES RESPONSIBILITY FOR YOUR LUMBER PURCHASE

WOOD is one of the oldest and most universal materials of civilization.

Yet people know less about it than about almost any other thing they buy and use.

Even the buyer of a great industrial concern, with all his special knowledge—the man who selects a motor truck or a dynamo with perfect confidence—is likely to order lumber without full consideration of the service he expects of it.



Some of the best commercial woods are little known in some sections of the country where higher prices are paid for inferior species. Industries specify a kind of wood through habit, or the practice of the trade, without knowing that a better kind is available.

Think what it would mean to the great industrial plants of the Middle West and the Eastern Seaboard to know the qualities of Douglas Fir—to be able to buy this wonderful structural timber, and to be sure of uniform quality by the trade-mark of a responsible producer.

As substantial factors in the lumber business, the Weyerhaeuser people want you to think more about the wood you use.

To this end we will supply to lumber dealers and to the public any desired information as to the qualities of different species and the best wood for a given purpose.

This service will be as broad and impartial as we know how to make it. We are not partisans of any particular species of wood. We advise the best lumber for the purpose, whether it is a kind we handle or not.

What we advocate is conservation and economy through the use of the right wood in its proper place.

Think how this service on lumber would benefit the farmer in his building and repairs—the home-builder in his investment in a house.



From now on the Weyerhaeuser Forest Products trade-mark will be plainly stamped on their product. You can see it for yourself at the lumber yard or on the job after it is delivered.

When you buy lumber for any purpose, no matter how much or how little, you can look at the mark and know that you are getting a standard article of known merit.

WEYERHAEUSER FOREST PRODUCTS SAINT PAUL • MINNESOTA

Producers of Douglas Fir, Western Hemlock, Washington Red Cedar and Cedar Shingles on the Pacific Coast; Idaho White Pine, Western Soft Pine, Red Fir and Larch in the Inland Empire; Northern White Pine and Norway Pine in the Lake States.



A good investment

PURCHASING an Austin Self-feeding Loader is a good investment, because

- it loads at 80% less than the cost of hand loading.
- it handles loose materials of every kind.
- it soon pays for itself by eliminating one truck. Three trucks with the Austin Loader will do the work of four trucks without it.

Ask for Catalog No W. L. 14

AUSTIN MACHINERY CORPORATION

(F. C. Austin Consolidation)

Chicago Office: Railway Exchange Building New York Office: 30 Church Street
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SHEETROCK

"The Fireproof Wallboard"

How Contractors Can Add to Their Earnings This Winter

Thousands of owners of private and public garages will want their garages lined with warm, fireproof walls and ceilings this winter. And contractors have found that they need only show these garage owners SHEETROCK to get instructions to go ahead with the work.

For Sheetrock, made from permanent rock, is fireproof and stoutly resists the winter's cold. It is thick, strong and rigid. It is durable—positively cannot warp, shrink or buckle.

With all its durable qualities, Sheetrock can be put up for less cost than ordinary wallboards. It can be sawed and nailed like wood. It needs no headers except baseboard headers. Tight jointed with the U. S. G. Patented Nailing Edge, it requires no batten strips; and being attractively finished, the cost of decorating can be saved. Freezing weather does not delay construction.

The economy and rock-permanency of Sheetrock is not confined to garages. In the building or remodeling of homes, stores, offices and factories, you will find Sheetrock equally satisfactory, and equally profitable.

Send for miniature sample of Sheetrock, also for detailed Direction Sheet prepared especially for contractors. Show the sample to building owners and they will be almost as quick to see Sheetrock advantages as you are, *and they will order Sheetrock work.*

UNITED STATES GYPSUM COMPANY

World's Largest Producers of Gypsum Products

GENERAL OFFICES:
Dept. D, 205 W. Monroe St., Chicago, Ill.

SALES OFFICES:
New York, Buffalo, Boston, Washington, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Detroit, Milwaukee, Minneapolis, St. Louis, Kansas City, Omaha, Denver, Los Angeles.

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Alabaster, Mich., Amboy, Cal., Arden, Nev., Blue Rapids, Kas., Cleveland, Ohio, Detroit, Mich., Denver, Colo., Eldorado, Okla., Fort Dodge, Iowa, Genoa, Ohio, Grand Rapids, Mich., Gypsum, Ohio, Loveland, Colo., Milwaukee, Wis., Oakfield, N. Y., Piedmont, S. D., Southard, Okla., Plasterco, Va.

Sheetrock comes in standard sizes, $\frac{3}{8}$ in. thick, 32 or 48 in. wide and 6 to 10 ft. long



An Interior Lath of Unusual Merits

Sykes Sure-Key Lath of Expanded Metal is a new product from an old company. You need a sample to realize its superiority. Send for one.

SYKES SURE-KEY is a flat-lying expanded metal lath of unusual weight and remarkable rigidity.

The strand is unusually wide and dips in both directions, making it impossible to apply it wrong.

SYKES SURE-KEY LATH EXPANDED METAL

takes a surer grip on the plaster than other flat laths. It insures a satisfactory job on all inside work, no matter how difficult the problem.

Sure-Key is the ideal lath for ceilings, corners, tile-setting and other difficult places.



**SYKES METAL LATH
& ROOFING CO.**

502 Walnut St.
Niles, Ohio

*And for the
Shuttered
Window*



IN period homes as well as in modern dwellings, builders are now using Andersen standard white pine window frames to secure artistic and pleasing effects.

121 Sizes of Standard Frames

Andersen frames are made in eleven standard sizes with sides and ends interchangeable. Each frame is assembled at the factory into only seven parts, which are put up in two compact bundles. By simply interchanging the "side" or "head and sill", 121 different sizes of two-light window frames can be made.

Every Andersen frame is complete with screwed in pockets and cast iron pulleys. Ten minutes' work with a hammer makes them ready to set in place.

Send For This Book

Get our illustrated book for builders showing how Andersen frames enable you to speed up building work and please your customers. We'll gladly send you a copy upon request.

Andersen Lumber Company

Frame Manufacturers

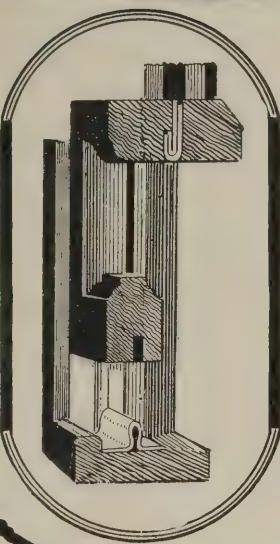
Dept. CD-12

South Stillwater, Minn.



Andersen
FRAMES

Allmetal



Big Money in Weatherstrip for the Builder

Winter is upon us—so don't wait another minute. **Investigate** the Allmetal agency proposition.

Remember, first, that sales are easy. Allmetal Weatherstrip saves a third in coal, keeps out drafts and dirt, and makes windows slide easily.

Here is an answer to the winter question of keeping busy every day. There's real money in it, too—last winter a number of Allmetal Agents made five thousand dollars. You can make this much, and more, right in your own town.

Sit down and write for details

Allmetal Weatherstrip Co.
128 W. Kinzie St., Chicago, Ill.

Brasco





CHANGE-O!



You Can Do This Trick Yourself!

The results of the typical Brasco transformation illustrated above are described in detail on page 35 of this issue. Every town is alive with similar prospects, waiting for the right man to develop them into mutually profitable remodelings.

Let Us Tell You More About Brasco Copper Storefronts and Our Plan

All you need do is locate the prospect. We will help you sell the job. The coupon attached will start the ball rolling.

BRASCO MANUFACTURING CO.
5035 S. Wabash Ave. Chicago

start by mailing this

BRASCO MFG. CO.,
5035 S. Wabash Ave., Chicago.

Gentlemen: Please send me catalogs and details of your special offer.

Name.....

City.....

State.....

NB 12-20

When writing advertisers please mention National Builder

"We'll Make it Warm for You"



JUST send for the Sager Metal Weatherstrip man and have your doors and windows fixed right—then you will be warm and comfortable too, all through the winter.

Weatherstripping today is a science, and thanks to the genius of our mechanics, plus our forty years' experience in manufacturing equipment for doors and windows, we can tell you more about this science than others in the business.

We know the Sager Metal Weatherstrip is the most scientific device ever placed on the market for its purpose. It not only keeps out the cold, but keeps out dust and soot, deadens street noises, stops the rattling of windows and saves one-third on your fuel bill.

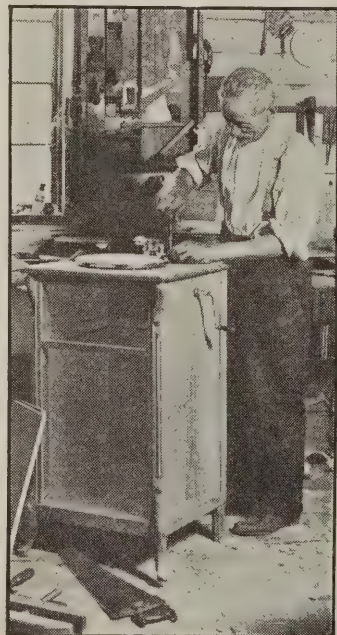
Builders and Contractors can add appreciably to their business if they will sell and install the Sager Metal Weatherstrip.

It is good and it sells easily because it's good.

Do it now while people are thinking of the winter days coming on.

Sager Lock Company

North Chicago, Ill.



Isn't This Convincing?

430 Charlton Ave.
Hamilton, Ont., Canada
Choraleon Phonograph Co.,
Elkhart, Ind.

Dear Sirs:—Please send me one of your circulars entitled, "How to Build Your Own Phonograph," as I would like to make one. Mr. Gallie, 339 Wentworth street, has built one and installed one of your motors and tone-arms, and if he hadn't told me that he had made it himself I would have taken it for a \$150.00 model.

Yours very truly,
F. C. STRONG.

Make Money Building Choraleon Phonographs \$50 to \$175 on each one

You can do it easily and have a lot of fun, too. Build one for yourself and then for your neighbors and friends. Here's Charles Leaderer of Goshen, Indiana, at the left working merrily away. Down in the lower right hand corner Mr. Chris. Kusenstrintz is trying out his latest model. In the other corner Mr. F. L. Claire of Lewiston, Me., is standing beside a beautiful Choraleon he made, with special inlaid work. Mr. Lawrence Hansen of Gibson City, Ill., in the center has just finished a beauty. Read what some of our customers have to say elsewhere on this page.

We furnish plans, blue prints, motors, tone arms, case material—everything required, and full instructions. Of course, being a



carpenter or cabinet builder, it will be the easiest thing in the world for you to build these phonographs.

CHORALEON PHONOGRAPHS are unsurpassed in tone. They play any record. You can't tell

them from the highest priced phonographs. Everything guaranteed.

We have been running small ads in various publications for three years. Maybe you missed them because they were small. But many others have seen them and many are now building phonographs and making money. If you want to while away some pleasant hours and make some big money, write today for free particulars.



36 Mescott St., Jamestown, N. Y.
Choraleon Phonograph Co.,
Elkhart, Ind.

Gentlemen:—I have my Choraleon all finished now and I am well pleased with it. Every one who has heard it says it sounds just as good as a \$200.00 one. I wouldn't sell mine for that.

Yours truly,
EDWIN JOHNSON.

Choraleon Phonograph Co.
1220 8th St.
Elkhart, Indiana



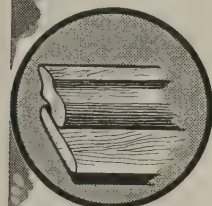
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Generous Winter Profits for Carpenters

A steady, liberal income is made by carpenters all winter—and extra cash during spare time—by applying Henry Airtight Weather Strips.

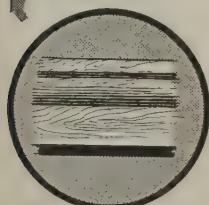
Henry Airtight Weather Strip is bought direct from us at the factory and cut to fit the job. The resulting profit is very generous.



Showing End View of Weather Strips

Coal Scarcity Makes Orders Easy

Demand for wind and cold-proof weather strips, that are a real protection, will break all records this year. Homes and office buildings with a shortage of high priced fuel will realize—as never before—the economy and need of weather strips. With the Henry Airtight Weather Strip you can get plenty of orders because it forms a positive and absolute airtight joint when applied to windows and doors. This can be quickly demonstrated by the sample we will send you.



Flexible Metallic Rubber Strip

Send for Complete Details and Sample

We will quickly convince you of the superior values of Henry Airtight Weather Strips by sending samples and explanatory printed matter. Now extensively used by carpenters. Proved weather-proof thru years of use. Write us.

The Henry Airtight Weather Strip Company
CRAWFORDSVILLE, INDIANA



Metal Lug attached to Door Jamb



Old John says:—

"If you want a door to hang right—be sure it hangs 'square,' not 'almost,' but exactly square. It's bound to hang right then. That's why I use Starrett Tools. They're always accurate. And besides, I like the feel of them. You just simply can't do a botch job with 'em. They won't let you.

"They're mighty handy tools, too, seem to fit every possible need. Believe me—you can't beat 'em."

And that's no exaggeration. Ask any good carpenter. Send for catalog No. 22 "M" and pick out the tools that fit your needs.

The L. S. Starrett Co.

The World's Greatest Toolmakers. Manufacturers of Hack Saws Unexcelled

ATHOL, MASSACHUSETTS

Use Starrett Tools





DISSTON

Good tools—Disston Tools for every job. Tools of Disston-made Steel hardened and tempered for the particular use of the individual tool.

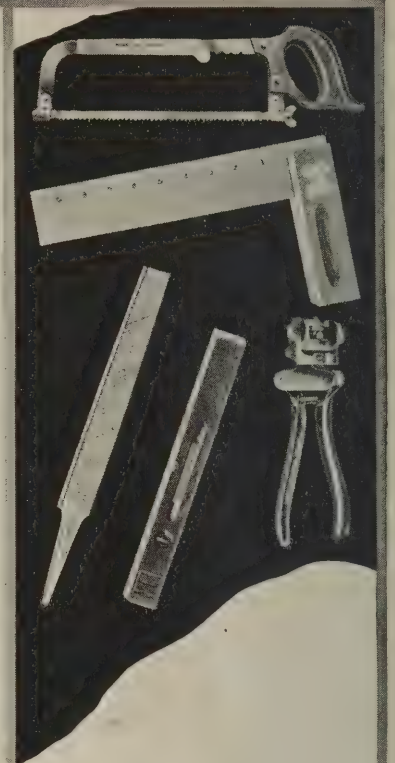
Tools that do all the work they should instead of demanding unnecessary effort to offset their shortcomings.

Tools made by the same expert workmen from the same flawless material as the Disston Hand Saw—the saw most carpenters use.

Sold by Good Dealers
Everywhere

Henry Disston & Sons, Inc.

General Offices: Philadelphia, U. S. A.



Speedy-Economical Form Work

There's a rare and worth-while combination—**speed and economy.**

Rush jobs often mean greater expense—more labor and a lower average efficiency.

But when you have a Parks' Machine on the job it's another story—fewer men, lower labor-cost, more work, greater speed, and higher efficiency per man.

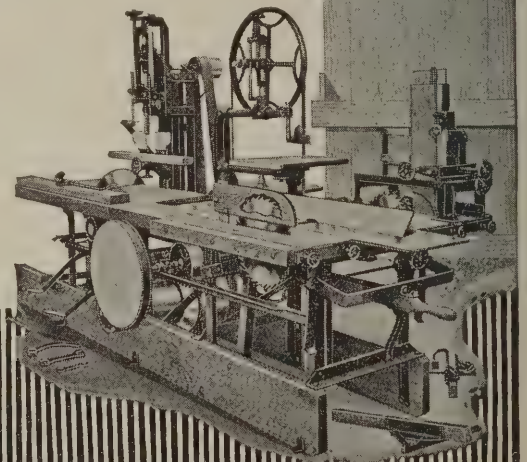
For fast form work on concrete construction the Parks Planing Mill Special is a whirlwind!

Another thing users of Parks Machines like about this equipment is **the price.** The work the Planing Mill Special does—the time it saves—the labor-cost it eliminates—the speed with which it produces—and the price for which it sells—combine to make it the most profitable equipment any contractor and builder can install.

THE PARKS BALL BEARING MACHINE CO.
KNOWLTON AND LANGLAND STREETS, CINCINNATI, OHIO

Chicago Offices and Show Room, 615 Machinery Hall.
Canadian Factory, 200-210 Notre Dame East, Montreal.
Western Office and Warehouse, 1113 Farnam St., Omaha, Nebraska.

Parks Planing Mill Special (illus.) Eight machines in one. Puts through forms ready-as-to-size faster than 4 men can assemble and construct them. One-man operation. Does every kind of special work besides. Circular rip and cross-cut saw, also band saw, swing cut-off saw, jointer, tenoner, upright hollow chisel mortiser, spindle shaper, and sander, all in one. Write at once for our catalog on these machines.



PARKS

Woodworking Machinery

"YANKEE" TOOLS

Save Time at Every Turn

PUSH DRILL No. 44

Here you have a rapid fire drill with adjustable tension, for hard or soft woods and the 8 different size Drill Points furnished with it.

A turn of the cap does the trick that saves you time, labor and Drill Points. This drill is about as valuable to the average mechanic as any "Yankee" Tool we make. Built for hard service.

Your Dealer Can Supply You



Let us send you our interesting "Yankee Tool Book" showing complete line. A postal brings it.

NORTH BROS. MFG. CO.
Dept. N, Philadelphia, Pa.

\$5⁰⁰
BRINGS IT
TO YOU

DO YOUR OWN LEVELING WITH YOUR OWN LEVEL

Sold On Easy Monthly Payments

Now you have the opportunity to own a strictly high-grade, accurate Convertible Level on Aloe's Easy Rental Purchase Plan—and without previous experience, or technical knowledge, you can put it to work so that it will make big money for you. Only \$5.00 brings it to you—then put it to every possible test. If you are pleased with it, pay the small monthly installments and the level is yours.

Aloe Convertible Level

It is a combination transit and level, quickly converted to the use of either. It is absolutely accurate—satisfies the requirements of the most exacting contractors—yet is so simple that anyone, without technical education can use it. Sights above and below the horizontal can be taken. You can use it for leveling up foundations, walls, pliers, running boundary lines, fences—in fact, a thousand and one jobs you meet every day that require an accurate level.

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No technical knowledge necessary. No previous experience is needed. With our simple and complete instruction book included free with every level, you can immediately put the instrument to work. It starts to pay for itself immediately and continues to be a permanent money-making investment.

Write For Free Book

It tells you how to increase your income, how to get the profitable jobs and become a bigger man in your community. Don't doubt or delay—write for this book at once.

A. S. ALOE CO.

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St. Louis, Mo. U.S.A.

**BE A
BIGGER
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A. S. ALOE CO. 613 Olive St., St. Louis, Mo.
Without obligation, send me your free book, "Be A Bigger Builder". Also full particulars about the Aloe Convertible Level and details of your easy payment plan.

Name

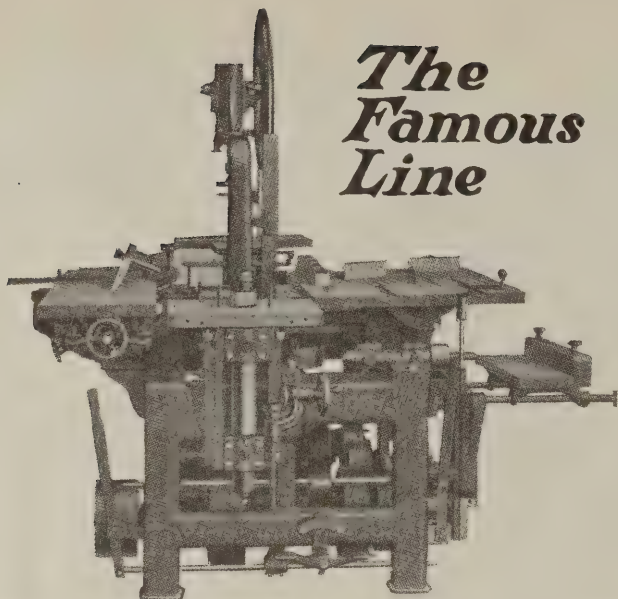
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Ten Days' Free Trial

Order the Aloe—try it for 10 days—put it to the most rigid tests. If you are not pleased, return it at our expense and your \$5.00 will be refunded.

The Famous Line



A COMPARISON of the "Famous" machines with any other on the basis of service cannot fail to convince that the "Famous" represents the ultimate in value and earning power.

There is no skimping of high-grade material, it is a simple, rugged, serviceable machine, designed to give service day after day, week after week, and month after month.

If you will compare the capacity of the "Famous" with any other machine of its class, you will be convinced they represent value and earning power.

*Write for catalog
and find out more
of this "Famous" line*

Sidney Machine Tool Co.
Sidney, Ohio

SIDNEY MACHINE TOOLS



Sargent Planes Mean Clean Work

The real test of a plane comes when it is called upon to perform work which requires cleanness, nicety and precision. On such jobs Sargent Planes prove their worth.

The Sargent Auto-Set Bench Plane for instance—you could not find a worthier tool for your kit. It is light, fast and clean cutting. It is positive in adjustment and has heaps of handle room. Cuts with or across the grain without chatter.

The blade of a Sargent Auto-Set can be taken out, whetted and replaced in exactly the same position without readjustment. Cap iron and clamp are in one piece. Made in six sizes. Smooth or corrugated bottom.

Sargent Block Planes

Sargent All-Steel Block Planes are light, unbreakable and indestructible. They are made of the very best tool steel, expertly tempered and finished. Owing to their size and shape they may be carried in the apron or overall pocket. Particularly useful for work on scaffoldings, etc. Write today for the Sargent Book of Planes.



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Hardware Manufacturers

52 Water St., New Haven, Conn.

SARGENT
LOCKS AND HARDWARE

When writing advertisers please mention National Builder

For *Better* Bricks and *Better* Profits The Helm Brick Machine

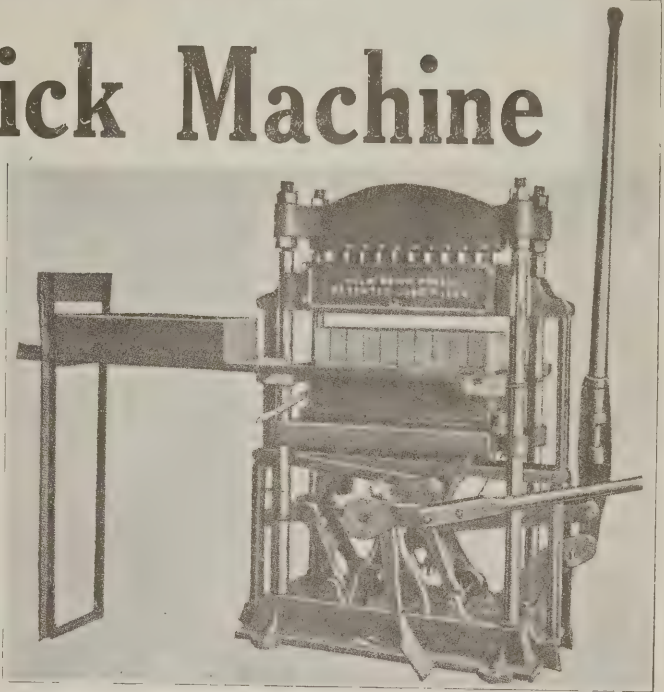
The demand for Concrete Bricks is growing every day, and the man who starts the manufacture of this product using the HELM BRICK MACHINE, will cash in on a splendid paying business during the 1921 building season.

Bricks and Blocks produced in the HELM Press are permanent and attractive. The machine exerts a pressure of 40' tons on the medium wet concrete, making them a compact mass that will endure the test of time.

HELM PRESS MACHINES will turn out 15,000 Bricks, or 1,500 24-in. blocks in a day, and will do it year after year without injury.

Write for literature

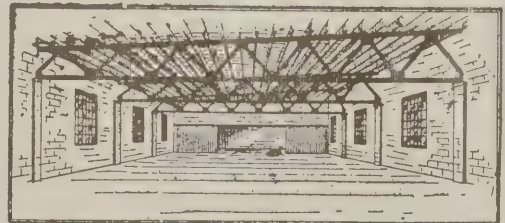
The Helm Brick Machine Company
689 Mitchell St. Cadillac, Mich.



MODERN GARAGES



GARAGE—ROUND LAKE, ILL.



GARAGE—ST. JOHNS, MICH.

Write for One of Our "Garage Illustrations," Showing at Least 50 Modern Buildings Designed By Us
STRUCTURAL STEEL — MODERN STORE FRONTS — FIREPROOF BUILDINGS
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INTERIOR VIEW OF STRUCTURAL STEEL
PLANT, EVANSVILLE, INDIANA

INTERNATIONAL STEEL & IRON CO., Inc.

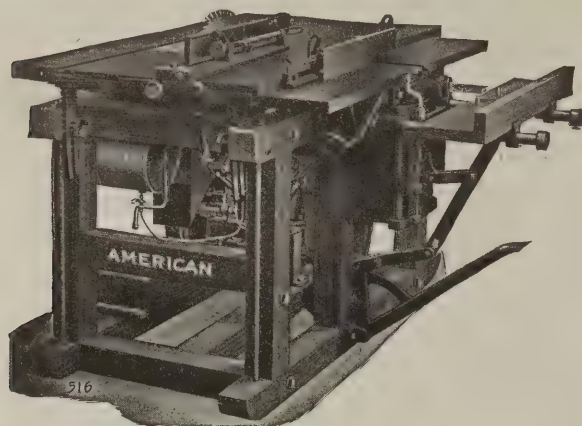
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EVANSVILLE, IND.

OPERATING
INTERNATIONAL STORE FRONT CO.—INTERNATIONAL WOOD-
WORKING CO.—INTERNATIONAL BRIDGE CO.

WE OPERATE
STEEL PLANTS—SHEET METAL PLANTS—WOODWORKING PLANTS

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"American" Variety Woodworker—Furnished with Built-in Gasoline Engine, Self-Contained Electric Motor or for Belt Drive

Eighteen Machines In One

Think of having 12 machines combined in one self-contained unit, with practically all the functions of a complete woodworking plant. This is what the

"AMERICAN"

CONTRACTORS' VARIETY WOODWORKER

offers you. Compare this outfit, item by item, with any other woodworker on the market. You'll decide that the "American" carries more real service-giving value—more time economy—than you get anywhere for the same price. Figure what economies an 18-in-1 machine could effect even in a plant with larger machines. You'll come to the conclusion that an "American" is a thoroughly good investment. Write for bulletins and judge for yourself.

The "American" line is fully described in Catalog 20. It covers saw mill, edgers, bolters, trimmers, planers, matchers, moulders, shingle mills, lath mills, excelsior machines, woodworkers, saw benches, bandsaws, rip and cut-off saws, wood lathes, etc. Ask also for Bulletin 77 on Woodworkers and 10 on Hoists.

American Saw Mill Machinery Co.

HACKETTSTOWN, N. J.
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Saw Benches

Rip and Cut-off Saws
Hoists

Faster Discharging Concrete Mixers

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Built in sizes to fit all jobs; 1/2, 1, 2, 3, 4 Bag Capacities; Gas, Steam, Electric.

\$325.00 Buys Our 1/2 Bag Low Charger
WITH NOVO ENGINE

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With Hyatt Roller Bearings

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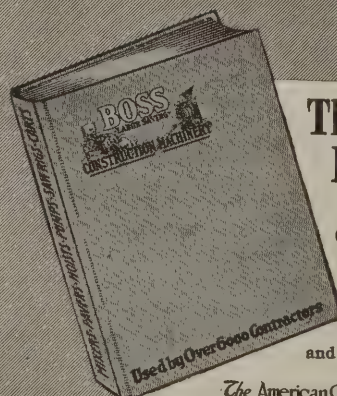
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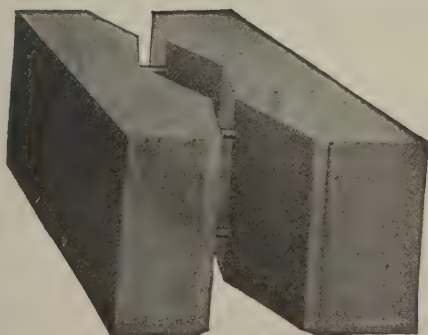
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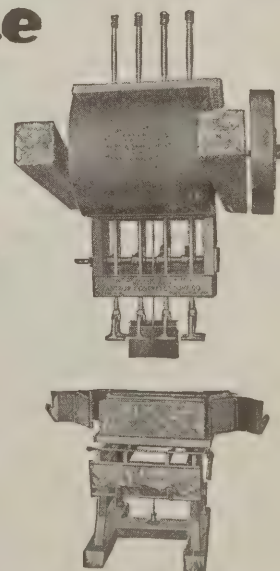
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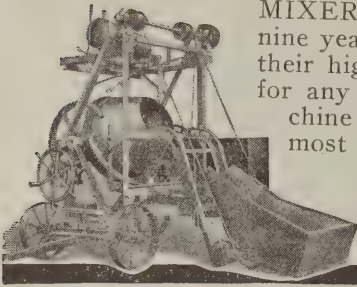
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Main Office: Rock Rapids, Iowa

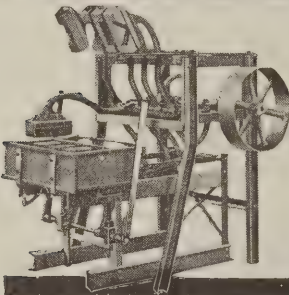
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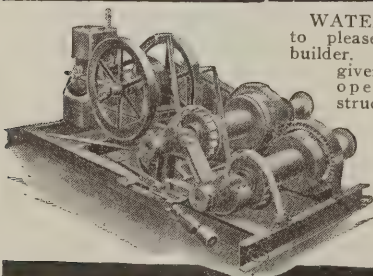
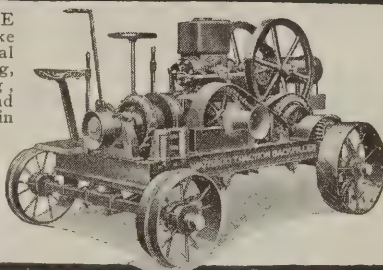


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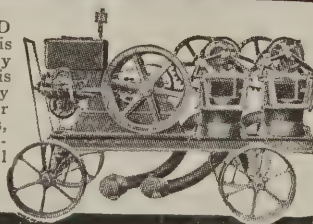
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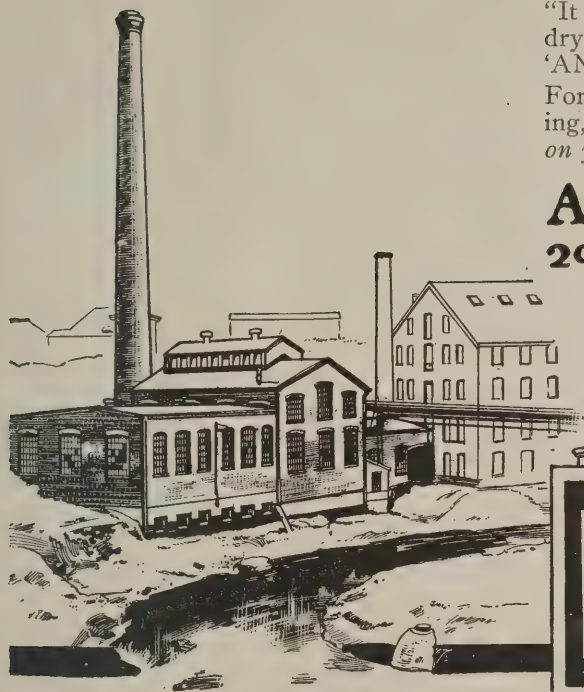
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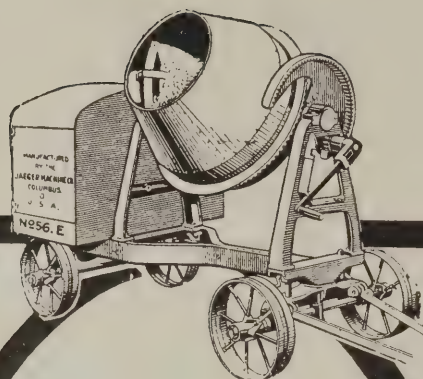
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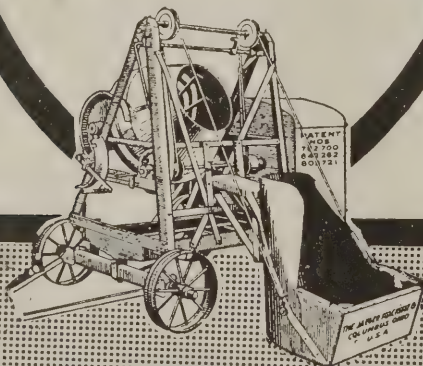


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No. 640

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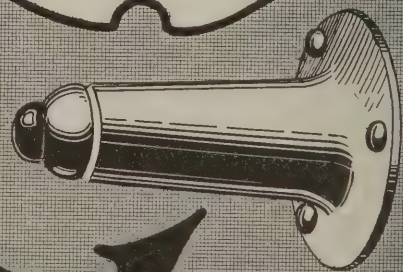
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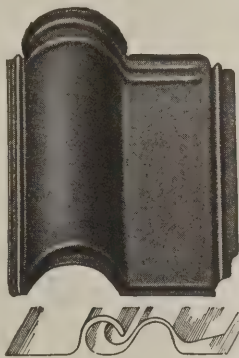
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So easy to lay that it saves time and trouble on the job.
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CON-SER-TEX is a chemically treated cotton fabric which will not rot, crack, shrink, stretch, peel nor leak. It is the ideal covering for porch roofs and decks—sleeping balconies, sun parlors, or any flat surface.

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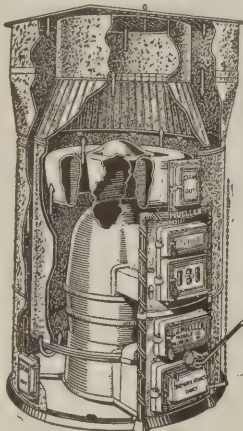


Detail of House by
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The Heating System You Can AFFORD to Recommend

YOU can always recommend the Mueller Pipeless Furnace with the assurance that it will measure up to every claim made for it.

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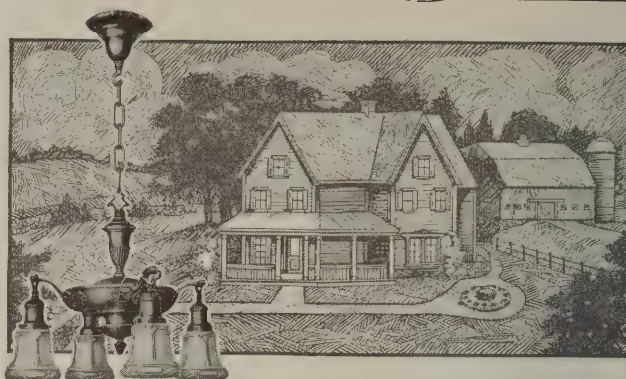
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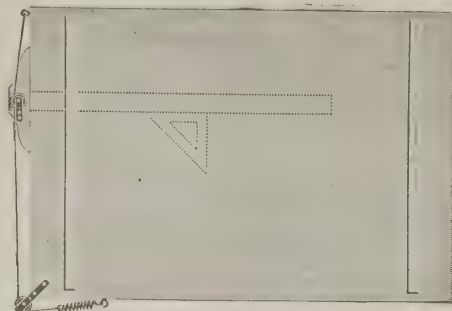
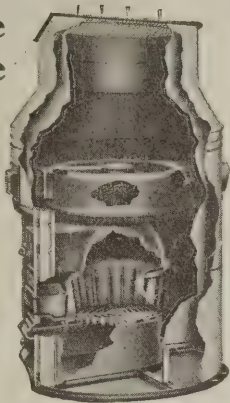
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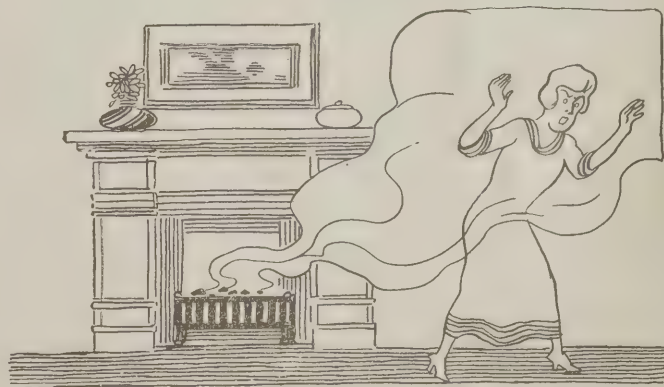
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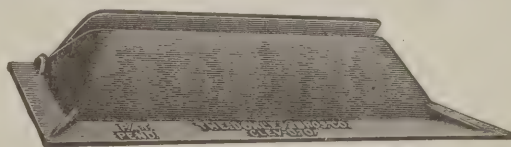
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Modernize the Home



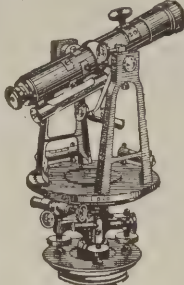
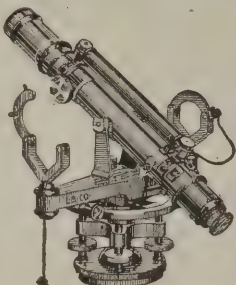
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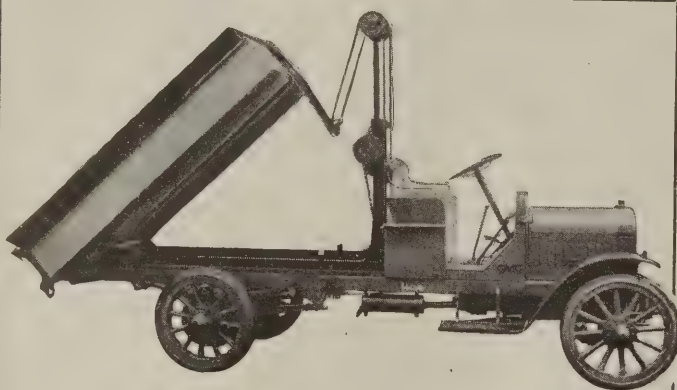


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The tailboard is hinged at both top and bottom.

Write for details and prices

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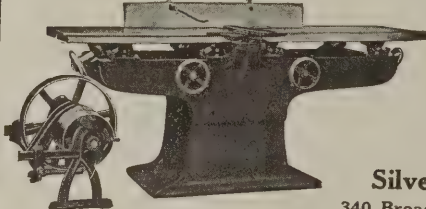
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Get the Silver Catalogue and see what Silver machine fills your needs best.

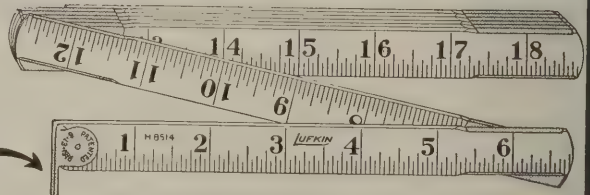




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WILL CERTAINLY APPEAL TO MECHANICS

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COMMON SPRING JOINT WOOD RULES - BOXWOOD RULES - MEASURING TAPES

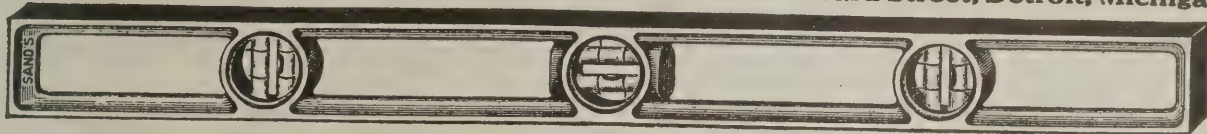
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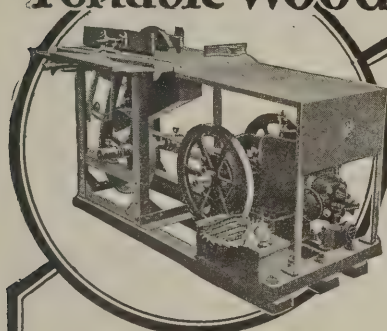
Always Tell the Truth

The standard of accuracy. And not only the most accurate—but the easiest to read, even in the dark. Never rusts—cannot warp, split or crack—and are easily handled. The lightest levels made—strong and durable because the greatest strength is placed where most needed. Ask your dealer to show you these levels, and also write for our new catalog.

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FAIRBANKS-MORSE Portable Wood Worker



With attachments for molding, mortising, rabbeting, jointing, matching, boring, sandpapering, tool grinding, sawing irregular shapes and tongue and groove work.

Equipped With "Z" Engine

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Send for Catalogue F-7056

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Built for Hard and Lasting Service

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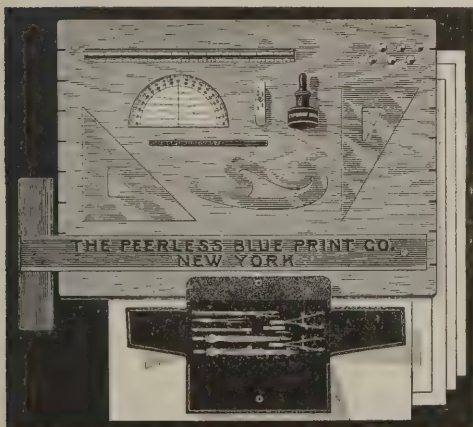
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22½-inch Mahogany, Maple-Lined T Square;
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7-inch 45° Transparent Celluloid Triangle;
8-inch 30°x60° Transparent Celluloid Triangle;
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Transparent Celluloid Irregular Curve;
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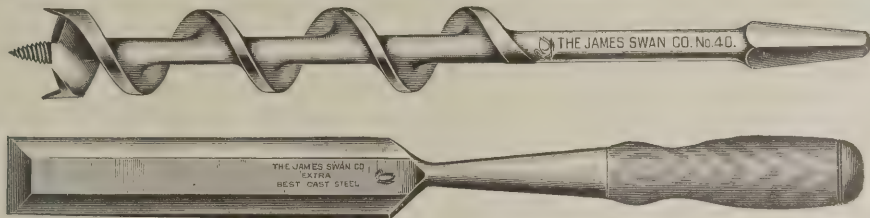
THE JAMES SWAN CO.

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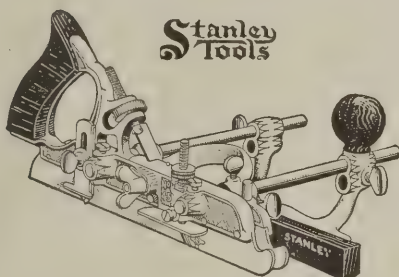
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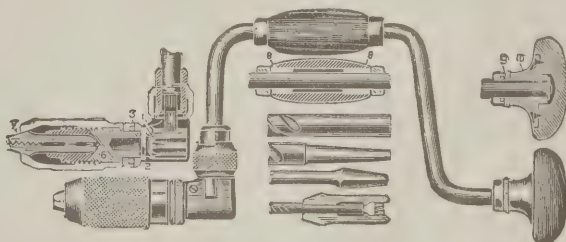
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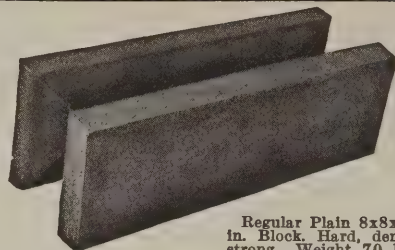
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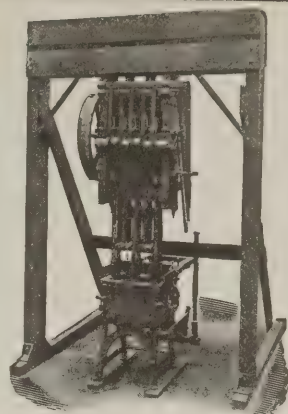
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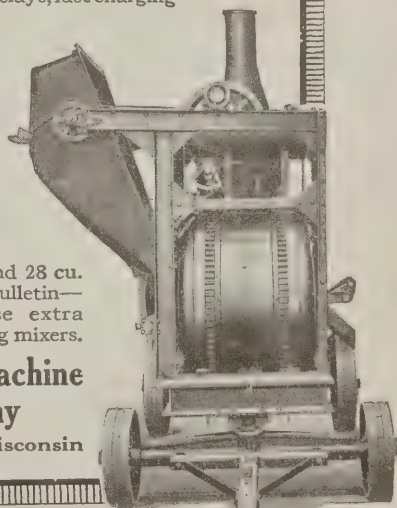
Heavy duty construction, speed in handling materials and the Koehring Re-mixing action—bringing preferred recognition for Dominant Strength Concrete—makes the Koehring the distinctive standard of value in the mixer field.

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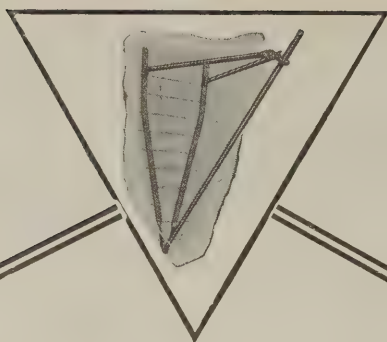


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Put money in your pocket by saving time and labor and preventing accidents.

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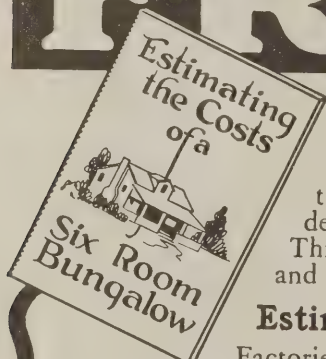


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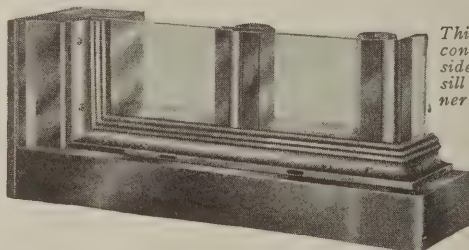
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Increases the Renting and Selling Value of Any Home

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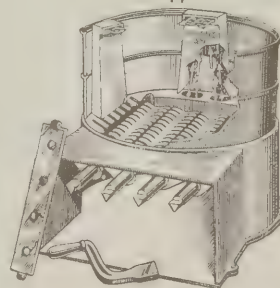
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In the Building of a Convenient, Weather-proof,
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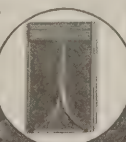
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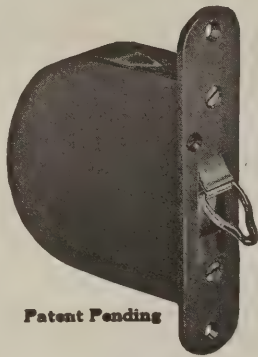
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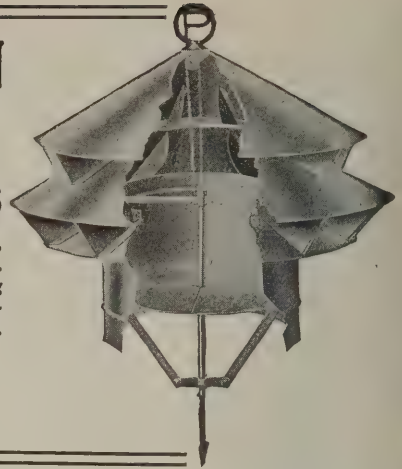
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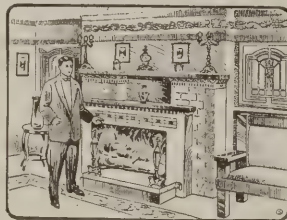


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THE OLD WAY

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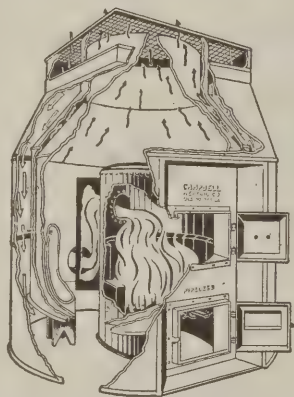
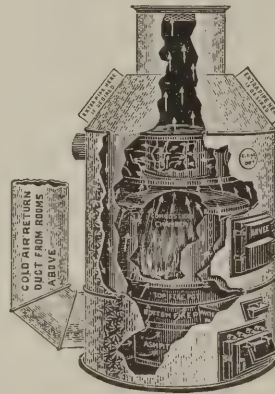
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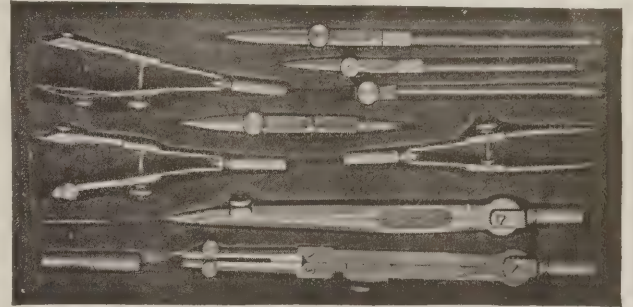


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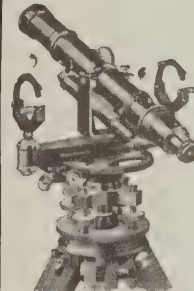
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Standard sizes in stock for immediate shipment.

Blue prints and full directions for erecting with each outfit.

Complete catalogue on request.

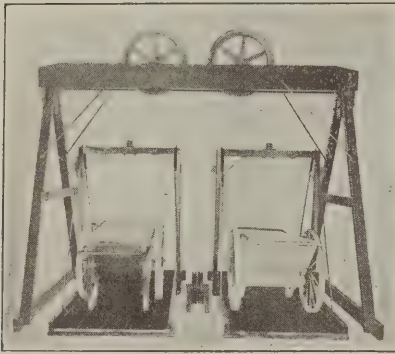
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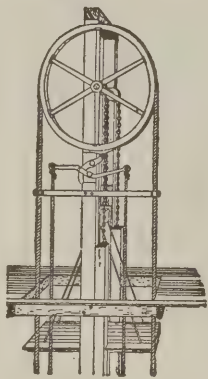
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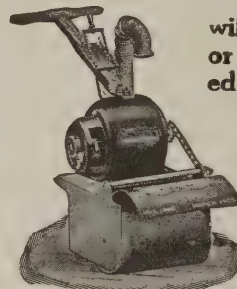
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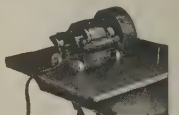
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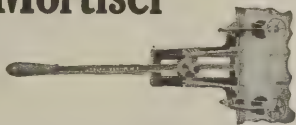
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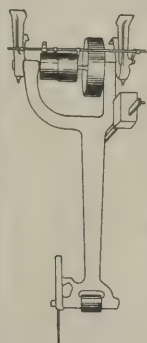


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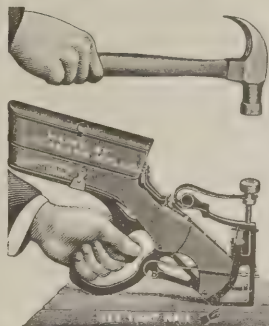
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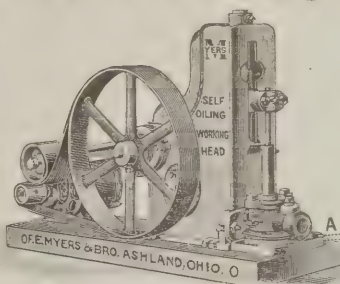
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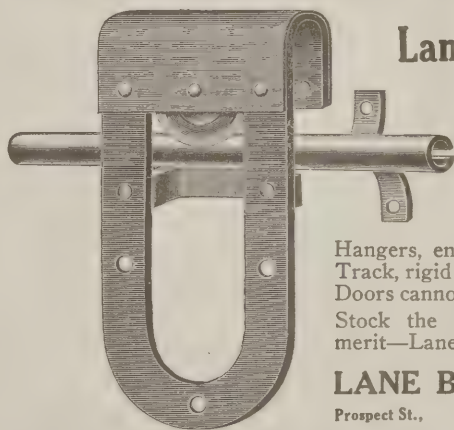
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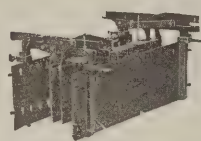
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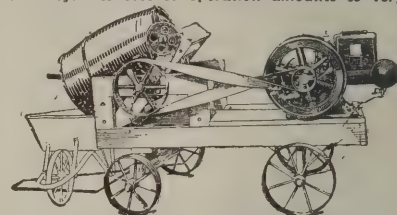
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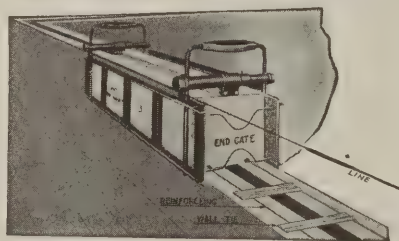
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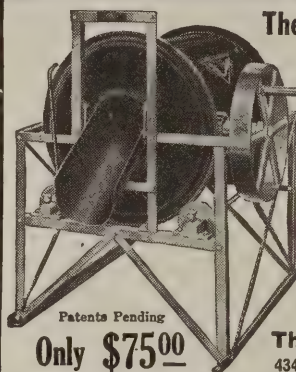
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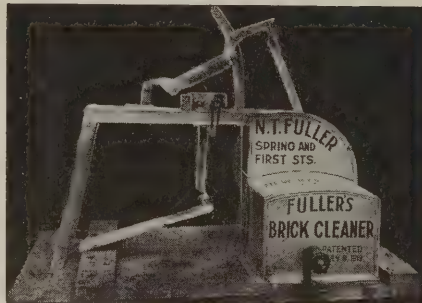
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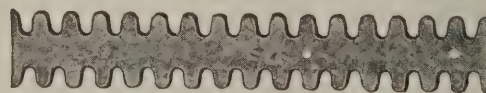
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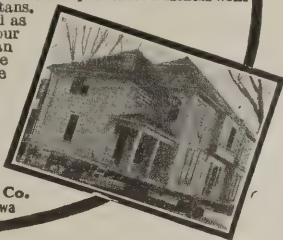
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Chicago, Ill.
Home Furnace Co.
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L. J. Mueller Furnace Co.
232 Reed St., Milwaukee, Wis.
Modern Way Furnace Co.
Fort Wayne, Ind.

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International Steel & Iron Co.
Dept. 21, Evansville, Ind.

Garage Door Hardware

McKinney Mfg. Co.
Pittsburgh, Pa.
National Mfg. Co.
Sterling, Ill.
J. E. Porter Co.
965 Guion St., Ottawa, Ill.
Stanley Works
New Britain, Conn.

Gypsum Wall & Ceiling Material

U. S. Gypsum Co.
Chicago, Ill.

Hack Saws

The L. S. Starrett Co.
Athol, Mass.

Hammers

Vaughn & Bushnell Co.
2114 Carroll Ave., Chicago, Ill.

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Home Furnace Co.
Holland, Mich.

Heating Systems

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L. J. Mueller Furnace Co.
232 Reed St., Milwaukee, Wis.

Hinges

Griffin Mfg. Co.
Erie, Pa.
Stanley Works
New Britain, Conn.

Hoists

American Cement Machine Co.
Keokuk, Iowa.
Utility Hoist & Mfg. Co.
829 Forest Home Ave., Milwaukee, Wis.
The Waterloo Construction Machinery Co.
111 Vinton St., Waterloo, Iowa.

Buyer's Guide

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Hollow Building Tile Assn.
Conway Bldg., Chicago, Ill.

House Moving Equipment

LaPlant-Choate Mfg. Co.
614 First Ave., Cedar Rapids, Iowa.

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Chicago Technical College
1237 Chicago Tech Bldg., Chicago, Ill.
Western School of Estimating
1521 Champa St., Denver, Colo.

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Johns-Manville Co.
New York, N. Y.

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Joist Hangers

Lane Bros.
Prospect St., Poughkeepsie, N. Y.

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L. Beckmann Co.
100 Adams St., Toledo, Ohio.
E. Dietzgen Co.
Chicago, Ill.
Henry Disston & Sons
Philadelphia, Pa.
J. Sand & Sons
1023-29 Rivard St., Detroit, Mich.
Warren-Knight Co.
136 N. 12th St., Philadelphia.
David White Co.
Chestnut and Ninth St., Milwaukee, Wis.

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Shapiro & Aronson, Inc.
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Lightning Rods

W. C. Shinn Mfg. Co.
1230 Lytton Bldg., Chicago, Ill.
Geo. E. Thompson Lightning Rod Co.
Dept. B, Owatonna, Minn.

Loaders

Austin Machinery Corp.
Chicago, Ill.

Lock Mortisers

A. W. Miller Mfg. Co.
3425 Erie Ave., Cincinnati, Ohio.

Lumber

Andersen Lumber Co.
Dept. D-12, South Stillwater, Minn.
Weyerhaeuser Forest Products Co.
St. Paul, Minn.

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Blaw-Knox Co.
608 Farmers Bank Bldg., Pittsburgh, Pa.
Metal Forms Corporation,
1460 Booth St., Milwaukee, Wis.

Metal Lath

General Fireproofing Co.
Youngstown, Ohio.
The Sykes Metal Lath & Roofing Co.
502 Walnut St., Niles, Ohio.

Metal Sash

Kawneer Mfg. Co.
1727 Front St., Niles, Mich.

Metal Shingles

Cortright Metal Roofing Co.
Dept. M, Philadelphia, Pa.

Metal Tile

Edwards Mfg. Co.
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Diamond Metal Weatherstrip Co.
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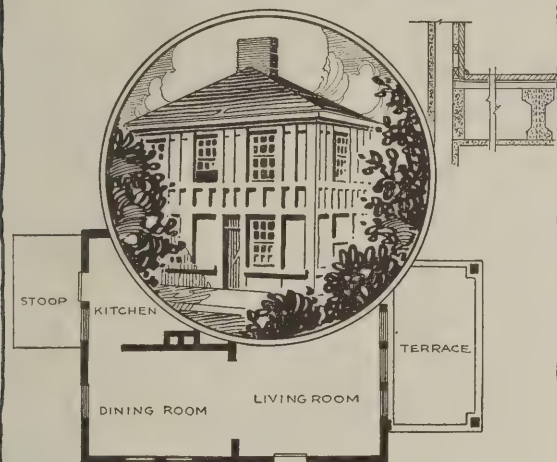
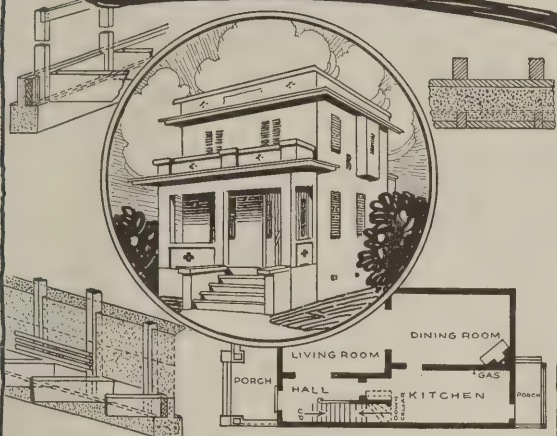
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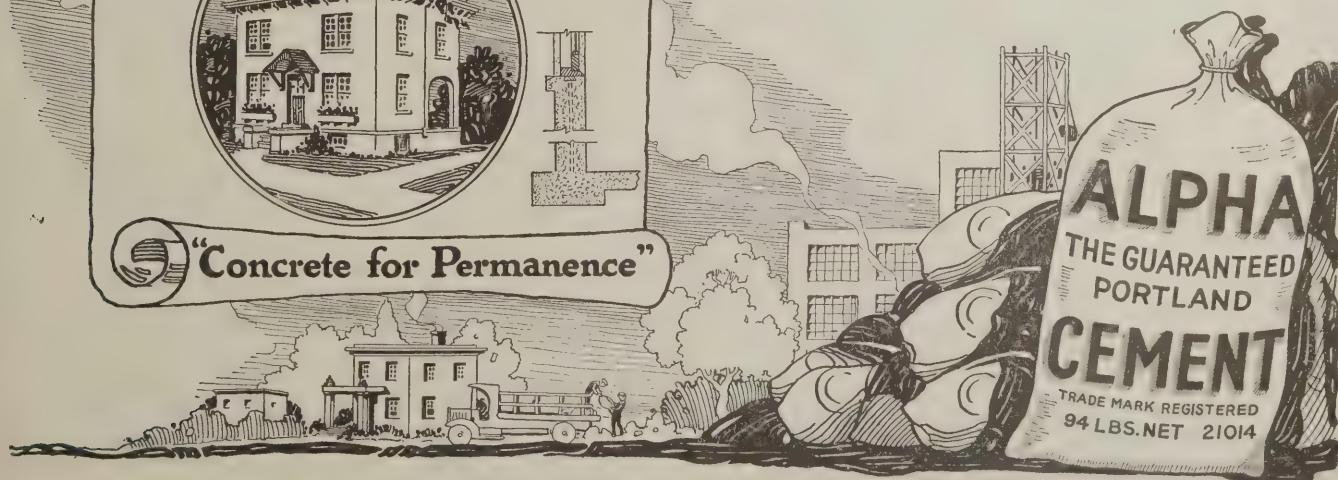
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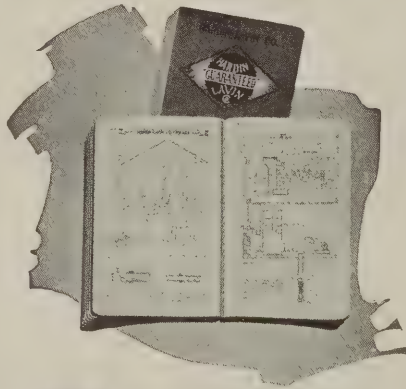
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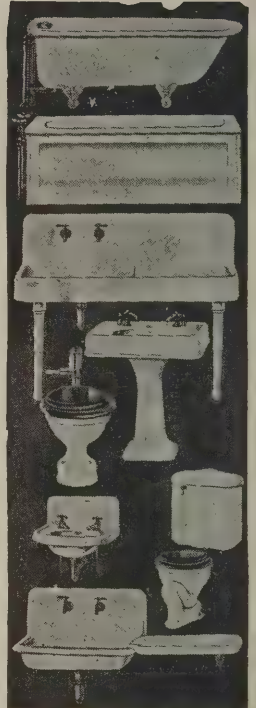
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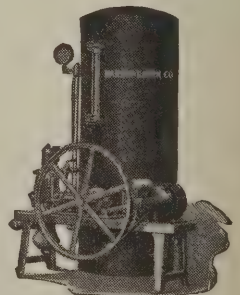
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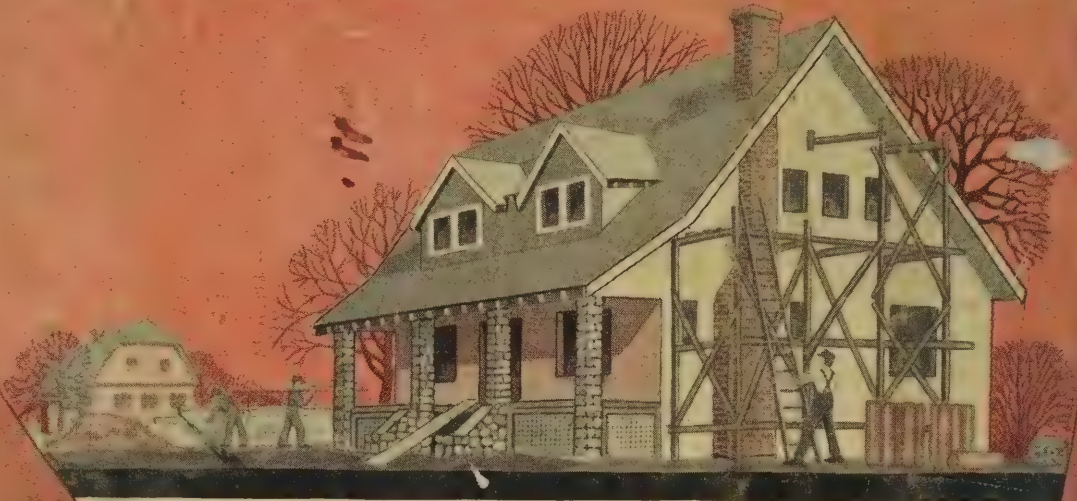
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