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The Quantity System

AMONG the lessons that the war will surely teach the American business man are the advantages of being prepared to undertake new projects and achieve their efficient prosecution. In no profession is the necessity of this lesson more apparent than in architecture. The wiser practitioners have learned it, and improvement in the presentation of working drawings and office administration methods is already noticeable.

Many weaknesses, however, remain to be corrected, not the least important of which is the matter of estimating, both in the preliminary stages of a work and in the final tenders. The processes in both cases are now crude and often unreliable. These things were realized in England many years ago, and resulted in the adoption of the "quantity system" now in successful use.

For various reasons, perhaps not all good, quantity surveying has not received the attention in this country to which it is entitled, although from time to time spasmodic efforts have been made by different organizations to arouse interest in it. American engineers have utilized its principles to a certain degree, as has also the Government, in its largest plan shop in the Treasury Department. But it has required a great emergency, such as the war, to give vital impetus to serious consideration of the merits of this measure.

The report, published in a recent issue of the *Journal of the A. I. A.*, of a joint committee composed of representatives from the American Institute of Architects, the various engineering societies and organizations among the contractors, indicates a renewal of the movement for the substitution of the quantity method for the one at present in practice. This movement has the backing of a majority of the allied forces interested in construction work. It is sincerely hoped that with this influence a decision may be reached which will insure the adoption, in the near future, of a well-considered system. A recent illustration of the need of such a system is to be found in the case of some Government emergency war work. Estimates were desired within forty-eight hours. These the contractors declared it was impossible to produce and declined to submit figures. If a bill of quantities had accompanied the drawings and specifications there is no doubt but that the desired estimates could have been supplied within the time set.

There are, however, preliminary to such action and in addition to the general adoption of this system, difficulties which must be met and at least tentatively settled before it can be put into efficient shape. The first of these is undoubtedly lack of uniformity in the standards of measurements. These vary so widely in different sections of the country that any attempt to utilize them as they now exist would create confusion. They should therefore be standardized. Might not the necessity for standardization serve to suggest that this is an appropriate time to substitute for the present cumbersome and practically out-of-date system either the decimal or metric system?

A second obstacle, and one that would retard the smooth operation of the system, would be found in the infinite variation of the building ordinances in different localities. These should be co-ordinated and a "basic code" formulated covering all the essential features common to building projects, although there might, and probably would, be variations owing to differences throughout the country in cost of available materials.

In any departure from an established custom it is the part of wisdom to consider if such a change is really necessary, and how it would affect the interests of all the parties concerned. There would be, in this instance, three such parties—the owner or client, the contractor and the architect.

Even those with slight acquaintance with the present methods of estimating will realize that they are extravagant, wasteful and inefficient. Any substitute tending toward the elimination of these undesirable elements would be beneficial.

The architect owes his first duty to the client; therefore the client will be considered first. The client would be assured under this proposed method

that he was paying only for what was actually incorporated in the building. He would be able to secure, in the earlier stages of the preparation of the drawings, a more reliable knowledge of the probable cost of the undertaking, thereby admitting of necessary modifications prior to any large expenditure for drafting. He would be assured of more intelligent and therefore closer bidding on the work, and would be relieved of many, if not all, annoying claims for allowances and extras arising from misinterpretations of what was called for by the drawings and specifications. He would be more sure of an honestly constructed piece of work because any tendency on the part of the contractor to slight workmanship and material would be removed. Finally, this system would provide the client with a better basis on which to judge the merits of the estimates received, and he would be assured that by no oversight would he be likely to make overpayments in the partial payments made during the progress of the work.

The second factor in a construction problem is the architect. He is just as vitally interested in a "repeat order" as is the most modern commercial house, and if he is alert is ever on the outlook for opportunities whereby he can improve his business and render better service to his client. The quantity system will provide many such opportunities. It gives the architect the benefit of a new viewpoint, the viewpoint not of a single individual but of a corps of men trained to observe and criticise the things that would escape the architectural eye. Their suggestions would be valuable in pointing out whatever might impress an outsider as a discrepancy or ambiguity sufficiently early to permit errors to be corrected without an undue expenditure of time and thought. It would relieve the architect from the necessity, which continually arises during the estimating period, of explaining or interpreting the requirements as to quantities, quality and types of work, thus eliminating many unnecessary questions and insuring an intelligent and uniform understanding of the requirements by everyone concerned.

The system would provide the architect with an excellent basis for judging tenders; would aid materially in checking progress reports; would enable him to calculate the amounts due as payments on account during construction; and would place in the hands of the clerk of the works or the superintendent invaluable data. Finally, it would relieve the architect of disputes and annoyances over claims and allowances for extra work which absorb much valuable time.

The contractor under this system would be as much benefited, if not more, than either the client or the architect, as he would be thoroughly protected thereby from losses excepting those due to his own ignorance or carelessness. He would have all his premises clearly stated and would merely have to place his conclusions after them. He would be relieved of the necessity of maintaining, at large expense, a force of estimators. By the "speeding up" of estimating he would have more time to seek new work. He would have a surer basis for taking sub-bids. The chances of omission of some important material or labor would be minimized. His estimates would be submitted under a fair and sensible competition in which all taking part would be figuring on the same basis and from identical data.

By the adoption of the quantity system the administrative features of construction work would undoubtedly be placed on a higher economic and moral plane, one that would greatly simplify them, and be so clear and free from mysterious features as to permit of their being easily understood.

Every architect who has given thought to these matters will have realized the enormous economic waste under present methods of estimating. The duplication of labor, the expenditure of money and the liability of errors all must be paid for in some way. This payment certainly does not come from the contractor, so must of necessity be borne by the client. The consumer pays the price here as well as elsewhere. He does not pay it directly, to be sure, but this excess exists just the same. It is generally understood that the accepted custom of our large construction organizations is to include in the amount of their tender a percentage varying with the magnitude of the expense involved. The elimination of the expense which would occur under the quantity system would have a tendency to reduce materially the estimated cost of work. This fact alone supplies a strong reason for the adoption of the system.

Another large element, that of allowances for contingencies, would also be eliminated, because the estimates would be based on definite statements of the labor and material that must be furnished, and no allowances need be considered. This, again, should reduce the cost.

A further beneficial result would be attained by a greater uniformity in the amount of the tenders, and this in turn would make possible a more equitable contract.

Every architect knows from his own experience the great variations that occur in almost every competitive bidding, sometimes running as high as 60 to 80 per cent. Such variation would manifestly be impossible if all estimators were basing their figures on the same knowledge or interpretation of the requirements. The existence of such variations often

raises a doubt of the reliability of any of the figures submitted.

It may be well to inquire into the disadvantages. Some architects would consider that their prerogatives as architects were being assailed by the introduction of a critic of their drawings. While every conscientious practitioner does produce drawings and specifications that are examples of completeness, nothing is perfect and it is only through the entry of a mind which sees things from a different angle that such imperfections as exist can be detected and corrected. A further objection might be based on the ground that the introduction of another element would still further complicate the question of fees. Already the multiplicity of additional fees is causing the client to ask "Why do I have to pay an architect if I also have to pay for a structural engineer, a sanitary engineer and several others?" "Where does the architect come in?" The discussion of this broad question must be left for future consideration. It is admitted that it raises a point requiring adjustment.

Planning and Financing the Industrial Housing Project

In Two Parts—Part II*

By ARTHUR F. CLOUGH

WITHIN the last few years many communities have awakened to the need of greater and better industrial housing accommodations for their workers, and before outlining the ideal method for financing such projects, it might be well to consider for a moment some of the enterprises which are already under way. Part one of this article discussed some of the methods by which projects could be financed. Since the majority of these schemes seemed to point toward the raising of funds by the co-operation of the industrial interests with the citizens in any given community, the following examples are typical of the means by which this is being worked out in various sections of the country. They are not offered as the solution of any particular housing problem, but merely as proof of the success of this kind of co-operation.

FLINT, MICH.

The need of increased housing accommodations brought about the formation of a "civic building company." Plans were originally made for 3000 houses, and up to March, 1918, 138 of them had been completed and sold. The selling plan called for a payment of 10 per cent of the purchase price when the sale was made and 1 per cent a month thereafter until the property was paid for. Interest charges are 7 per cent annually and the monthly payment of 1 per cent includes the interest charge on the investment, so that the payment on principal and interest are simultaneous.

COATESVILLE, PA.

One hundred volunteers, each of whom pledged himself to take $1,000 worth of stock, organized the Coatesville Housing Company. They expect to spend $300,000 on housing this year. No cash first payments are required in the sale of a house, the purchaser obtaining a first mortgage on the property from the building and loan associations and permitting the housing company to carry a second mortgage for the balance of the purchase price. By an insurance clause the company also agrees, in case of the purchaser's death before the first mortgage is cancelled, to take up the second mortgage so that the home is not lost to the survivors, the family continuing to pay a low rent on the property until the building and loan mortgage is liquidated.

WILLIAMSPORT, PA.

The Williamsport Improvement Company was organized by the Board of Trade with an authorized capital of $1,000,000, on which at least $500,000 in bona fide subscriptions was required in order to make all the subscriptions binding. The stock-selling campaign lasted one week, at the end of which time public-spirited citizens had oversubscribed the necessary amount. It is proposed to build at least 320 homes and, to make sure that benefit will inure to the public, dividends upon the capital stock were limited to 6 per cent per annum, accumulative.

WAUKESHA, WIS.

Here the city manufacturers combined to form the "Manufacturers' Building Association," with a capital stock of $100,000; secured options on land; contracted for building material, and are erecting small houses to rent and sell at prices within the reach of the common laborer.

In considering the various methods so far suggested, it will be found that there are desirable features in many of them, but that no one combines enough of these features to make it the ideal plan. In developing this ideal method, however, it must be remembered that laws, conditions and requirements vary in different communities. Therefore, all that can be done is to suggest the points considered most essential and leave it to the promoter of the project to adapt it to his particular needs.

Primarily, the housing problem is of interest to every right-minded citizen and the expense of such

*For Part I see issue May 15.

PLANNING AND FINANCING THE INDUSTRIAL HOUSING PROJECT

Factors in Determining Its Advisability	Sources of Capital	Methods of Financing	Desireble Fetures Of the Ideal Method
Is there no other solution for the housing situation in this community ?	Manufacturer's Own Funds	From manufacturer's surplus	Must supply Funds quickly
Can we go into such a project extensively enough to provide an adequate remedy for our housing situation ?	Other Industrial Interests.	Cooperative Associations.	Must not tie up the manufacturer's funds for any great length of time.
Have we the funds to finance it ?	Municipal Government.	Home Building Corporations	Must give a reasonable return on the investment
If not, can we get them ?	Business Organizations.	Financing Corporations	
What do we expect to get out of this investment ?	Contractors, Builders, Etc.	Business Organizations	Must appeal to the investor
Will it— a— Reduce our labor turnover ? b— Attract a better class of workers ? c— Build up the community and its industrial interests ? d— Enhance property values ? e— Tie our money up for long periods of time ?	Real Estate Operators	Manufacturers' Associations	Must be flexible enough to permit any desired future expansion.
	Merchants and Other Business Interests.	Bank Loans	
	Speculators and Investors	Issuance Of Municipal Bonds	Must avoid any appearance of charity or paternalism
	Philanthropists	Public Subscriptions	
	Banks— Trust and Insurance Companies	Private Enterprise.	Should weld labor and capital together to mutual advantage
	General Public	Real Estate Promotion	
	Own Employes, and Other Workers	Pro Rata Distribution Of Expense Among— a— Contractors b— Manufacturers c— Other interests	Should give a wide distribution of expense.
Can we provide homes at a low enough figure to meet the financial resources of our employes ?	State Appropriations		Should not be run for a profit.
	Federal Government	Philanthropic Contributions	Should issues shares of small denomination so as to be within the reach of every investor.
	Cooperative Financing	State Appropriations	
		Federal Government	Should permit stock to be exchanged for its equivalent equity in the property of the corporation.

Factors in Selection Of Types of Houses	Factors in Determining Selling Plans	Desireble Fentures Of Ideal Plan
Do we intend them for sale or for rent ?	What is the total cost of project ?	Should provide homes at cost, or a very low figure
Type of Worker——— a— Gregarious b— Individual c— Dependents d— No dependents e— Skilled f— Semi-Skilled g— Unskilled h— Highly paid i— Well paid j— Poorly paid	What return must we have on total investment to take care of— a— Dividends ? b— Maintainence ? c— Reserve funds ?	Should require a small cash payment with purchase
	Having determined monthly payments necessary to take care of a, b, and c, can our workers afford to buy houses on such a basis ?	Should make provision for workers who cannot make initial payments.
		Should take care of property disposal if purchaser is compelled to sell.
Construction Cost	If not, should we— a— Reduce dividends ? b— Increase wages ?	Should take care of payments on— a— Principal b— Interest c— Taxes d— Life Insurance e— Property Insurance f— Maintainence and repairs
Utility		
Appearence		Should avoid all appearence of charity or paternalism
Selling Value		Should prove equally advantageous to capital and labor; the investor and the purchaser.
Location		
Probability of Increase in Valuation.		

a project in any given community should be shared by

a—The industrial interests.
b—The city government.
c—The business organizations.
d—Contractors who reap a profit on the construction work.
e—Business men and other public-spirited citizens.
f—The working classes themselves, who derive direct benefit from such activities.

With a proper appreciation of this fact and the right sort of campaign, the manufacturer will find here a ready source of funds to supplement his own capital in the promotion of building operations. In order to harmonize all of the various investing elements to whom he must appeal, he may find it advisable to proceed in the following order:

First, he should take the matter up with the other industrial interests of the community and endeavor to combine their financial resources to mutual advantage in the promotion of better housing.

Second, if several can be found who agree on this need, even though the building operations are to be scattered in various parts of the city, they should get together and form a Co-operative Housing Association, designed to erect, rent or sell low-cost houses on easy terms to the workers of the community.

Third, efforts should also be made to interest the other investing factors of the community in the order given above.

Fourth, the charter of the Association should be carefully drawn up so as to embody as many desirable features as possible. In considering the nature of this charter it should be borne in mind that the Association is not formed primarily as a profit-making institution, but that all of its shareholders have an equality of interest which entitles them to share equally in all its benefits.

Fifth, the type of organization which best meets these requirements is apparently a combination of the old joint-stock company and the more modern corporation, embodying the most desirable features of the joint-stock organization, yet also deriving the benefits which come from incorporation. Under this plan, we have a joint-stock corporation, wherein an indeterminate number of individuals voluntarily associate for the purpose of providing capital for a given enterprise; the capital being divided into transferable shares, ownership of which is a condition of membership. The essential advantages of this form of organization would be as follows:

1—There is an equality of interest.
2—It is not run for a profit.
3—The capital stock is divided into equal shares.
4—These are readily transferable, and transfers can be made without the consent of the other members.
5—The possession of a given number of shares indicates the owner's part in the income (dividends or interest) of the enterprise.
6—All share in the benefits proportionately, since there is no preferred nor cumulative preferred stock.
7—The element of incorporation removes the individual liability or financial risk by giving the body an impersonal standing, thus protecting, as far as possible, the interests of the smallest investor.
8—This form of organization results in greater financial stability, since the interests of all are equally bound up in it, thereby carrying a stronger appeal to the investor.
9—The sale of a large number of transferable shares permits of a wide distribution of the expense of the project, while the flexibility of stock transfer gives the fluidity desired to protect the interests of all at all times.
10—It provides the principle of association, not only to capital but also to management, for the investors can elect directors or a board of management to conduct the operations and administer the collective property of the corporation.
11—Stock can be exchanged for an equity in the property of the corporation.
12—Future growth and its consequent necessity for an increased capitalization can be taken care of in two ways—either by a reorganization of the corporation; or, if so provided in the charter, by a majority vote of the stockholders to issue additional capital stock to the amount required. If it is desired to insure still further against over-capitalization or stock manipulation for profit by the management, each stockholder can be limited to but one vote, irrespective of the number of shares owned. This would be apt to prove objectionable, however, in communities where the stock is held by some hundreds or thousands of investors, owing to its unwieldiness and the difficulty of convincing many uninformed investors of the necessity of increased capitalization.

Sixth, bearing in mind the desirability of making the investment as stable and attractive as possible to all investors, and having determined the extent and cost of the proposed initial housing operations, it will be necessary to fix the annual returns required to pay a fair dividend to the investors, take care of taxes, upkeep and operating expenses and have enough left over to go toward a surplus or reserve fund.

Definite limitations should be set upon the annual dividends, and, in most cases, if houses are to be sold at cost, they should be ranged from 5 per cent to 7 per cent of the amount subscribed. Added to this, of course, is sufficient percentage to take care of the reserve fund, taxes, etc. Any surplus left over from taxes, maintenance, etc., should go into the reserve fund at the end of the year. Local conditions will influence the total returns required, but ordinarily they will range from 9 per cent to 14 per cent of the total paid in stock, annually.

Once the foregoing figures are determined, it will be comparatively simple to figure out the basis on which properties can be sold. In most cases, the plan outlined in Method 1 will prove satisfactory—that is, a certain percentage as a cash payment at the time of purchase, and a sufficient monthly percentage payment to take care of the dividends, maintenance and reserve funds. Payments on the prin-

cipal are taken care of by obligating the purchaser to take out shares in a co-operative bank. If the prospective purchaser is unable to make the required initial payment at the time of purchase, he is permitted to purchase shares in the Association from time to time, these shares being of small denomination, and as soon as their valuation equals the initial payment on the property desired, they are turned over to the Association in lieu of money. Thus he is encouraged to save, is given an interest in the project, and gets a better return than the banks would pay on his savings while he is waiting until he has accumulated a large enough amount to take care of the purchase payment on the property he desires.

Under such a plan, the worker purchasing a home, can continue to invest his surplus savings in the project and get a better return from it than he could elsewhere. Since, in the case of skilled and well-paid workmen, the payments on his property would not ordinarily utilize all he could spare from his pay envelope his familiarity with the project would make such an investment more attractive than placing money in a bank at 3 per cent or 4 per cent interest.

Appeal to the municipal government and other investors could also be made on the grounds that the successful completion of such a housing enterprise would enhance property values, increase the amount of taxable property—thereby increasing the city revenue, develop the industrial interests of the community, attract and provide work for more citizens in the community—thus increasing the volume of business done by merchants and others, and transform into substantial citizens many workers whose stay would otherwise be brief. It would hold an appeal to the moneyed class because it is a comparatively safe investment, its assets are tangible ones and largely indestructible, and the returns on money invested are assured and as large as could reasonably be expected when the element of risk is practically eliminated.

The foregoing plan is not perfect, of course, yet it provides a means of obtaining the necessary capital to finance housing operations and to do so without the delay which would attend an endeavor to enlist municipal, state or Federal aid. Ultimately, the Federal Government may have to take a hand in the housing operations of congested communities, where the housing accommodations are inadequate. Private capital, or even capital raised by public subscription, is not always obtainable quickly enough to alleviate conditions and many communities are already suffering from this cause.

In Bridgeport, for instance, $1,000,000 was provided by local capital to house the workers of the city, yet that has been far from sufficient and the influx of new workers this year has been much more rapid than the building operations which have gone on to accommodate them.

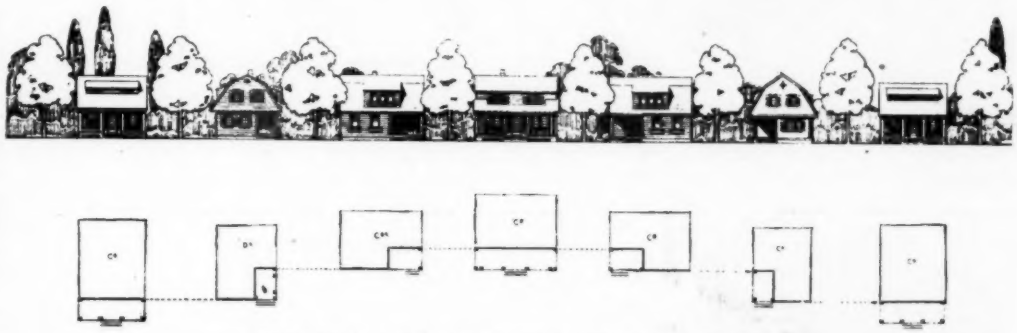
Eventually we will have to take the steps that England has already taken and establish some form of Government control and assistance to cope with our housing problems. This might take the form of a Housing Commission vested with the authority to survey housing needs in various communities and determine the relative importance of industrial enterprises. Such a commission should also be empowered to seize or purchase land, buildings or materials; and to design and construct communities and industrial settlements where most needed. In addition, they should make a study of post-war problems in order to determine the best ways of utilizing the communities so built after the war and under conditions which will necessitate a readjustment of labor throughout the country.

In order to do this, Congress must authorize the appropriation of sufficient money to finance such work, whether construction is carried on by the government or loans made for construction by private enterprise. By thus accelerating the housing operations in communities where the need is most urgent, the Government can be of invaluable assistance in stabilizing and rendering more productive the most important, yet most uncertain and undependable factor of all industry—the wage earner.

A Wage Earners' Community Development at Beloit, Wisconsin

By RALPH F. WARNER OF GEO. B. POST & SONS, *Architects*

WHEN the Board of Directors of Fairbanks, Morse & Company was confronted with the problem of housing a thousand new employees who were to be brought to their Beloit plant a year ago, following the greatly increased industrial activity brought about by the war, the obvious solution of the problem appeared, at first, to be the best. The plan proposed and nearly carried into effect was to take a parcel of fifty-odd acres lying just north of the company's yards, and to extend the rectangular street system which abutted on this undeveloped land and which had been platted on the city map in a certain part of the tract. For houses it was proposed to build several hundred of the type common in that section of the country in which little consideration is given to problems of architectural design, economy in planning and details of construction.



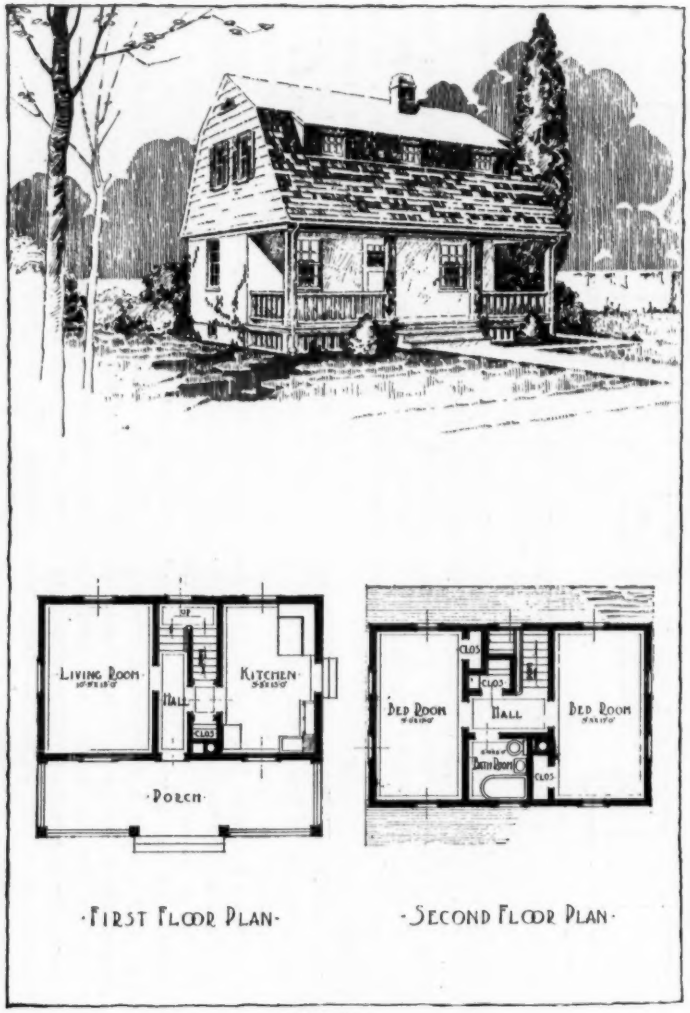
GROUPING OF HOUSES ON A TYPICAL STREET

One of the officials of the company in charge of the plant operation in Beloit, who had built a number of dwellings for wage earners in Beloit on his own account and who had taken a great interest in the social and recreational activities of employees, favored a broader consideration of the entire problem. To him a very different plan of development from that at first proposed was outlined by the architects, George B. Post & Sons, subsequently engaged for the work. The landscape work was under the direction of William Pitkin, Jr., landscape architect. The architects' plan was backed by indisputable figures showing the economy of their scheme. It was shown that the rectangular layout which it was proposed to adopt would be much more expensive than a contour plan which the rolling character of a large part of the tract favored. The original rectangular scheme provided for streets of greater width than the potential traffic of the section made necessary; in the new scheme streets were designed for local use only.

It was also proposed to subdivide the entire area of 50 acres into lots which were deeper than was necessary for the type of house which is was proposed to erect. In the architects' plan an increase of about ten per cent in the number of lots was provided, all lots equally desirable with respect to size, and yet much more attractive with respect to outlook and picturesqueness. The other characteristic of the plan which the architects proposed, and which was accepted, was a neighborhood center group where people who were to live in the community could get their supplies, and come for organized community or social functions. This would serve as a center of life and recreation for the wage earners and their families. It was no easy task to convince the Directors of the advantage of this scheme, but figures as to cost and salability prevailed and the architects' scheme, with a few modifications, was finally adopted.

The site of Eclipse Park is possessed of a variety of charms which make it an ideal place of residence. The area now in course of development overlooks Rock River and covers about 53 acres, all well-drained. The topography is partly level, partly undulating. This diversity in contour is one of the principal charms of the property.

The most important single feature of the adopted



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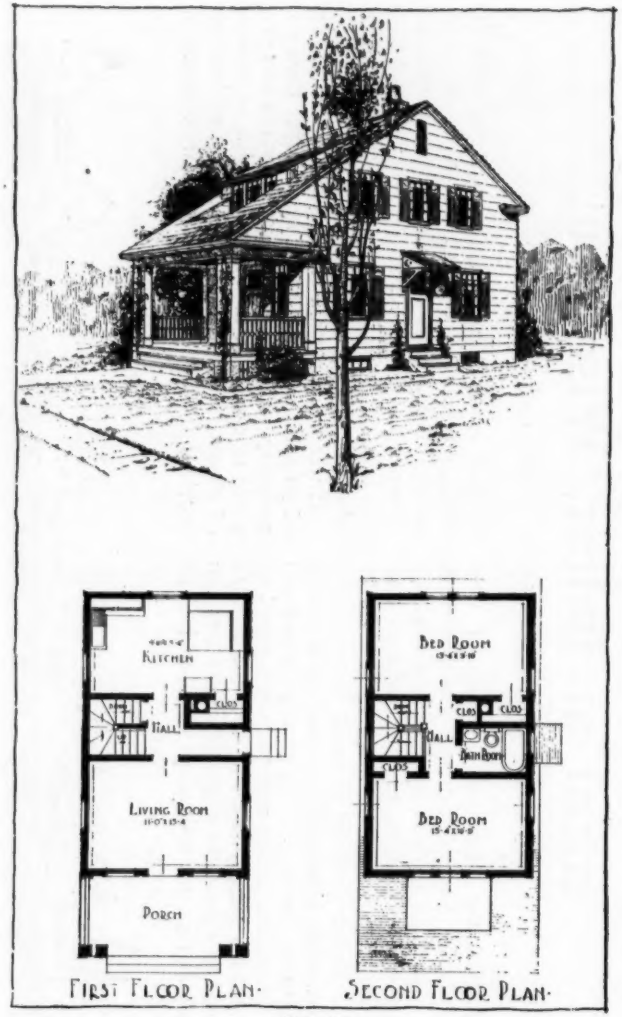


TYPE A-7.

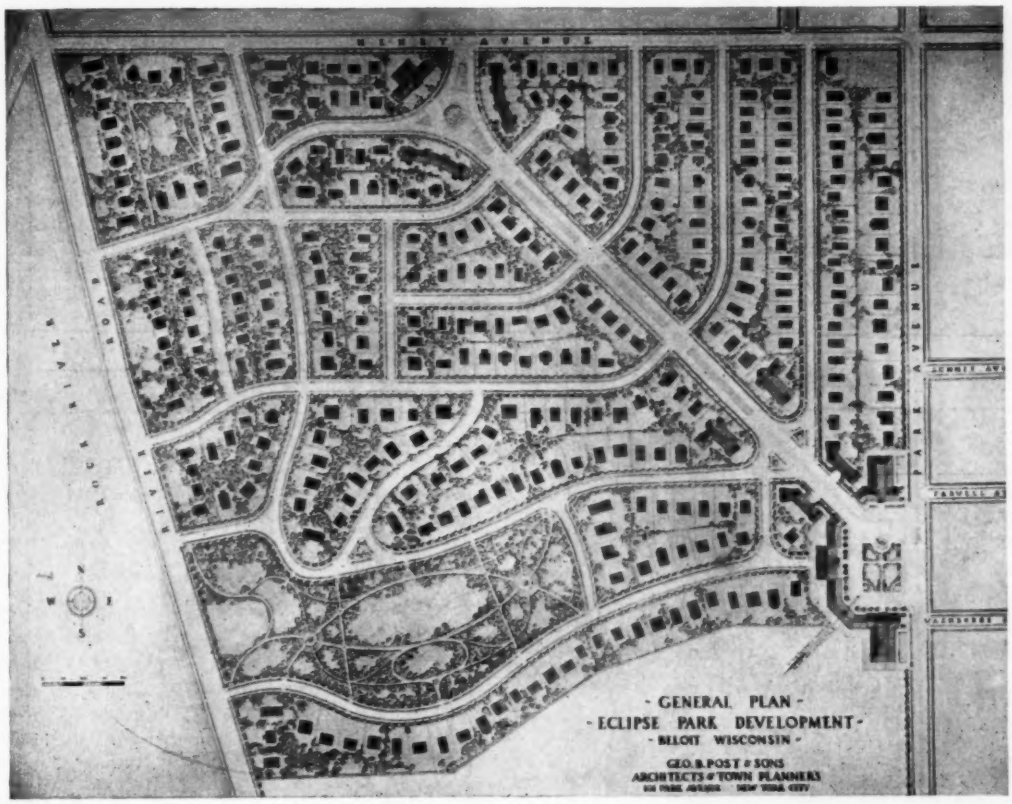
TYPICAL HOUSES, ECLIPSE PARK DEVELOPMENT, BELOIT, WIS.
GEORGE B. POST & SONS, *ARCHITECTS.*

street plan, is a broad, diagonal thoroughfare, Morse Avenue, 80 feet wide, extending northwesterly from the entrance of the property. Through this broad boulevard, direct access is possible to all parts of the development by the shortest route. A single track belt line trolley will be extended through the property and along this avenue, so that transit service at the most convenient point will be available to all residents of the park.

One of the most important items of expense in the cost of the home, is the cost of land for streets and street construction, paving, and underground utilities. Every known and well tried expedient has been adopted at Eclipse Park to bring the land development cost, as it is termed, to the lowest figure, and at the same time to give to the entire property and to each of the lots the maximum of charm, picturesqueness, accessibility, sunlight, airiness, and sanitary convenience.

All streets, except Morse Avenue, have a total width of 50 feet. Vehicle roadways on these streets will be laid out 18 feet wide and paved with concrete. Aside from the quietness and intimacy and safety of these residential side streets, with their narrow roadway uninviting to traffic, there is a saving in paving and other development costs which serves to reduce further the cost of properties to purchasers in Eclipse Park by just that amount.

As a measure designed further to reduce the cost of development and at the same time to increase the landscape and architectural interest, the streets in Eclipse Park conform to the lines of least resistance and follow the easiest and most natural grades. The cost of land development under this system is appreciably less than that incurred in the usual method of land subdivision with right-angled streets, where the cost of cutting hills and filling hollows is one of the heaviest items of expense. The gain under the system adopted in Eclipse Park is not only measurable in dollars subtracted from the price asked for properties in the park, but in the greatly increased desirability of the lots where the changing curvature of the roads and the variations in the elevations and settings of the houses introduce ever-changing elements of interest as one traverses the streets, not at all like the hard lines and painful monotony of the right-angled street subdivision.



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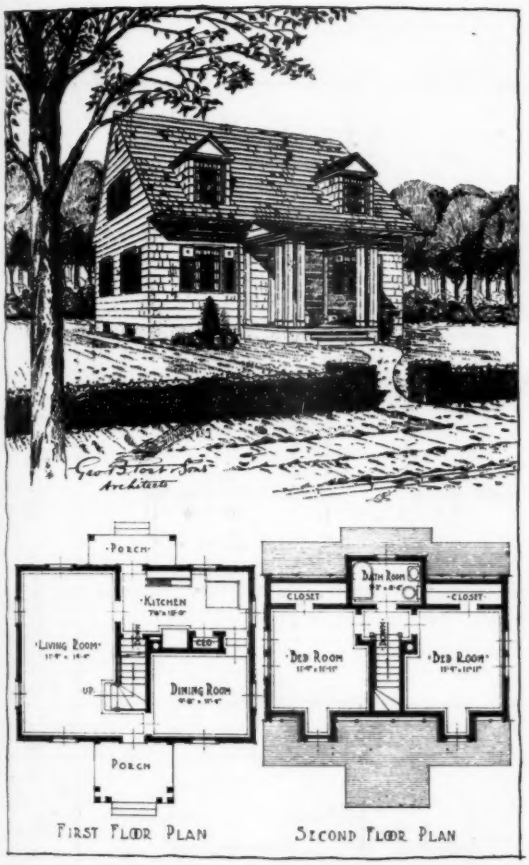
TYPE C-8.

TYPICAL HOUSES, ECLIPSE PARK DEVELOPMENT, BELOIT, WIS.
GEORGE B. POST & SONS, *ARCHITECTS.*



TYPE B. 1 AND 2.

One of the most striking features of the plan of Eclipse Park—and what is destined, on completion, to become an important center in the life of the residents of the park—is the entrance square, with its group of attractive stores and its motion picture theater. Overlooking the square, and around three of its sides, a group of two-story buildings of charming design is to be erected. The first story of this group will be treated as an arcade, extending continuously around the enclosed portions of the square. This arcade will add greatly to the appearance of the square, and will provide shelter in bad weather.

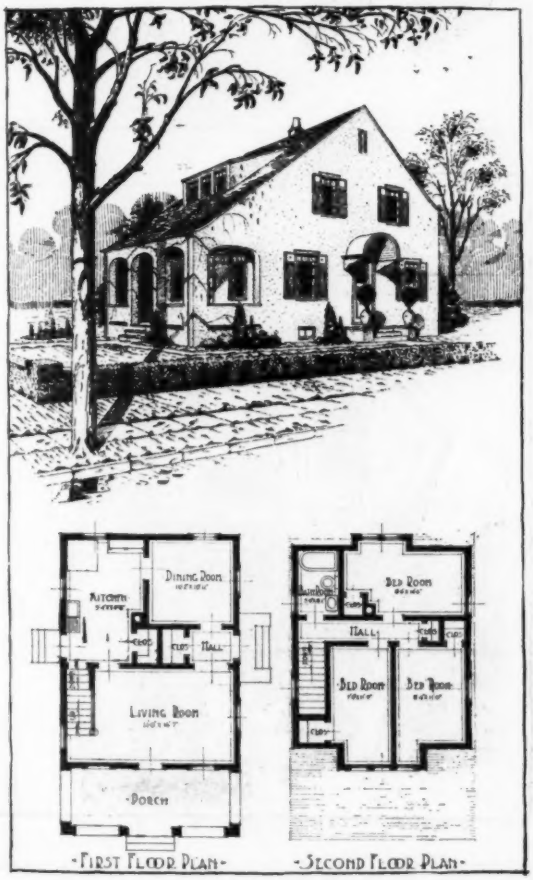
In addition to accommodations for stores of all kinds and a motion picture theater, the buildings here will provide attractive quarters for a branch library, rooms for civic organizations, clubs, and the like. The second story will be used for apartments, offices, and some of the community activities mentioned. The square also serves as a focus and distributer of all traffic in the park.

Part of the area between the entrance square and the factory yards is given over to an athletic field for the use of employees of Fairbanks, Morse & Company. A little over six acres has been set aside as a park for the use and enjoyment of residents of Eclipse Park. This acreage lies in the southwest corner of the property, has a frontage on Rock River of about 370 feet, and extends inland about 900 feet.

Sites for semi-public and public buildings are reserved at the three most prominent street intersections on the entire property.

Ground Area of House and Lots

The free-standing, detached house, open on all sides, is recognized to-day as the ideal accommodation for the man with a family. It affords the maximum of light, air, privacy and convenience. Eclipse Park houses offered for sale are all of this type and have ample front, rear and side yards.



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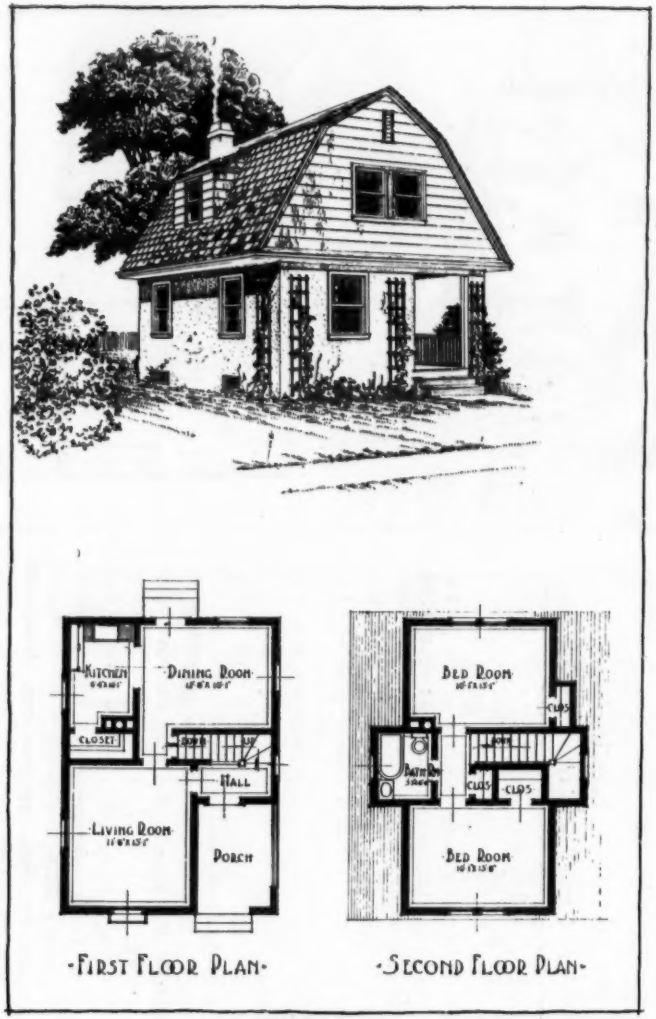
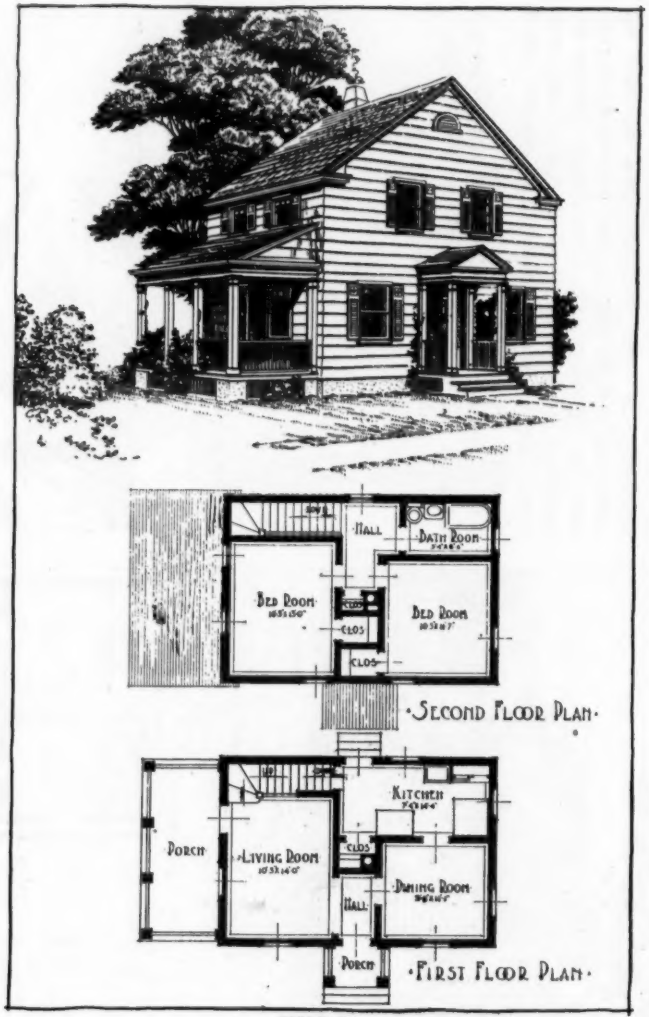


TYPE A-10.



TYPE B-8.

TYPICAL HOUSES, ECLIPSE PARK DEVELOPMENT, BELOIT, WIS.
GEORGE B. POST & SONS, *ARCHITECTS.*

The following general arrangement of houses and lots has been adopted:

No. of Rooms	Average Floor Area	Dimensions of Lot	Area of Lot in Sq. ft.
4 *A* type	448 sq. ft.	40 x 80	3,200
5 *B* type	468 sq. ft.	45 x 90	4,050
6 *C* type	564 sq. ft.	50 x 100	5,000
7 *D* type	605 sq. ft.	55 x 95 & 50 x 100	5,000
8 *E* type	700 sq. ft.	55 x 110	6,000

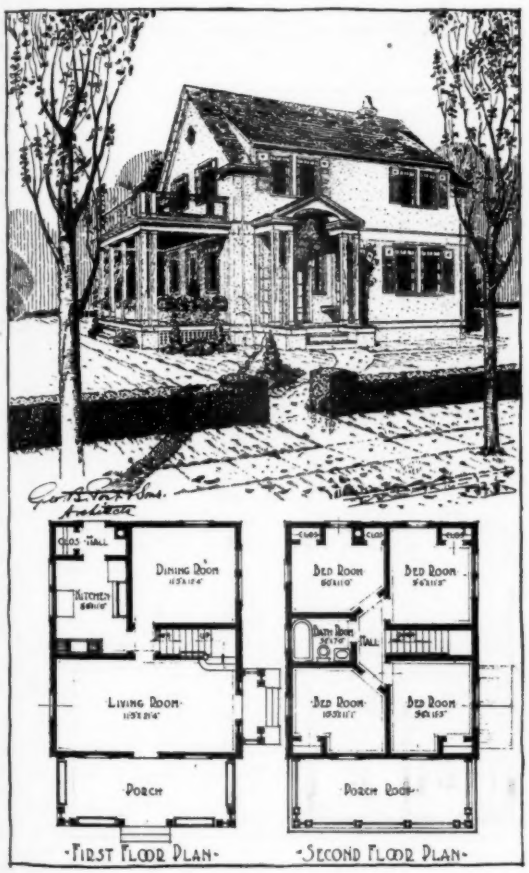
A few of the houses with seven to eight rooms (F Type), with exceptional interior accommodations and with 800 square feet average floor area, are located on lots with a frontage of 60 to 75 feet, and a depth of 100 to 110 feet (6,000 sq. ft.).

Some of the smaller houses of the five and six room type are located on lots varying in size from the above schedule, but in no case are they less than 40 x 80 feet.

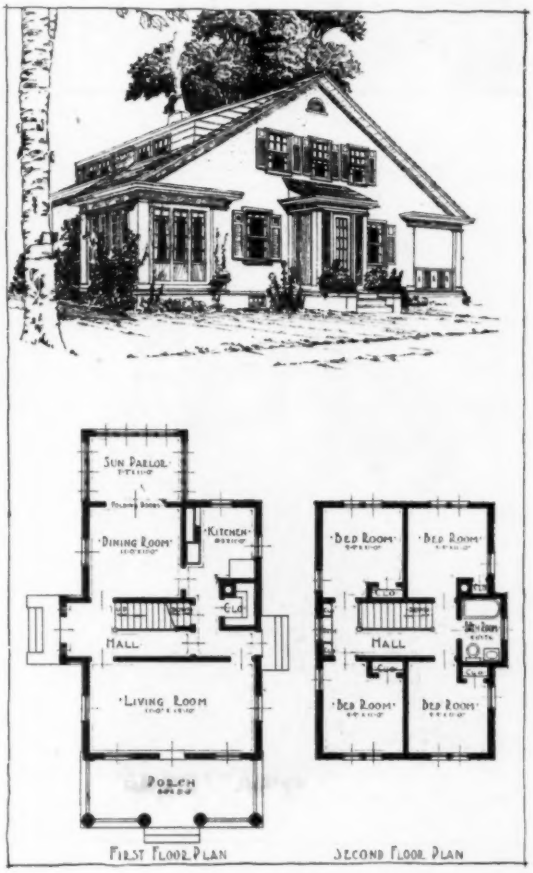
The houses are all set back from the front lot line for a distance of 20 to 28 feet. A few of the larger houses are set back to a greater depth. Between houses on adjoining lots a space of at least 20 feet is maintained, and in most instances this free space is 25 feet or over.

The cost of the undeveloped land at Eclipse Park was quite high considering the character of the house which was erected. For this reason the lots on which a number of the four room houses were built, and a few of the five and six room houses, were given a depth of only 80 feet, with a frontage of 40 feet.

Now that the houses have been completed and one has an opportunity to study the effect produced in a single block where the houses are completed around all of the sides, the effect of the shallow lots is very pleasing. The interior of the block has the appearance of an enclosed court or playground, rather than the usual appearance where small houses are located on deep lots in which there seems to be no relationship between the entire group in any block. The architects believe, however, that a 90 foot depth would be more desirable. With a setback of 20 feet at the front, and a total depth



TYPE D-5.



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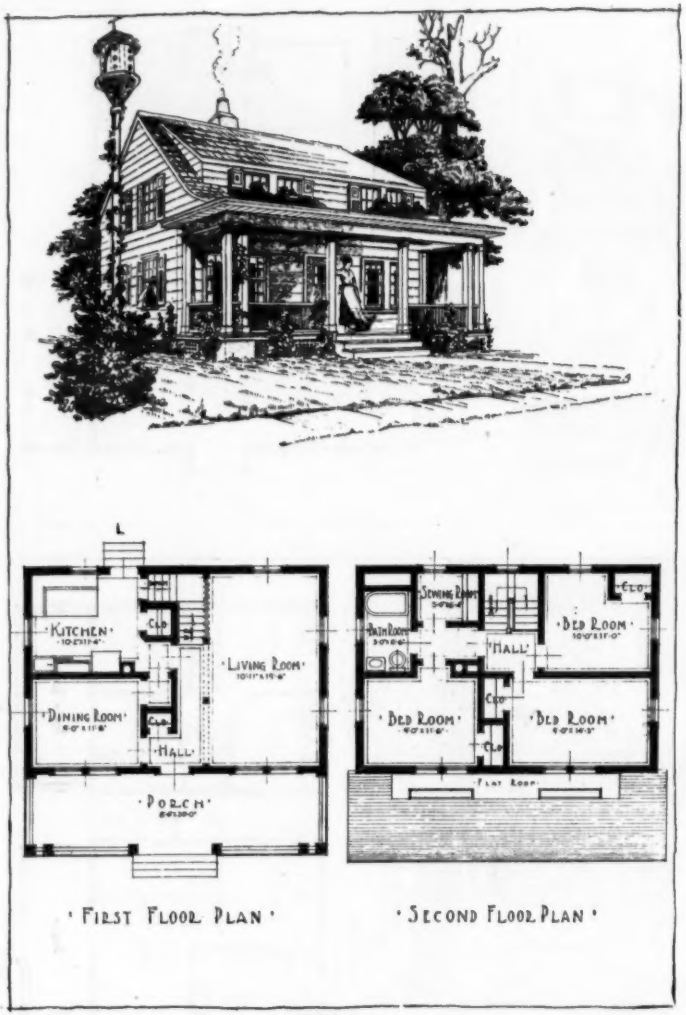
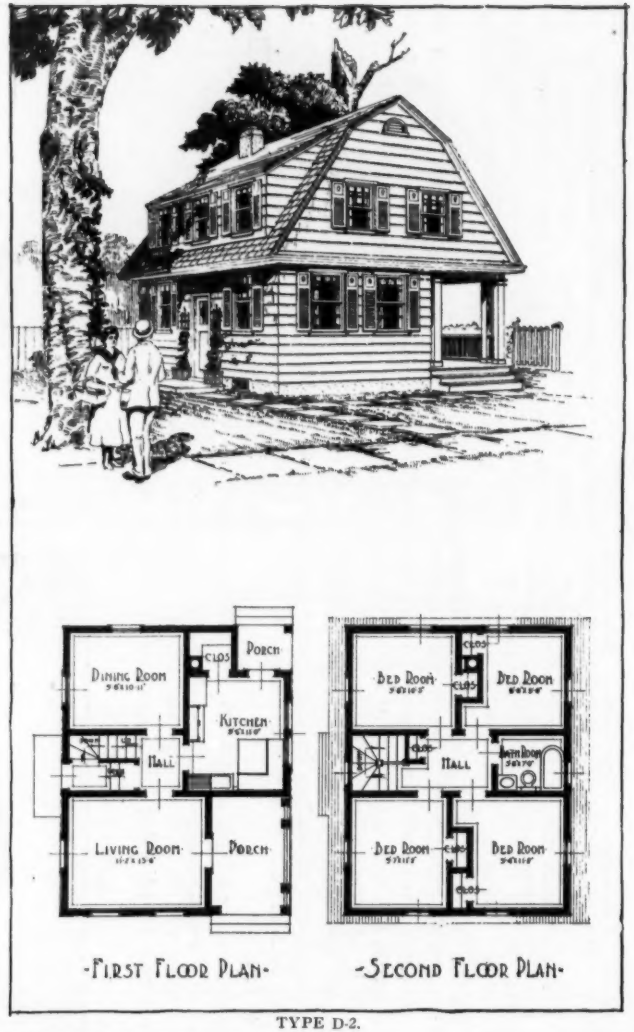


TYPE C-5.

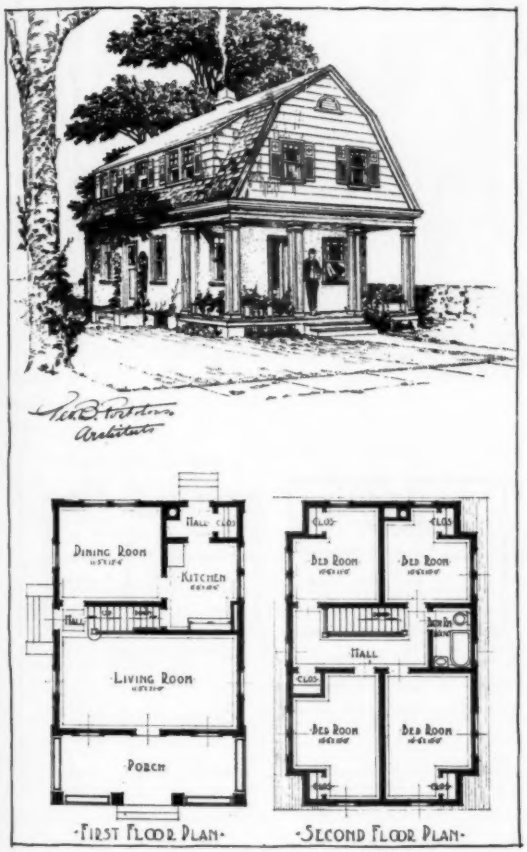


TYPE D-2.

TYPICAL HOUSES, ECLIPSE PARK DEVELOPMENT, BELOIT, WIS.
GEORGE B. POST & SONS, *ARCHITECTS.*

of house, including the front porch, of approximately 32 feet, the rear yard is only 28 feet deep, making the distance between the rear of the houses 56 feet. Most purchasers favor a greater distance between rears, although the effect is less happy. The lot 90 feet deep has been adopted, therefore, in the later work for the smaller houses.

Advantage has been taken of the variety of house designs produced to create groups of six to eight houses in which a single architectural effect has been preserved. By balancing types more or less



TYPE D-11.

of the same character, and setting back certain houses to give variety in the street picture, a certain unity in the composition of the whole has been effected, with desirable variety in the style and setting of individual houses.

Next to the problem of the location of the house, the most important matter in the mind of the prospective home buyer is its interior arrangement and practical convenience. All the houses have concrete cellars, with 7-foot clear headroom, under the entire first floor. The cellar is equipped with a special hot-air furnace, with flues and registers to all rooms. The furnace has a hot water back, connected with a hot water boiler, for winter use. Connections are provided for a gas heater to be used with the hot water boiler in warm weather.

A pair of washtubs is provided in the cellar of the largest houses—that is, the D, E and F types—with seven, eight and nine rooms.

All of the houses have a separate living room, dining room and kitchen on the first floor, all of comfortable sizes. There are a few exceptions in the case of the A type, with four rooms, where the dining room and kitchen are combined.

The living rooms in the four, five and six room houses have an area of 150 to 190 square feet. In the seven and eight room houses, the living room has an area of 200 to 210 square feet.

The dining room runs from 100 square feet in the smallest houses to 140 or more feet in the largest houses.

The kitchens are one of the most appealing features of properties in Eclipse Park. No kitchen has an area of less than 90 square feet, and some have as much as 115 square feet floor area. They are equipped with a modern sink and drain board, dresser and gas range. A unique feature is the commodious supply closet, with six tiers of shelves, giving ample space for storage of supplies and kitchen utensils.

In Type A houses (four rooms), in which the dining room and kitchen are combined in one large room, as mentioned above, buffet corner seats are built in. In others a dining room with an alcove kitchenette, 6 feet by 10 feet, has been constructed. The largest houses have a space in the form of an alcove, or closet, located at the entrance vestibule to the kitchen, to accommodate a refrigerator.

All rooms on the first floor have ceiling heights of 8 feet, 4 inches, clear.

Special study has been given to the most economical, convenient and sanitary type of bedroom. Such rooms have a minimum floor area of 110 square feet, and range from this up to as much as 150 square feet.

All bedrooms have two windows, each arranged on opposite walls, to give proper cross ventilation.

Every bedroom has a clothes closet, and on each bedroom floor there is, in addition, a linen closet, which is in itself a feature that will appeal to the careful housewife. The ceiling heights on the second floor are 7 feet 9 inches clear. Where a roof causes part of a ceiling to slope, there is at least a height of 5 feet at the lowest point.

All houses are equipped with modern bathrooms, complete in every respect, including a porcelain tub,

washbasin and sanitary fixtures. Lighting is by electricity throughout.

The houses are of frame construction, with clapboard, shingle and stucco exterior walls. Only the best materials are being used, and the closest supervision is being given to the work of construction.

Of the four room houses (A type), there are ten variants; of the five room houses (B type), eleven variants; of the six room houses (C type), nine variants; of the seven room houses (D type), eleven variants; and of the eight room houses (F type), there are two variants, with additional designs and preparation.

The architects have made a special effort to produce the variety and individuality in the houses which the promoters especially desired, without sacrificing the architectural harmony of the entire development. In locating the houses on the land this consideration has been equally potent. In one block where 13 four-room houses have been located, nine different designs are seen. In this arrangement there is no danger of monotony, and it has the advantage that the prospective buyer is more strongly attracted by a dwelling that is a little different from that of his neighbors.

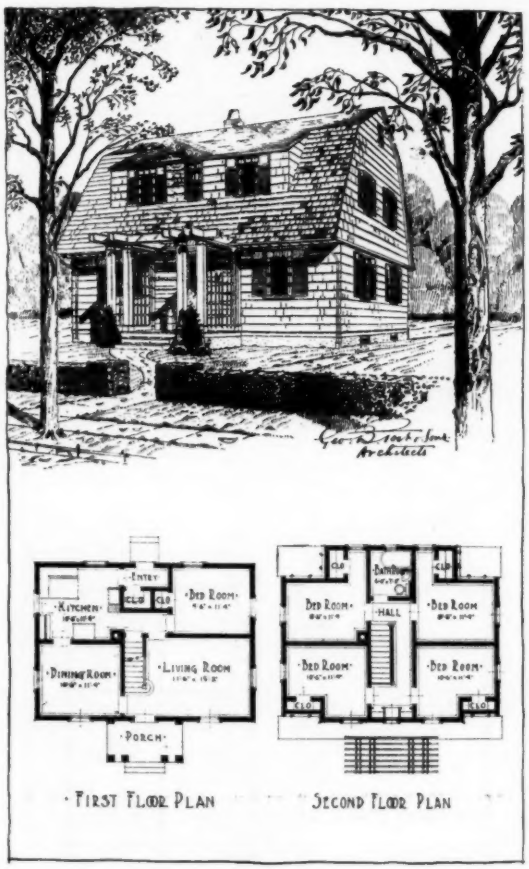
As a further illustration of the care with which the architects have studied their problem in this respect, reference should be made to the ingenious variations in the style of outside shutters used in different houses, eight different types of shutters having been adopted; similarly with regard to the treatment of the chimney caps, seven different types having been evolved, and five different types of window boxes, each one suited to the particular house on which it is to be used.

In some cases living room windows are paired and are without shutters, in other cases have shutters, and in still others the windows in the living room are separated and have shutters.

Frequent use has been made of the various types of roofs, some with single pitch with or without dormers, others single pitch with curving eaves and dormers, and still others with gambrel roofs and dormers. The hipped roof has been used sparingly.

Various types of porches have been used to give variety to the 30-odd designs which were created. Most frequent use has been made of the built-in porch extending the entire length of the house, and of the inserted porch on one corner of the house also. Less frequently the free-standing piazza has been used. The inserted porch at the one corner of the house is not as highly favored among small home owners as the larger porch, but its advantages in planning the five room house are unquestionable.

In considering the Beloit development as a whole the architects and town planners were favored by having a tract to develop which lent itself readily to an attractive and economic layout, so that the advantages over the rectangular scheme of platting were especially notable. The success which has attended their efforts to design a low-cost wage-



TYPE E-1.

earner's house has been due to an intensive study of the actual needs of the families who were to be housed, and to a scientific and detailed investigation of the problems of construction, floor planning and use of materials. The problems of architecture and design have been treated with consideration and co-ordination of the other elements which the problem presented, so that the result, as a whole, has been a distinct forward step in the solution of the problem of housing the wage earner—one which, to-day, is of vital interest to the architectural profession.

Specimen Requirements for a Y. M. C. A. Building for Community of from 200 to 500 Families

In Two Parts—Part II*

BUILDINGS of this type are adapted for use of the men, women and children of the community in which they are located. Many of the rooms, such as the general, social lobby, the auditorium, educational and clubrooms on second floor, are to be used by both men and women. The billiard room, men's reading room, men's locker room and baths are intended to be used by men only. The boys' social and club room is for exclusive use of the boys. The women's club room on second floor is for exclusive use of the women. The education and club rooms on the second floor are intended for education and club or social gatherings as will hereafter be described. The girls of the community will be classed with the women, and when taking advantage of the privileges of the building they would be under the same restrictions as the women.

This plan contemplates a two-story building of semi-permanent character which may easily be made of a permanent character with little or no change in the plan. The building is to be of a type of construction which may easily last from five to twenty years, and the recreation building could be of the same type of construction.

It is necessary to make separate social room provision for the boys, as their presence is, as a rule, resented by the men and would soon cause the men to forego the use of the building, and it would then fail to fulfill its purpose as a community recreation building. Separate toilet, separate locker room and separate baths are provided for the boys.

As the women will not use the gymnasium for more than one period during the week, and as this would undoubtedly occur in the afternoon or morning, it is recommended that they use the boys' locker rooms and baths. The boys' baths can be adapted for the use of women and dressing spaces provided. The women can enter at the side entrance to the auditorium and from there into the passage leading to the boys' locker room. The door from this passage to the boys' social room would be locked at this time, and would thus give the women the exclusive use of the boys' locker rooms, showers and the gymnasium. The women could also pass up the outer stairway to the women's department on the second floor, if they desired, without having to pass through the boys' or the men's social rooms.

It should be noted that the men and women enter directly into the social lobby which would be for the use of both men and women. From this lobby the women can pass up to the second floor where their club room and toilets are located, and immediately adjacent to their club room will be the quarters of the visiting nurse.

The boys will have a separate entrance, as it is not desirable that the boys and men come in the same entrance if it can be avoided.

In this size of building a large room or space is provided which can be used for either a gymnasium or an auditorium. In the larger buildings a separate room for each of these functions is provided. Bowling alleys are not recommended for groups of this size, by reason of the amount of space required for the alleys, the cost of installation and the cost of maintenance. The space occupied for the bowling alleys would provide service to a limited number of people. The different functions should be studied carefully as relating to the service they would give to the greatest possible number. In the larger buildings provision is made for bowling alleys.

Location

The building should be located on an entire block, approximately 200 ft. by 600 ft. This would permit the building to be placed at one corner or possibly in the center and the balance of the block to be used for recreation purposes. This outdoor field would then be under the direct supervision of the physical director who has charge of the physical work of the building, and would avoid duplication of service.

The games provided for in the outdoor recreation work should be such as can be played by the greatest number with the least requirement for expert skill or knowledge. Provision should be made for outdoor volley ball, outdoor basket ball, and soft ball baseball. A regulation baseball field can be provided if the property is large enough, but if this would take up too great a part of the playground, it may be installed in some other place, so that the available space be used for those games which appeal to the greatest numbers. The provision for tennis, outdoor bowling and roque should be a question of the character of the groups of people who are to use the building. In most cases tennis does not appeal strongly to industrial families. Many groups of foreigners are, however, interested

Continuing A Needed Supplement to Industrial Housing, by Charles R. Towson, Secretary Industrial Department, International Committee Y. M. C. A., in issue of May 15.

in outdoor bowling and in roque. The plot of ground set aside for the recreation building and playground should be near the homes and not necessarily near the shops or plant.

Schedule of Rooms and Spaces

BASEMENT: Boiler room, coal space, ash space.

FIRST FLOOR: Men's and women's main entrance; men's and women's social room and lobby; men's reading room and quiet room; men's billiard room; general office and refreshment counter; general secretary's office; men's coat room; men's toilet room; barber shop; physical director's office and examination room; men's locker room; men's shower room; boys' main entrance; boys' social room and game room; boys' office; boys' toilet; boys' coat room; boys' locker room; boys' shower room; gymnasium and auditorium with stage; storage room for apparatus and chairs; janitor's sink closet and storage.

SECOND FLOOR: Women's club room; women's toilet room; visiting nurse's room with bath; kitchenette; three small class rooms; two large class rooms; gallery of auditorium and gymnasium; dressing rooms for stage of auditorium; moving picture machine room; emergency exit stairs from gallery of auditorium; resident secretary's living room, bed room and bath; chair storage and janitor's sink room.

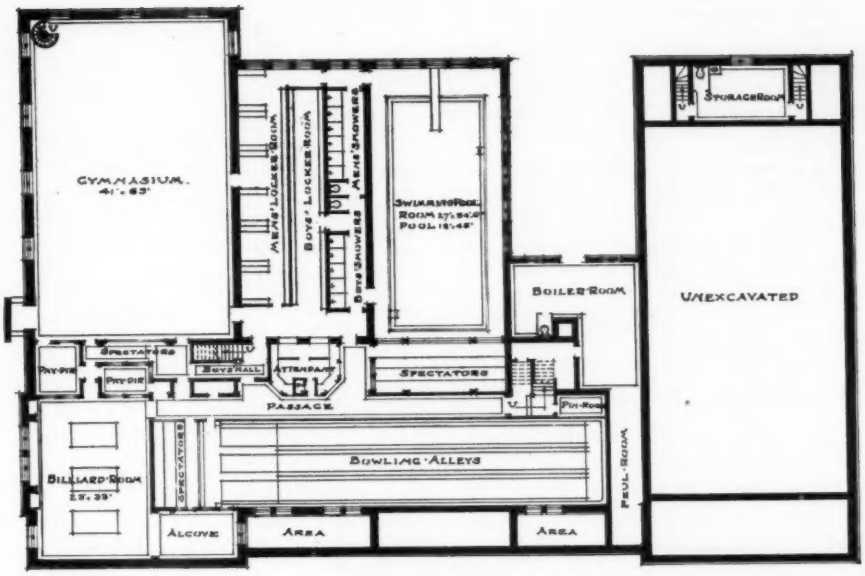
Description of Rooms and Spaces

FIRST FLOOR

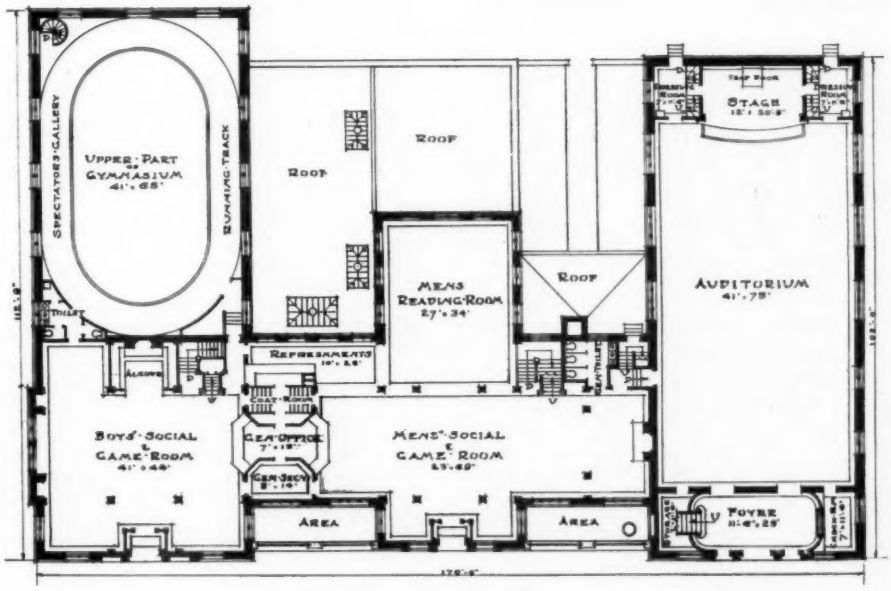
Men's and Women's Main Entrance—This should be located on the front of the building, which should be on the principal street. There should be no large covered porch at this entrance to provide a loafing place. Where these porches have been provided facing the street and men have been permitted to gather there in the warm evenings, it has been found that careless remarks are often made referring to passers-by which have seriously injured the character of the building and have been a detriment to the work they were designed to carry forward. A hood or a protecting covering, which would be useful in case of storm, is not found objectionable. This entrance should enter directly into the main social room and lobby. The boys will be provided with a separate entrance as later described.

FIRST AND SECOND FLOOR PLANS, TYPICAL Y. M. C. A. BUILDING.

Men's and Women's Social Room and Lobby—This room, which should be approached directly from the main entrance, should be available in community work for both men and women. It should be large and well lighted and planned to give a distinctly club-like feeling. The rather cold feeling of the hotel lobby feature should be avoided. A large, attractive fireplace should be installed in this room, and the arrangement of the furniture such as to divide the room naturally into groups. Careful atten-



BASEMENT PLAN.



FIRST FLOOR PLAN.

Y. M. C. A. BUILDING, DANVILLE, VA.

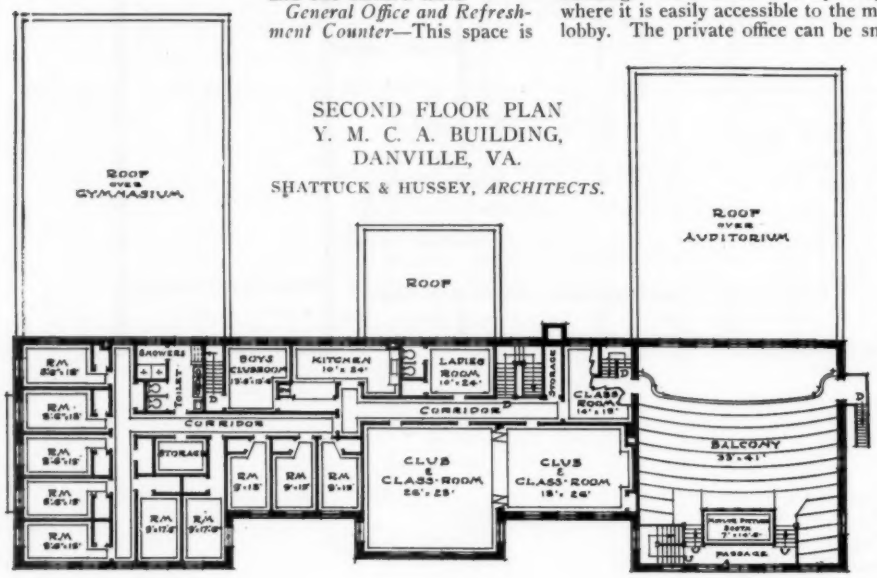
SHATTUCK & HUSSEY, *ARCHITECTS.*

tion should be given in the plan as to the effect of this room on those who enter through the main entrance.

Men's Reading Room and Quiet Room—This room should be adjacent to the social lobby and separated from it by a partition with glass doors and windows of clear glass. There should be bookcases for books of an industrial nature and general reading. Install one or two large tables with magazines and papers. The room should be well lighted and cheerful.

Men's Billiard Room—Should be adjacent to the lobby and provided with three tables, preferably two pool tables and one billiard table.

General Office and Refreshment Counter—This space is



SECOND FLOOR PLAN
Y. M. C. A. BUILDING,
DANVILLE, VA.
SHATTUCK & HUSSEY, *ARCHITECTS.*

important and is in reality the heart of the first floor plan. The success of a recreation building is largely dependent upon successful control and economical maintenance. In order that the requirements of these two functions may be met as nearly as possible, the general office must be so located as to control and oversee the greatest possible number of the rooms and spaces on the first floor. The general counter is so located and designed that the one attendant can take care of the boys and men, the refreshment counter, billiard room, the cigar counter, the candy counter, keys for men's lockers, keys for boys' lockers, coat rooms and entry to auditorium.

In case the manufacturing plant which this building is to serve should be running on shifts, there would undoubtedly be needed two counter attendants to keep the building going at night. The work of the attendant for this general office and counter should not be undertaken by the general secretary, as it would seriously interfere with the community work, which he should handle and for which he should be especially fitted. The counter attendant should be able to see the entrances to the men's toilet or barber shop and the boys' toilet room. Both the men's and the boys' main exterior entrances should be under control from this counter. This counter should be of sufficient size to provide space for the sale of light refreshments such as soda, soft drinks and sandwiches.

A building of this size would be so planned that it would take three men, exclusive of janitor service, to run the building, and these three men would be the general secretary, who would have general charge of the building, including the community work, religious work and educational work; the physical director, who would have charge of the work in the gymnasium and the playground in connection with the building; and the counter attendant, whose duties would be as above described. If the building was to be used by men working in shifts it would, of course, be necessary to use at least two counter attendants as noted above. The notation of the men required to operate the buildings does not, of course, include the visiting nurse.

General Secretary's Office—In this size of building there should be a small private office and directly outside of this an open rail space. The secretary would have a desk in this open rail space, which he would generally use so that he is easily accessible to the men and women entering the building. This office and open space should be located where it is easily accessible to the men's and women's social lobby. The private office can be small, as the directors or committee of management can meet in one of the class or club rooms on the second floor.

Men's Coat Room—This should, if possible, be located adjacent to the general office, so that it can be supervised from the general office. It is also desirable to locate it so that it can be used in connection with the auditorium. There should be a door from the coat room to the public corridor or lobby. This door should be of the Dutch door type, so that the coat room can be handled by an attendant at rush periods or can be "self-service" at slack periods.

Men's Toilet Room—This space should be convenient, but should not open directly off the social lobby. It would be better to locate it on a secondary lobby or corridor. It would be desirable to have the door visible from some point in the general office space if possible. If the barber shop is used, it would constitute an entry to the toilet room in most cases. This toilet room should have two or three waterclosets and three or four lavatories.

Barber Shop—The question as to the advisability of the installation of a barber shop would be governed by local conditions. In many cases it has proved very popular. One chair would not pay, and two chairs are the least that should be provided for. This space need not open off the lobby—it is considered more desirable that it open off a secondary corridor or lobby. It has proved very desirable in many cases so to locate the barber shop that one passes through it on the way to the men's toilet room, but it should be so planned that it would be thoroughly protected from any odors from the toilet room penetrating into the barber shop, and this would mean that both the barber shop and the toilet room should be well ventilated.

Physical Director's Office and Examination Room—This can be one room, so arranged that a small portion can be curtained off when it is necessary for the physical director to make an examination of a man or boy who proposes to do gymnasium work. The room should be immediately adjacent to the gymnasium and the locker room. If possible, it should be convenient to the men's social rooms or spaces, so that the men interested in physical or gymnasium work would have no trouble finding the physical director. The room should be provided with a closet and there should be a door, glazed with clear glass, opening directly from the physical director's office into the gymnasium.

Men's Locker Room—This space must be adjacent to the gymnasium, and under normal conditions there should be a door leading directly from the locker room to the gymnasium. This room should have capacity for from fifty to seventy-five dressing lockers each 12 in. by 12 in. by 60 in., and 175 to 200 box lockers. There should be a lavatory in this room and a watercloset should be provided, accessible from this room or from the drying space of the showers immediately adjacent. There should be a door in this room leading directly to the shower room.

Men's Shower Room—This space must be adjacent to the locker room and must be separated from it by a full height partition and not a half partition, as the steam from the hot water used must not enter the locker room any more than is absolutely necessary. The best plan for shower room is to divide it into two parts, one a shower space and one a drying space. The floor of the shower space should be sunken slightly below the floor of the drying space to keep the water out of the drying space as much as possible.

No good substitute has been found for marble or ceramic tile for facing the walls of the shower space up to a height of 7 ft. The best floor has been found to be a ceramic tile floor and no plaster for side walls above the marble or tile and from the ceiling.

The floor construction under the shower rooms and drying space should be of concrete construction to avoid shrinkage and thus cracking the tile or marble of the showers and creating leaks and an unsanitary condition. It is also recommended that the floors of the general toilet and men's locker room be of concrete construction. There should be as little woodwork as possible used in connection with the shower and locker rooms. Use metal-covered doors and door jambs with plaster or metal corner, and no wood casings. The doors would have wire glass panels. The windows would have as little woodwork as possible and no wood casings or window stools. There would be no subdivisions between the showers dividing them into separate stalls.

Boys' Exterior Entrance—This should be separate from the men's entrance, as men and boys will not mix, and the boys tend to drive the men away from the building. This entrance should lead directly into the boys' social and game room and should be visible from the general office counter of the boys, which would be a part of an extension of the general office. There should be no porch at boys' entrance which would permit of loafing.

Boys' Social Room and Game Room—This room should be an attractive and well-lighted room and should be provided with a large fireplace. There should be a pool table and cue-roque tables. There should be small tables for games and a table for magazines.

Boys' Office—This should be an extension of the general office if possible, so that the general office attendant can take care of the needs of the boys and can supervise the boys' social and game room. From this office counter the attendant should be able to see the entrances to the boys' toilet, the boys' locker room and the boys' coat room. There should be storage space in this office for the storage of small games.

Boys' Toilet—This room may open off the boys' social room if necessary, or off a small corridor or hall, but the door should be under observation of the attendant at the counter. Provide two waterclosets and two lavatories.

Boys' Coat Room—This should, if possible, be close to the counter of the boys' office, so as to permit the counter attendant to supervise it partially. The door from the boys' social room to the coat room should be of the Dutch door type, so that the coat room can be "self-service" or in cases when the entertainments are being given, can be handled by an attendant.

Boys' Locker Room—This should be located between the boys' social and game rooms and the gymnasium. The locker system may be of the Kansas City type or a modification of the "self-service" type. If the Kansas City type were used, the boys' attendant space would have to be provided with storage for from 100 to 150 wire baskets and from fifty to sixty dressing lockers should be provided in the locker room. If a modification of this is used, the shelving for baskets can be provided in the locker room with wire guards to protect them, as the boys only use the gymnasium in class work at specified periods and do not have access to the locker room except at those periods, and then under the supervision of the physical director. There should be a lavatory in this locker room and there should be a watercloset accessible from the locker room without going outside.

Boys' Shower Room—This should follow the same general principles as the men's shower room, and there should be no subdivisions between showers dividing them into individual showers.

In this size of building separate provision of showers and lockers would not be made for women. Women can be given the use of the boys' locker room and showers for the one period per week which is commonly assigned to them. To accomplish this a certain arrangement can be made, which will provide three dressing spaces connecting with two showers in the shower room. This curtain arrangement can be removed easily, and as this would need to be done but once a week, the difficulties are not serious. The women must be provided with dressing enclosures in connection with their showers, as they cannot be handled in the same way that men are treated in this respect.

Combination Gymnasium and Auditorium—This is one of the most important rooms in the building and should be planned and detailed to answer for both a gymnasium and an auditorium. This can be done by taking a gymnasium and adding the stage and dressing room. The gymnasium should be about 45 x 65 or 45 x 70 ft. on the floor, not including the stage. The stage should be a permanent, raised stage with proscenium opening and small dressing rooms. Footlights are not necessary. The main entry to this room for the public when an entertainment is given should be through the men's social room or the corridor adjacent, as it is desired to have the people come through the building so as to become familiar with it. There should also be a direct exit and entrance from the exterior for emergency purposes, though not for general use.

The spectators' gallery, which will be described in connection with the second floor, will be 12 ft. above the floor of the gymnasium. The windows on the first floor portion of the gymnasium and auditorium will be so located as to height that the stools will be 5 ft. 5 in. above the floor, thus allowing for apparatus storage. The main stairway from first floor to second floor will give access to the spectators' gallery. In addition to this there should be provided, if possible, a separate stairway in connection with the exterior emergency exit or entrance, which will provide direct exit from the gallery in case of emergency.

Janitor's Sink Room—This room should contain a slop sink and shelving and hanging space for janitor's equipment. It should not be in a toilet room, as it cannot be foretold whether the janitor service for cleaning will be male or female help.

SECOND FLOOR

Women's Club Room—This room is placed on the second floor, as both women's and boys' club rooms cannot be placed on the first floor without enlarging the area to an undesirable extent. The boys must have supervision, and in buildings of this size this supervision must be given by the men's secretary and the counter attendant, as it is not desirable to provide a boys' secretary, except in the larger buildings.

The only supervision necessary for the women would be undertaken by the visiting nurse. This room is for general social purposes and it should be large enough for club meetings for at least twenty to thirty women.

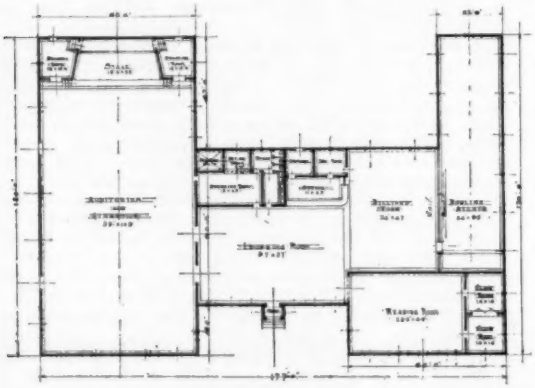
Women's Toilet Room—This should be placed adjacent to the women's club room and should be provided with one, or preferably two, waterclosets and two or three lavatories.

Visiting Nurse's Room—The provision of a visiting nurse's room is strongly recommended, as in addition to

her professional work in the community she can direct many of the women's activities in the building. Her presence would also tend to make the women feel more free to use the facilities of the building than if all of those in charge were men.

Visiting Nurse's Toilet Room—This should open directly off the visiting nurse's room and should be equipped with tub bath, lavatory and watercloset.

Kitchenette—If possible, this should be placed between the women's club room and the class or lecture rooms, or



FIRST FLOOR PLAN, TYPICAL Y. M. C. A. BUILDING

should be so placed as to serve both with the least possible interference. The kitchenette is to be used to serve light refreshments for small gatherings or could be used to serve suppers to small groups. It need not be large enough to feed banquets.

Class Rooms—These would handle class, club and social work. It is recommended that there be three small class rooms about 12 ft. by 18 ft. or 12 ft. by 20 ft., with folding partitions between, so that they can be used as one, two or three units; one large class room, or better, two of medium size, which can be separated by folding partitions between, so that they can be used as one, two or three units; one large class room, or better two of medium size, which can be separated by folding partitions, and when thrown open will accommodate from seventy-five to 100 for lecture purposes. It would be desirable so to locate this large class room or lecture room that the stereopticon or moving picture machine which is used for the large auditorium could be reversed to throw pictures on a screen in the lecture room.

Gallery of Auditorium and Gymnasium—This should be 6 ft. wide on the sides and from 6 ft. to 8 ft. wide in the rear. This gallery should be readily accessible from the main stairway leading from the first floor to the second floor. It would be desirable to have emergency stairs in addition to the main stairway already described. These stairs would lead from the spectators' gallery directly to the first floor and would land adjacent to the exterior entrance to auditorium. The gallery should be suspended from the roof girders or trusses, as no supports of any kind are permitted on the floor. There should be two rows of seats on the sides of the gallery and one or two in the rear.

Moving Picture Machine Room—This should be in the rear of the auditorium gallery and must be fireproofed or semi-fireproofed for walls, floors and ceilings. A vent must be provided through the roof. State laws frequently cover the details of the construction. The projector openings should be high enough to clear the heads of spectators in the rear of the balcony.

Resident Secretary's Living Room, Bedroom and Bath—In many cases it is desirable to provide this space for a resident secretary, particularly if the building is to be used by men working in shifts.

Chair Storage—A large storage closet should be provided for the storage of chairs and tables. As suppers will be given in the class or club rooms, we must have storage space for the bucks and table top as well as the chairs.

Janitor's Sink Room—This should be accessible from some hall or corridor for the same reason as given for the janitor's sink room on the first floor.

SCULPTORED RELIEF. ARCH OF TITUS, ROME

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A Promise of the Future

THE steel market has usually been accepted as an indicator of business conditions. While this view is general, it has been almost universal with those connected with the building industry, in which activity the factor of the steel supply, in various forms, is a very important element. With the great demand for steel which resulted from the outbreak of the war in 1914, the supply to the building industry was greatly restricted and almost entirely disappeared. The natural result was a complete stoppage of major construction in which structural steel is a vital necessity.

The producers of steel have risen to the demands and the output has been brought to a maximum, dependent only on transportation. The War Industries Board has decided to test the ability of the producers to fulfill all Government requirements, these requirements to include the needs of the railroads, agricultural implement plants, mines, oil wells and other essentials. They have sent a pledge form to every member of the American Iron and Steel Institute, which is a promise to subordinate all commercial demands to Government requirements. This will be done unanimously, and it is confidently expected that the steel producers will demonstrate their ability to meet all governmental demands and still have a substantial surplus for commercial needs.

Commenting on the situation *The Iron Age* says:

"There is the opinion among producers that a 60-day concentration on Government orders will make it possible to resume general business to an extent. The War Industries Board does not encourage that view, even intimating that summer operations must provide against the chances already looming up of a fuel and car shortage next winter.

"The plan is to hold the steel men strictly to their pledge and a close check will be kept on all deliveries for individual account. It is not overlooked at the same time that allowance must be made for the wants of consumers who make stock products which are constantly drawn upon by manufacturers directly or indirectly working for the Government.

"The cars already given out at Washington or offered to the builders on the basis of 5 per cent profit foot up 85,000 to 90,000 and the full 100,000 in the original program will be allotted, but car companies are not enthusiastic over the bargain driven by the Government."

Reliable sources of information indicate that the manufacturers, not only of steel but of all other building materials, are in a position to supply a very considerable demand for all materials used in building construction. The only possible drawback is transportation, and as the Government has ample means and authority to provide for this need, the responsibility is clearly established.

While the War Industries Board does not share the opinion of the producers, as expressed above, the manufacturers of staples in this country have always shown themselves to be reliable judges of their ability to produce. That all demands, both on the part of the Government to supply transportation and on the part of the producers, will be successfully supplied is to be expected, and the future of the building industry appears more promising than for some time. With a supply of structural steel available, there will naturally be a revival of building construction, and, as stated above, a 60-day test will clearly indicate the future.

A Convincing Demonstration of Art's Assistance in War

THE essential part that artists are being called upon to play in this war is constantly increasing. The idea, strongly implanted in the minds of a large proportion of those in control of our war preparation that art was but a recreative thing, pursued properly only in times of peace, is rapidly becoming dissipated. The error made, almost at the outset, in ignoring the freely offered services of architects in the essential fields where their training fitted them for the most valuable co-operation, is now plainly seen and is rapidly being corrected.

In the news columns of this issue reference is made to the important and extremely useful part that artist painters are taking in the painting of range-finding pictures of large dimension, which

will lend valuable aid in educating men for aerial and artillery service.

The idea of these range-finding pictures originated with our French allies, who at the outset used lithographs or large colored prints for this purpose. A group of men and women in this country early saw the opportunity for artists to render valuable and patriotic service, and the result of their activity is the completion of a series of most admirably painted canvases, now in practical use in the Government training camps.

The majority of people are not close observers of the conformation of land, the essential details of the open landscape. In the hazardous work in the comparatively new field of aeronautics the necessity for a trained power of observation of the highest type is of first importance. These large range-finding pictures serve a very useful purpose in enabling the instructors to determine to just what extent the student aviator is able to observe quickly and accurately. It is quite certain that many of these things which are becoming part of the education of the modern soldier will have been found to be such important features in education as to become included later in certain courses of school work.

If these things serve to show that art is not a recreation but a necessity, we shall in this country have learned the lesson, and in a comparatively short time, that it has taken other nations centuries to master. These things go to prove that art is a practical necessity, not a hobby or a fad. The co-operation of artists in the war, to the valuable and practical extent that has so far been demonstrated, is a more conclusive argument than all the books and learned essays that have ever been written.

Design in Concrete Buildings

OVER forty years ago there were published in THE AMERICAN ARCHITECT several articles on the use of concrete as a structural material. It is doubtful if those who discussed the subject at that time had any clear idea of the great development in its use to take place within a comparatively short time. While there was some cement construction in those early days, the real utilization of this material did not occur until the later 80's, when principles of reinforcement were applied; but in the subsequent quarter-century this type of work has made enormous strides.

This, however, is true only in its mechanical aspects. As for the design of concrete, little progress has been made. The work accomplished has been chiefly that of a few men in the western section of the country. A real appreciation of the material with which they were working, and some thought as to its proper uses, has been shown by these men, as indicated by the results accomplished.

The steamship piers on Water Street and Twenty-second Street, New York, and several examples of construction in Detroit, Chicago and other western cities, are encouraging instances, showing what could be done with this material if our architects would all put their minds to the task.

In view of the remarkable developments in practically all other branches of architectural effort, it is all the more surprising that so little progress has been made in this direction. In other fields of architectural endeavor there has been steady and constant improvement, while concrete, in large part, still follows the types adopted in the earliest stages of its use. There is the reproduction, in a new material, of types previously constructed in another, quite ignoring all the good qualities inherent in the new, except those of a structural nature.

The very name—concrete—suggests a monolithic mass; and it would seem logical for that quality to dominate throughout the design. That this has not been done generally must be evident to anyone who observes the concrete structures of to-day.

The average concrete building, with its horizontal and perpendicular lines strongly accentuated in white, while the panels are filled in with red brick and glass, resembles nothing so much as a huge checkerboard set on edge. Surely there can be found some less crude and inharmonious combination of colors that will give more pleasing results; and just as surely, there must be possible some arrangement of the structural elements that will result in a more attractive building, without losing that factor of economy which is one of the primary advantages of the material.

At this time, when war demands have created a scarcity of the usual structural materials, it would seem that there should be a most appropriate opportunity for architects to develop these possibilities, until concrete design shall have at least an excellence equal to that developed in other lines of architectural endeavor.

Planning for Domestic Efficiency

EFFICIENCY in the household, although a much discussed and exploited subject, differs very little, in its elemental aspects, from any other sort of efficiency. In its first causes all efficiency depends upon the elimination of waste effort and upon sensible and comfortable provisions for the welfare of the worker.

Manufacturers have come to recognize the significant relationship between their output and the physical aspect of their factories; when they progress a step further and take heed of the bearing which the worker's whole environment has upon his output, industry will have advanced indeed. Theoretically, no doubt, it is conceded at the present time that domestic content has a very distinct effect upon the morale of the family, but it is still a matter of doubt just how far the manufacturer or others interested in housing will go in the development of this idea in its relation to industry. However, a worker, particularly if he be of the higher type, coming from a clean, comfortable home, leaving a happy and contented family, with worries minimized by reason of the knowledge that they are free from dangers due to unhealthful conditions and evil influences, must be recognized as a valuable industrial asset.

This is quite aside from his influence as a stabilizer, which is of itself sufficient reason for giving the worker the environment he needs, in view of the present excessive labor turnover, with its attendant great and unnecessary waste of money, effort and precious time.

It is recognized, of course, that it is not an easy thing to make the low-cost house attractive and livable, and that funds are not always available for large scale operations. But if housing operations of any permanent kind are contemplated, it should be borne in mind that economy in construction does not necessarily mean cheapness in first cost. Durability of materials, proper installation of utilities and correct planning and design will make for much greater ultimate economy, not only in the actual housing operation but in the entire industrial scheme, than could possibly be effected by the wholesale erection of flimsy, collapsible barracks.

It is true that for certain types of labor and for shifting classes of workers buildings of the latter type might be warranted occasionally; but equal regard for the other types of labor must be shown if the housing project is to be a success. The mental types of the occupants must be given consideration, and the plan of the house and the scheme of the whole village or section developed with reference to it. When the scheme organizes itself from that standpoint, if the architect has really got the viewpoint of the people he is to house, the worst is well over. But he must learn to recognize his types and build to fit them.

Needless to say, durability is a prime requisite in a house built for the laboring classes. Such a house is exposed to more wear-and-tear, to more danger of contamination through dirt and germs than ordinary, so that simplicity and accessibility should be kept paramount in its plan. Dark and hidden recesses which could be filled with accumulations of dirt should be scrupulously avoided, as should any extensive mouldings, woodwork or other dust catchers.

If closets are to be incorporated into the house itself, they should not be of the closed, boxed-in type, but should be enclosed on three sides, leaving one face open to give access to light and air. A curtain can be hung across this space to keep out the dust and to conceal the contents of the closet. The built-in wardrobe, where cost will permit, is a much more desirable feature, since it is less likely to be abused than the larger and less attractive looking space. Its uses are more limited, but this it not necessarily a drawback, since the tendency of this class of people is to abuse any sort of storage space woefully.

From the standpoint of the efficiency of the housewife the prime consideration becomes reducing the travel from point to point as much as is consistent with good working conditions. This is particularly necessary in the kitchen, where many a good woman has zigzagged about unnecessarily for long and weary years, without knowing that about fifty per cent of her labor was futile and without reason for being.

With the advent of furnace heating the kitchen has ceased to be the center of the household, and its formerly spacious and commodious proportions have been reduced to the minimum. A partial return to the old practice now seems imminent, due to the growing popularity of the combined kitchen and dining room. This is often a very practical solution of the problem, particularly where the plan will permit of an alcove arrangement, which gives a semblance of seclusion to the dining.

It is often possible to provide certain features of built-in furniture under these circumstances which add further to the economy and efficiency of the domestic arrangement. These fixtures can be in-

corporated into a house at the time of its erection without much cost, and make a great difference in the occupant's outlay for furnishing it. The most important of these are the cabinets and cupboards, with which every kitchen should be provided; the work bench, which may be built in connection with the cupboards; a sideboard for the dining room, or dining alcove; and benches in the alcove, together with a built-in table when it is considered advisable to provide it.

It goes without saying that every kitchen should have a sink and drainboard, and a gas stove where gas is available for cooking. It should also be understood that every kitchen should have plenty of light—sunlight—and air, and ready access to an outside entrance.

One of the most harmful economies effected in the low-cost house lies in the cramping of the staircase, which is about the first place to suffer when space is being limited. Injudicious relation of treads to risers, a riser of too great height, ill-advised disposition of winders, and dark and narrow stairs are not to be condoned. Their use, combined with faulty construction, can really be regarded as responsible for much harm. It is better to effect economies elsewhere, if necessary, in order to make possible a proper stairway, although, in many instances at least, that is the place where the architect is most willing to be niggardly.

In the low-cost houses being erected at the present time sanitary facilities are being provided very generally. A discussion of the essential requirements of each house as to bathroom equipment, closet and storage space, ventilation and the like is hardly necessary, but it should be remembered that all of these things make for the efficient operation of the home and have an important bearing upon its success.

It is not expected in houses of this type that any mechanical equipment in the way of labor-saving devices can be installed. Judicious planning, with the elimination of all unessential space, with the advantageous use of short-cuts where possible, and with simplicity in design and decoration, can, however, take the place of such equipment in large measure, and can do more toward the making of a successful house than any other thing.

An Economic War

Sounding through the numerous intellectual and often brilliant discussions of the recent convention of the National Foreign Trade Council, in Cincinnati, there was, states the *Cincinnati Enquirer*, in the opinion of some thoughtful students of its meetings, an almost inaudible but ominous undertone. Every speaker recognized and almost everybody seemed impelled to dwell upon the renewed struggle for the markets of the world which must inevitably begin the moment that peace is declared. That an economic war was certain to follow the military war appeared to be the general impression, and all seemed engaged in eager preparation for it, or to feel the necessity of doing so early and with an irresistible enthusiasm and might.

That "an inevitable struggle" for these markets must take place no thoughtful outsider can possibly deny, but the more thoughtful he was the more earnestly he would insist, we think, that nothing could be more important than just exactly what sort of a "struggle" it was going to be! Is it to be the same old ruthless rivalry and competition which prevailed before the cataclysm? Is boundless greed to dominate the activities of the men and organizations engaged in this economic war?

That there is any possible hope for universal and permanent peace without some modification of the prevailing selfishness of business in the commerce between nations seems utterly unthinkable. How that modification is to be brought about; by what principles and methods a greater sense of brotherhood and a deeper consciousness of the community of interests between the races can be attained we may not be competent to say. But, in the lurid light of the conflagration which the lust of commercial conquest has kindled, it ought to be seen by even the stupidest merchant or manufacturer that a ruthless economic war always has produced and always will produce a ruthless war of swords and guns. The man who forgets this terrible fact, or allows his agents to ignore it, is as much an enemy to civilization as a person who walks through a powder mine with lighted torches in his hands.

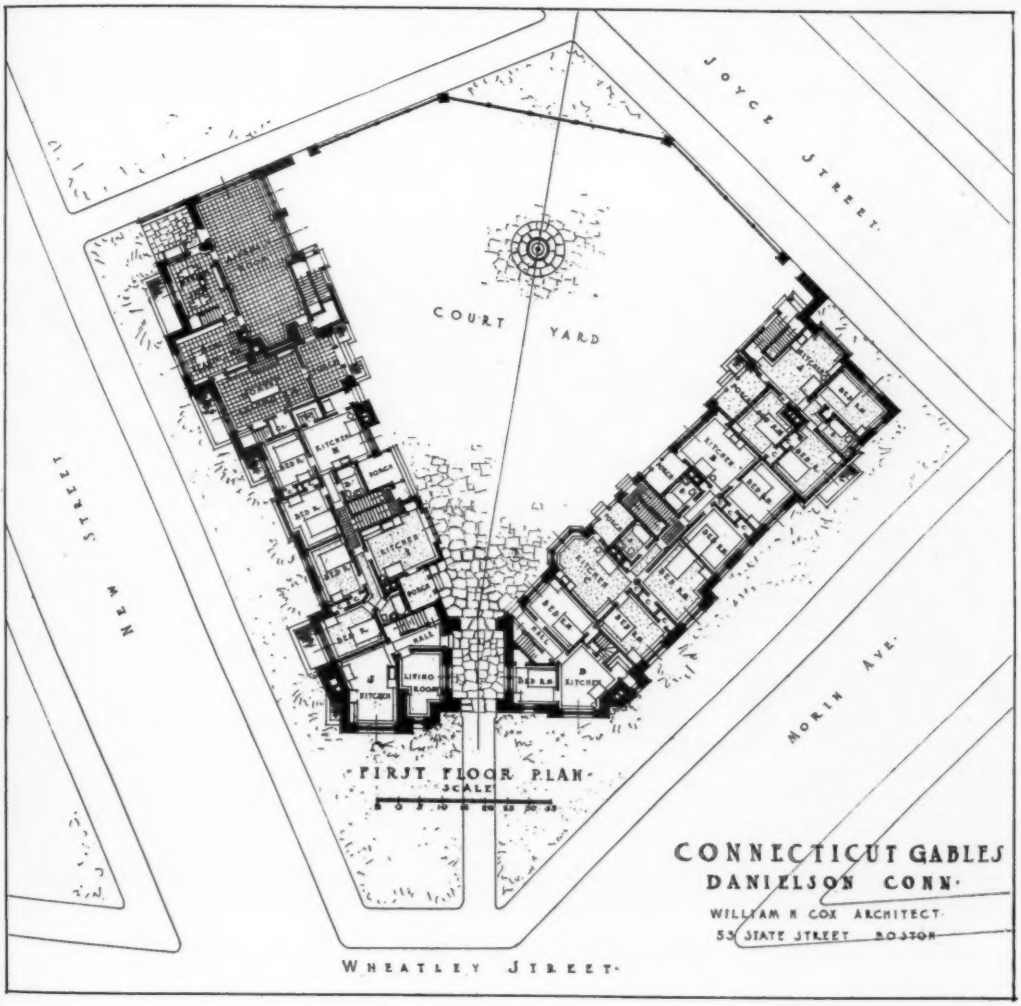
Let us all thank Heaven that the United States Department of Commerce has been wise enough to issue a bulletin denying flatly that our European Allies are planning, as had been rumored, to injure our trade when the was was over. We must be as considerate and just not only to them, but to our rivals and enemies as well, for if the Golden Rule cannot be applied to commerce the world is doomed.

Housing Development at Danielson, Conn.

By W. H. Cox, *Architect*

THOUGHTFUL planning of the housing of the employees of the Connecticut Mills Co. has proved not only a humanitarian project, but a profitable investment for that company. The Connecticut Mills are located in Danielson, Conn., a town of about 5000 people. In the planning of the houses for its employees the company has had uppermost in mind the desire to create a genuine home life, to encourage a spirit of contentment and an interest in the community among the workers. This has been accomplished by constructing houses, neither the rental nor the cost of which is prohibitive; which could be made attractive individual homes, and still preserve a harmonious whole. The development contemplates a unity group, which, when complete, will include apartments, a school, churches, a recreation center, stores, shops and theaters. There is ample space surrounding the houses for the development of gardens.

The center of the community group is the "Connecticut Gables" (see plans and perspective). This apartment house is built of local ledge stone, stucco, and half-timber, with a heavy green slate



roof. It will house thirteen families and provides also adequate club and assembly rooms for the entire community. The walls of the assembly room are panelled in cypress with heavy hand-hewn ceiling beams, and at one end of the room is a large, attractive fireplace. In the basement are general laundries for the tenants. These laundries are large, light and airy and are equipped with washing machines and dryers. A central heating plant supplies the heat for the entire building.

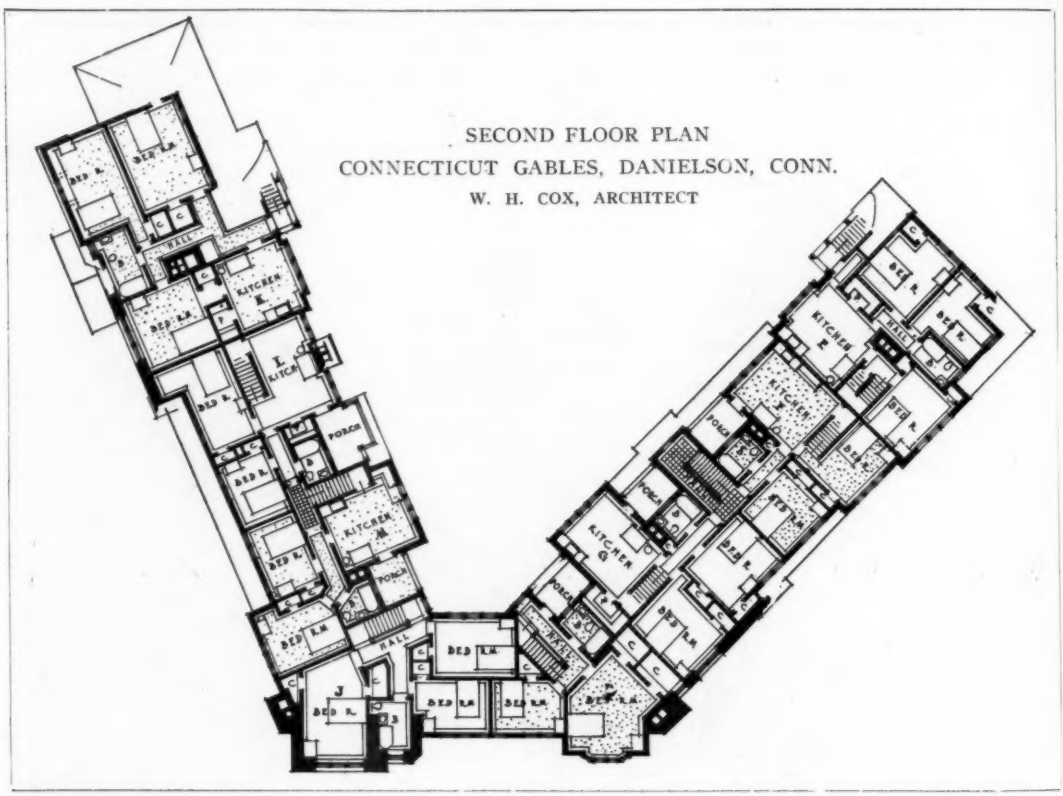
On the property there is a natural pond with rugged slopes, upon which it is planned to build one and two family houses of field stone. The cottage for the welfare worker contains, beside living quarters for herself and assistant, kindergarten rooms and equipment for cooking and domestic science classes.

In general the workmen's cottages range from five to seven rooms per family and the rent from $12.00 to $18.00 a month.

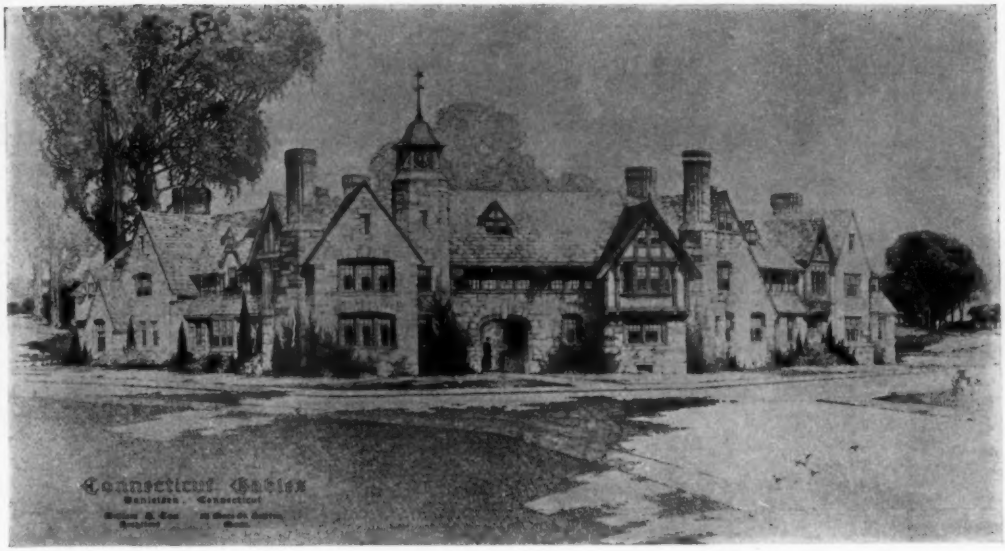
A similar development for the Canadian-Connecticut Cotton Mills is in process at Sherbrooke, Quebec.

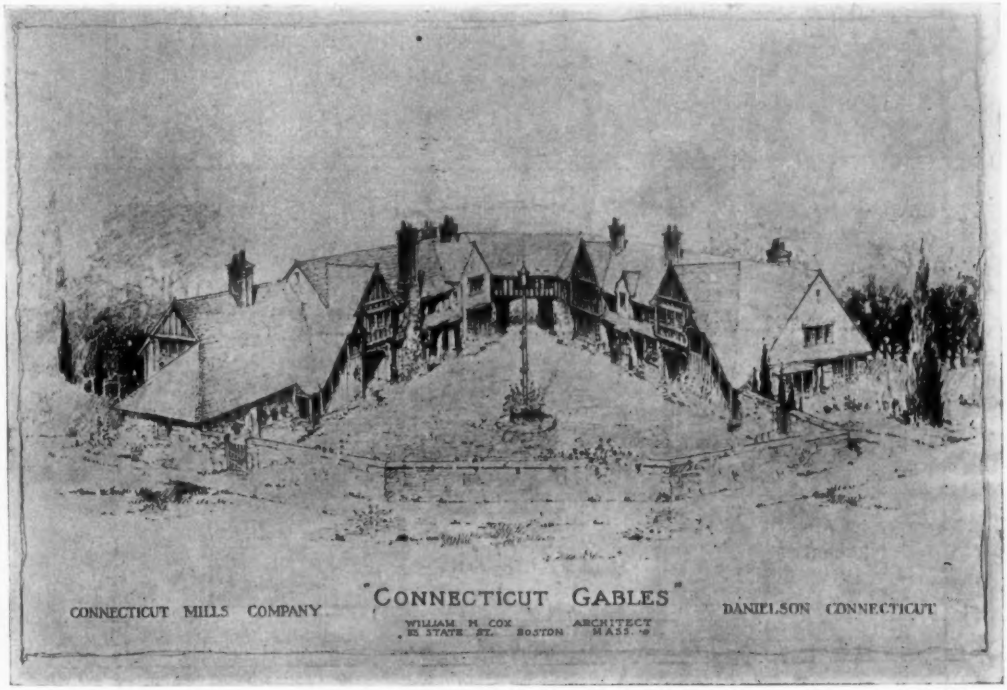
THE ABBOTT WORSTED COMPANY

Illustrations of the housing development now begun in both Graniteville and Forge Village, Massachusetts, show the character of the work being done there by the Abbott Worsted Company, which is endeavoring to carry out plans for the better living conditions of its workers.

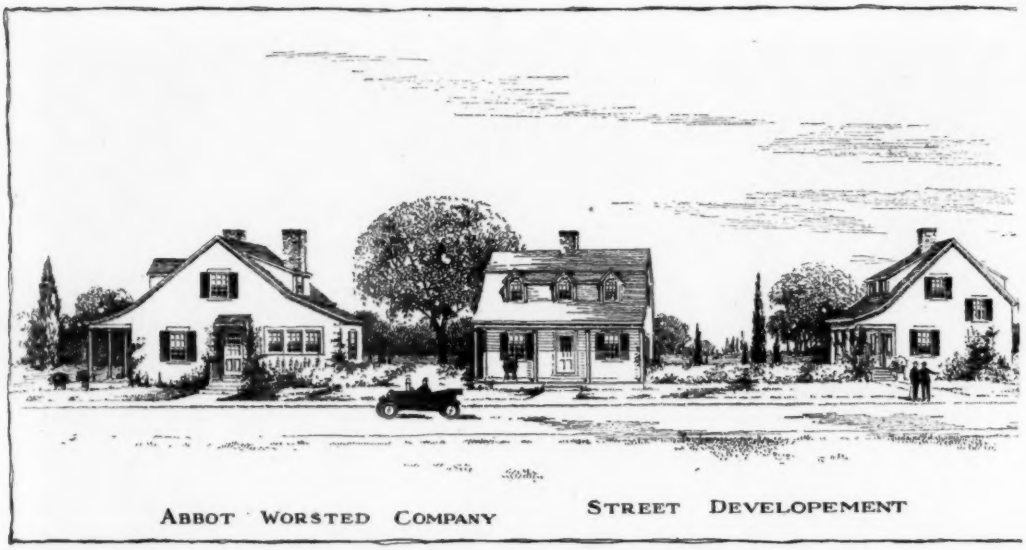


SECOND FLOOR PLAN
CONNECTICUT GABLES, DANIELSON, CONN.
W. H. COX, ARCHITECT

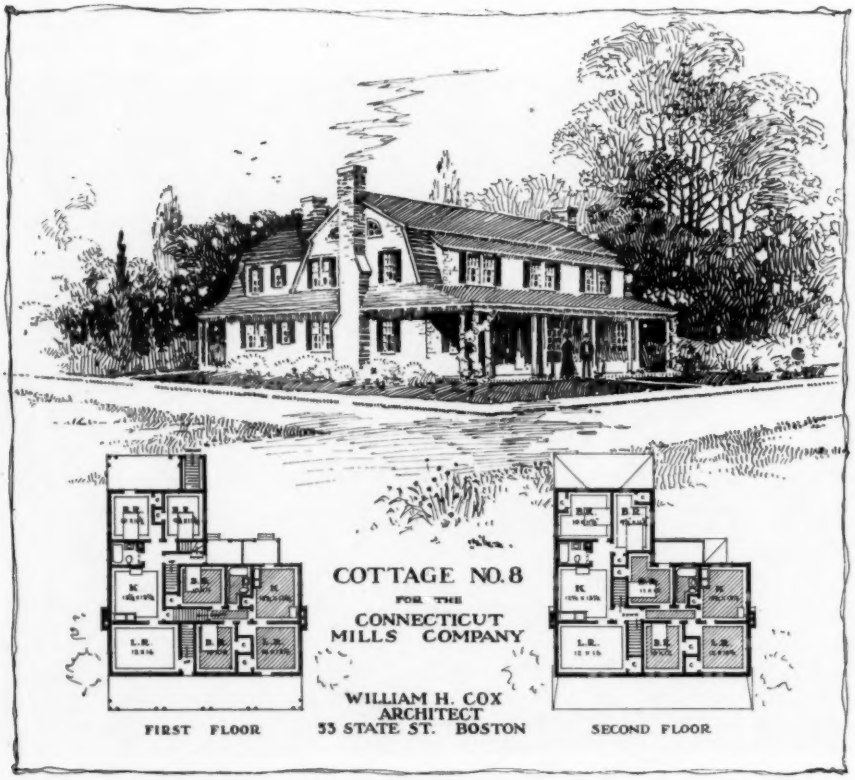




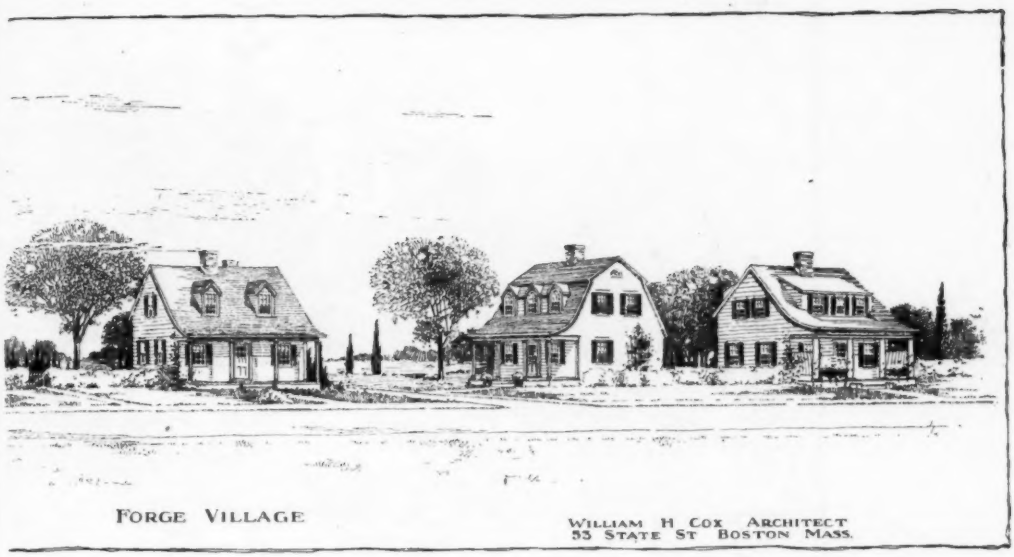
THE COMMUNITY CENTER OF THE HOUSING DEVELOPMENT AT DANIELSON, CONN.



ABBOT WORSTED COMPANY STREET DEVELOPEMENT



HOUSING DEVELOPMENT, DANIELSON, CONN.

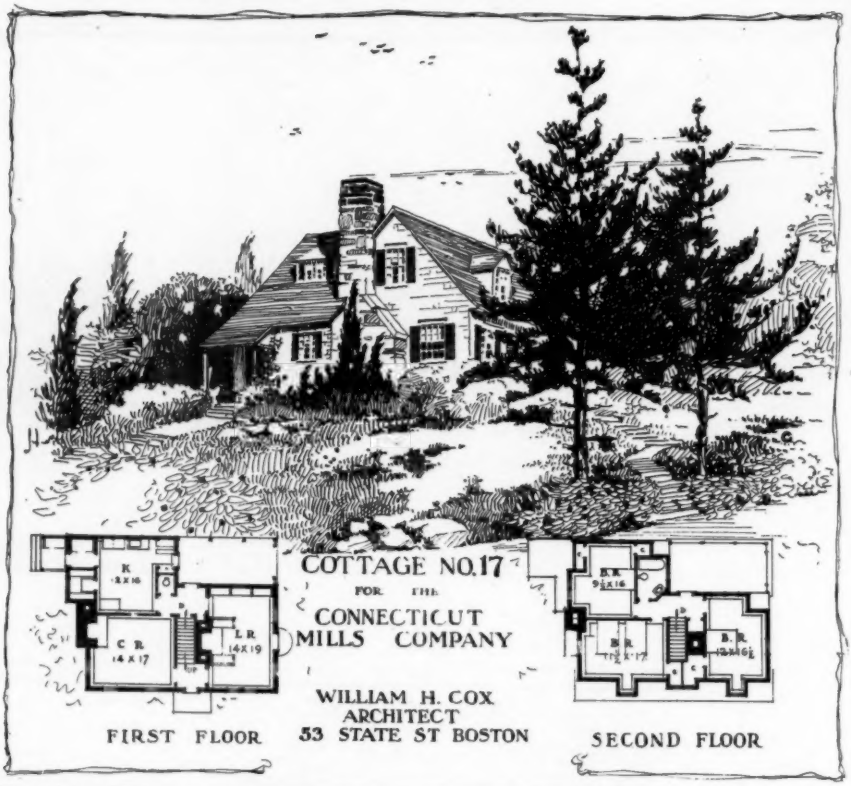


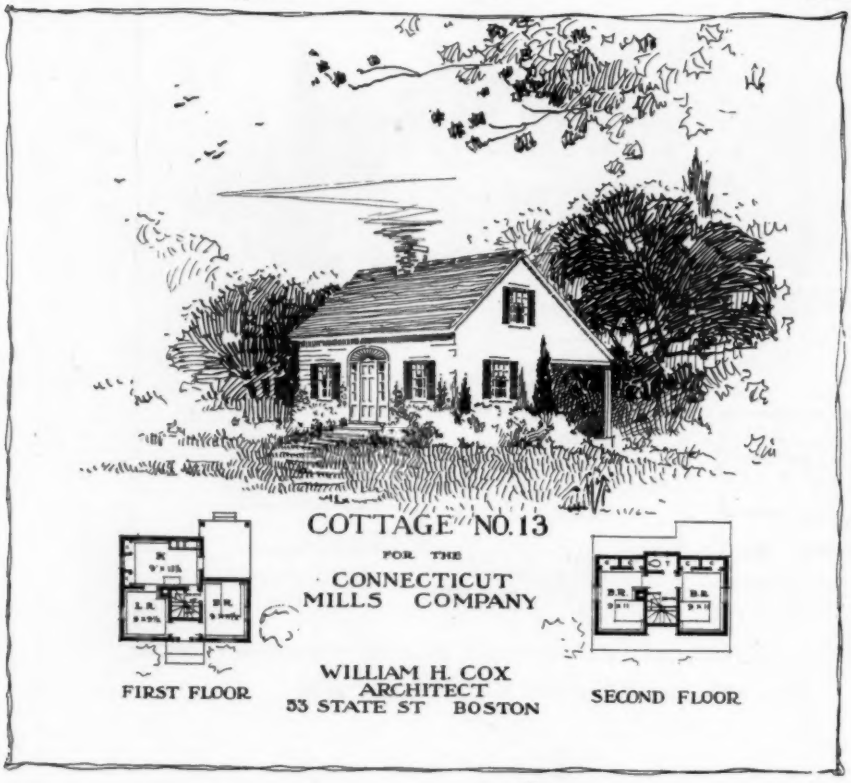
FORGE VILLAGE

WILLIAM H. COX ARCHITECT
53 STATE ST BOSTON MASS.

HOUSING DEVELOPMENT, DANIELSON, CONN.

DANIELSON, CONN.





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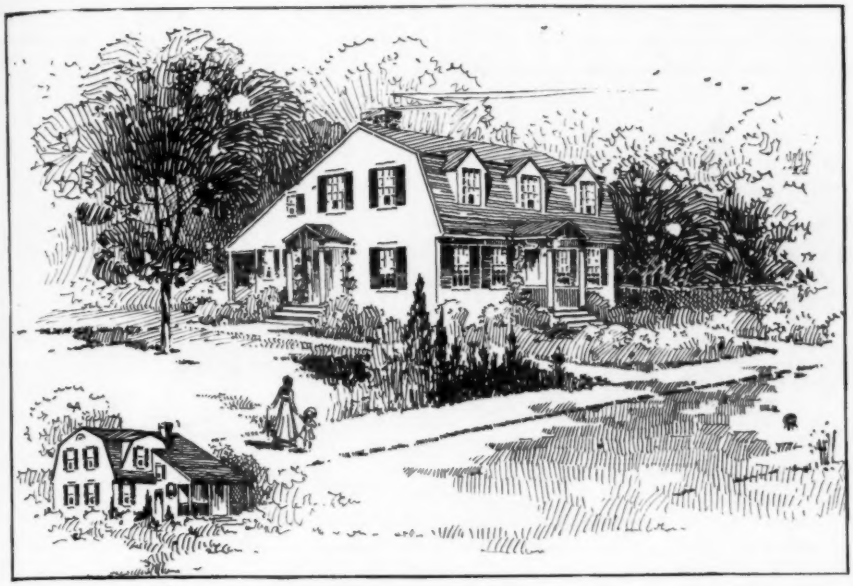
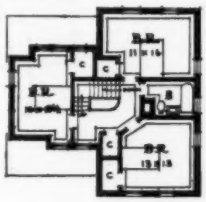


FIRST FLOOR

TWO COTTAGES FOR SHERBROOKE CONSTRUCTION CO.—SHERBROOKE, P. Q., CAN.

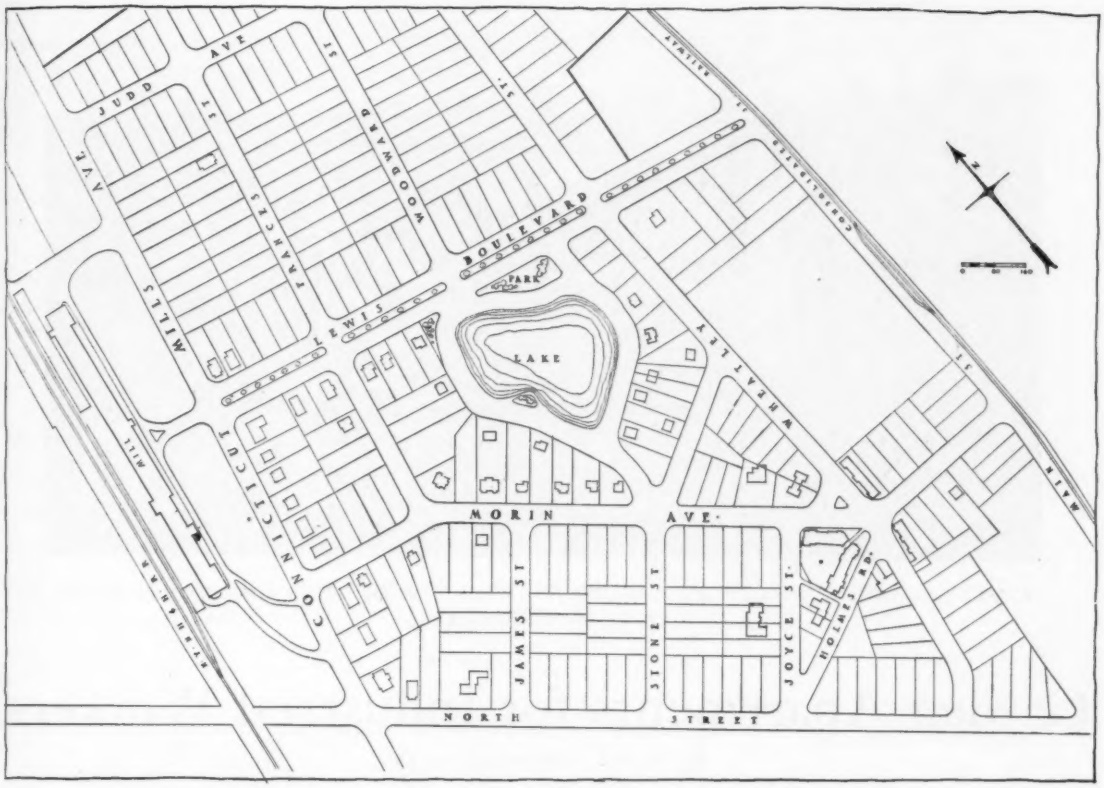
W. H. COX, *ARCHITECT.*



SECOND FLOOR

TWO COTTAGES FOR SHERBROOKE CONSTRUCTION CO.—SHERBROOKE, P. Q., CAN.

W. H. COX, *ARCHITECT*



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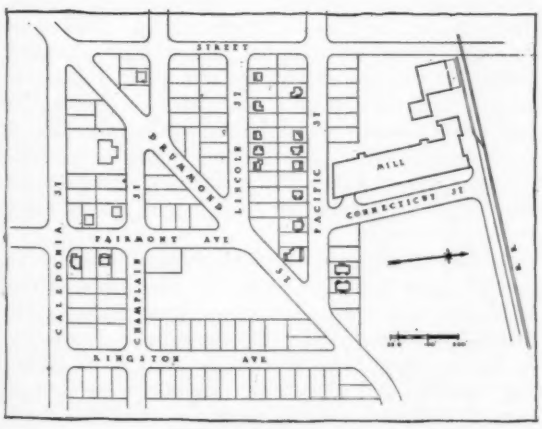
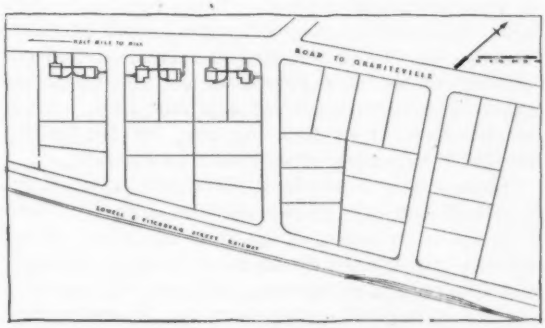


SHERBROOKE, ONT.



FORGE VILLAGE, MASS.

PLOT PLANS OF HOUSING DEVELOPMENTS

W. H. COX, *ARCHITECT*

ALLOTTED GARDENS ADJOINING "GARDEN APARTMENTS" OF THE QUEENSBORO CORPORATION, NEW YORK CITY

Garden Apartments for Industrial Workers

By HENRY ATTERBURY SMITH

THE intensive growth of large towns and the temptation to pack industries therein should be discouraged by those who are interested in the progress of a people. Cities tend to congestion; they are far away from the source of food; they set up a false standard of recreation, and the children of the next generation are at a disadvantage. The opportunity for a prolific labor market is obvious near or in a big city, but the quality thereof is beginning to be known as inferior.

Some enterprising plants blazed the way and established large industries in comparatively rural districts, or at least well out from the town. Soon, as they grew, they experienced housing shortage, and to a certain extent many of them fell back for the solution of their problems by improving the transportation facilities, thus using and inducing the congestion of the neighboring town.

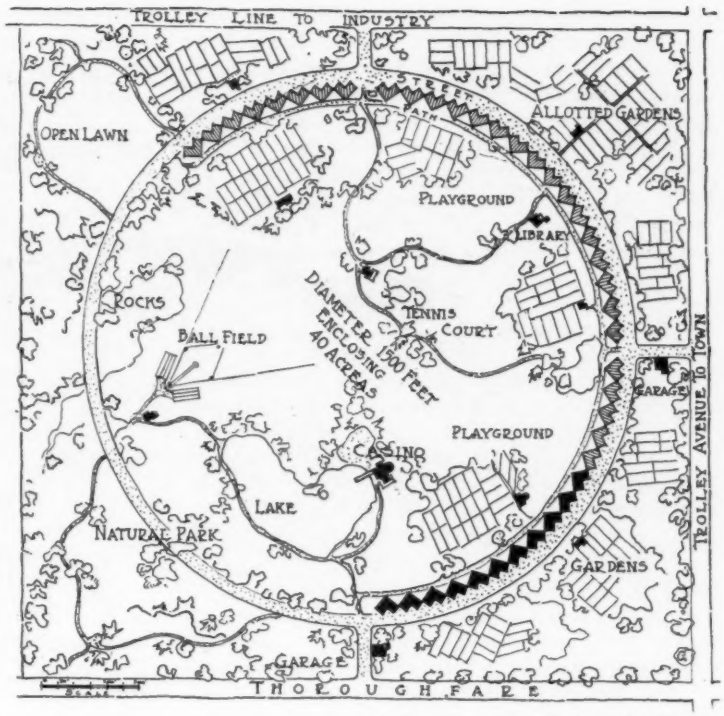
People can live more cheaply in the city than in the country because they live differently. People could live more cheaply in the country than in the city if the economies and efficiencies which we have developed for the cities were applied in the country.

There is a persistent impression among those who have given the question but little attention, that a multiple dwelling savors of congestion. This is because the multiple dwelling has usually been utilized where land was scarce or dear. In villages or the outskirts of industrial towns it is assumed that the rational development is the individual house, and so it is, for those who can afford it and want it. For those who cannot afford the individual house, or for those who do not want it there is usually but one of two alternatives—boarding in individual houses or moving into the town into a multi-family house, into the uninspiring congestion. There is no necessity for associating the multiple dwelling with congestion. It is happily placed right in the open fields.

In these times when so much thought is being expended upon housing by our Government and the industries, the great mass of plain people and their families in connection with our industrial army, it is imperative to bring to the attention of all thinking people the means of attaining gardening, country life and rational recreation even for those whose incomes are not sufficient to pay for an individual house.

The illustrations submitted are the results of applying the multi-family scheme to the open country—the economic advantages of city life combined with the beauty and opportunity of the open coun-

try. We take for illustration a plot of 100 acres near an industry, and instead of cutting it up into streets and sidewalks, thereby losing perhaps one-quarter of it, we lay out a beautiful park of forty acres with a lake, a ball field, a meadow, a ramble and allotted gardens, and surround this with apartments to house 480 families of industrial wage earners—the plain people. Each family then averages an area of a little less than one-quarter acre, a space of about 100 feet by 90 feet. The circle is about 1500 feet in diameter. Your opposite neighbor is more than a quarter of a mile away. This center is an unmolested park; no vehicles enter here; the children are safe. Immediately outside is the only street, connecting all of the multi-family residences. Between this circular driveway and the avenue or street that



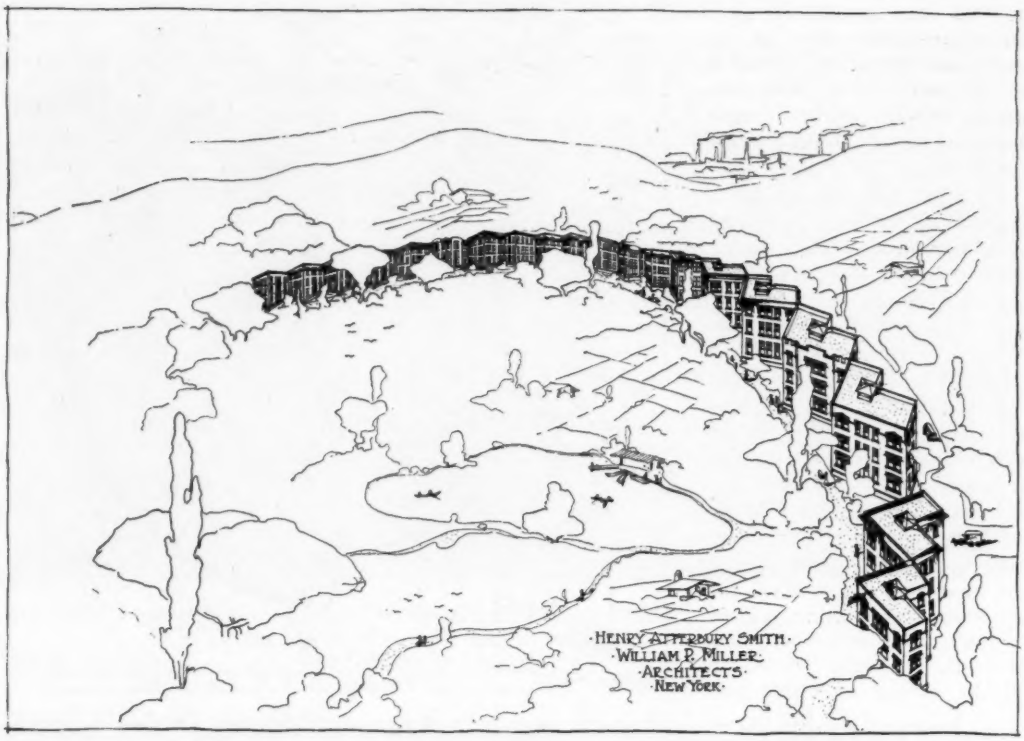
VIEW OF CIRCULAR MULTIPLE DWELLING, EXTENDING OVER ROLLING COUNTRY

ONE HUNDRED ACRES CUT UP IN THE USUAL MANNER, SHOWING LOSS OF SPACE IN STREETS AND ALSO THEIR COST OF PRODUCTION AND MAINTENANCE

may enclose the property is more natural planting and shrubbery and allotted gardens.

Occupants ascend to the upper stories even in the pure air of the open country and enter their group of rooms through their own little Dutch door from the "open stairs" into the private vestibule of each family. Each segment will average twelve families, four on a floor, with an average annual rental of $236 a year if rents are even as high as steam-heated modern equipment demands in new buildings upon Manhattan Island. Those of us who have operated individual heating plants in our homes realize what expense this is getting to be and what a saving results from the central heating plants that would be installed in each group.

From the roofs of these buildings at an elevation of about 35



ONE HUNDRED ACRES WITH FORTY UNITS THREE STORIES HIGH FOR 480 FAMILIES, ELEVEN UNITS OF WHICH ARE SHOWN AS ALREADY COMPLETED TO SHOW HOW THE DEVELOPMENT GROWS; SHOWING THE GREAT SAVING IN STREETS AND THE RESULTING OPEN SPACES FOR RECREATION

feet, beautiful views can be obtained of the surrounding country. Here is one of the finest opportunities for the landscape architect to bring to the people, whom the architect can house at less than $2,000 per family on an average, all the advantages of country life with the conveniences of the city. Here we have an opportunity to Americanize our foreign born by encouraging him with the opportunity to garden that he had in the "old country," even though he may be able to pay but $12 per month when he commences housekeeping. The gardens are allotted at a nominal rent. As some families will not want any garden, the others have the advantage of having just that much more space to utilize for pleasure and profit.

As to the matter of cost and maintenance and return upon the capital invested also, the following figures are given, which will have to be modified to suit time, location and circumstances:

Location: 210 and 211 West 146th and 147th Street, New York.

Built: 1917 and 1918.

Number of families housed: 216 in 568 rooms with 216 baths, i.e., 784 rooms in all.

100 two-room suites, average rent			$3.80 weekly
96 three-room suites, average rent			4.85 weekly
20 four-room suites, average rent			5.55 weekly
Cost of land,	$39,000.00	or	$180.00 per family
Paid builders,	250,000.00	or	1,160.00 per family
Paid architects,	15,000.00	or	210.00 per family
Carrying charges,	30,000.00		
Total	$334,000.00	or	$1,550.00 per family

Two buildings were finished in 1917 and 1918 upon Manhattan Island, with excellent finish, brick walls, first floor fireproof and the remaining ones protected by composite metal lath upon long leaf yellow pine framing, with solid, 2-inch verminproof partitions; Byers galvanized wrought iron pipe for plumbing, steam heat, and a complete bath room with three fixtures to each of the 216 families, Yale & Towne hardware, at a cost paid to builders of $250,000 or $1,160 per family. This is at the rate of 23½ cents per cubic foot, measured from cellar to top of roof beams, which would bring each of these illustrated units to a cost of $20,000 at the same rate, to which must be added the architect's fee, the carrying charges and the land, each of which items varies considerably in different localities.

So will the cost of building vary. In many places where industrial housing is most needed the advance in price may be 25 per cent, as is the case in New York, to judge from new figures taken upon a building identical to those just finished.

The costs of the circular dwellings would look like this:

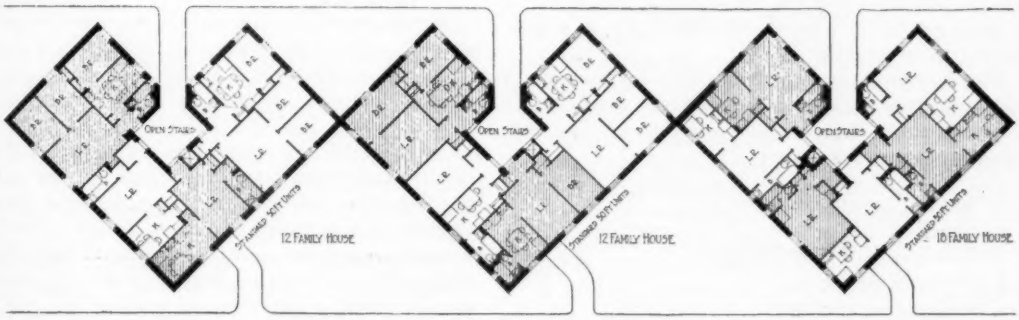
Land, 100 acres, say	$30,000.00
Buildings for 480 families in 40 units	1,000,000.00
Architects' and engineers' fees	60,000.00
Carrying charges, perhaps	50,000.00
	$1,140,000.00

PROFIT AND LOSS

Rents received if proportional to New York (which are lower than those of many towns whose industrial plants have outgrown their housing facilities), $236.00 per year per family, steam heated and hot water supplied		$113,000.00
Taxes, water and insurance	$10,000.00	
Wages	4,000.00	
5 per cent upon rents for management and collection	5,000.00	
Fuel, light and power	8,000.00	
Interest upon total capital invested at 5 per cent	57,000.00	
Vacancies, 2 per cent	2,000.00	
		86,000.00
Surplus for depreciation		$27,000.00

Tenants will purchase a stock or bond if an arrangement is made by which they can cash it in case of emergency or in case of wanting to buy or build an individual house as their means accumulate. Usually a rebate upon the yearly rent, payable in stock, is granted to tenants of long standing.

A group of buildings such as these will serve a class of people that can not be housed in any other way except by boarding or in hotels. This is particularly true in munition industries, and in many other industries. It was so even before the war in the cotton or rubber mills, where much unskilled labor is used and, as a result, many women. Here there is a great demand for small housekeeping suites of two and three rooms and a bath, or even one room and a bath, which is far better for all concerned than boarding. This is the stepping stone to establishing one's own home when there is sufficient income and sufficient necessity for larger and more independent quarters. In the meantime, allotted gardens with lockers for tools, etc., in a cottage adjacent to each group of gardens, a community workshop where boys and adults can work at wood and iron; laundries, nurseries, kindergartens, restaurants, together with the usual amenities proportional to the number of families, are very readily and economically provided.



DETAIL PLAN SHOWING VARIETY OF ARRANGEMENT. (SEE ALSO THE AMERICAN ARCHITECT OF JAN. 9, 1918.) THE BASEMENTS ARE CONTINUOUS

The Business Situation

THE *Business Bulletin*, issued monthly by the La Salle Extension University, prints in a recent issue a comprehensive review of the present business situation. This is a complete and clear analysis of present conditions.

It states:

In the midst of the most complex economic, political and military situation which we have ever faced, we see into the future as through a glass darkly. These conditions only make it more necessary for us to analyze the fundamental conditions intelligently for such rays of light as will make our progress surer and steadier.

One of the problems which is occupying a foremost place in the calculations of business is that of inflation and higher prices. These questions affect future business policies with reference to all such important problems as purchases of raw materials, supplies, and merchandise, working capital, wages, sales policies, etc.

Commodity prices on March 1, as expressed in Bradstreet's *Index* for the first time since December, 1916, show a slight recession from the previous month, the amount being .02 per cent. This small decrease is what the chemist might describe as only a "trace." How is it to be accounted for? Is it the beginning of a downward tendency or only a slight halt for readjustments in a continuing price advance?

The answer to these questions involves a summary and evaluation of the different factors which are responsible for the present high prices. The outstanding causes are these:

1. Intensification of demand.
2. Shortage of supplies.
3. Disruption of distribution.
4. Shortage of labor.
5. Speculative profits.
6. Currency and credit inflation.
7. Extravagance.

This list of causes presents a bewildering and immensely complex interplay of economic forces. It takes into account some of the special operations and applications of the well-known economic law of supply and demand, and relates these forces to money and credit inflation.

The first two factors enumerated in this list summarize the most obvious application of the law of supply and demand. The greatly increased demand of war has been added to the regular peace-time demands, and although the latter have decreased the shrinkage has not been anything like the extra demands imposed by war.

Committee on Registration Laws A. I. A.

In the report of the Committee on Registration Laws presented to the recent Convention in Philadelphia, a model law for regulating the practice of architecture by state legislation was submitted. The necessity for uniformity in the laws of the various states regulating architecture is so apparent that it is hoped that architects will take interest in the matter and comply with the request of the Board of Directors that suggestions and criticisms of the laws proposed in the report of the committee be forwarded as quickly as possible. Copies of the report of the committee can be obtained from the executive secretary of the Institute, The Octagon, Washington, D. C., and comments should be made either to the chairman of the committee or to Mr. D. Everett Waid of the Board of Directors, 1 Madison Avenue, New York

From a British Point of View

The Architects and Builders' Journal of London, commenting on an editorial in THE AMERICAN ARCHITECT, issue of March 6, states:

"Should architects advertise? According to our contemporary THE AMERICAN ARCHITECT, the Illinois Chapter of the American Institute are going to raise the question at the forthcoming convention of the Institute, to be held at Philadelphia this month, when, no doubt, the matter will be very thoroughly debated. So far as can be gathered from our contemporary's leading article on the subject, the American Institute is even more strict than our own on this 'question of ethics,' as it is called; for it appears that not only are architects forbidden to display their names on buildings during construction, but that at one time an attempt was made 'to characterize as advertising any illustrations of the architect's work in the architectural press.' Naturally, this attempt failed ignominiously, and its revelation that extreme delicacy may amount to disease caused a recoil of which the effects will become more apparent at the meeting at Philadelphia. Our contemporary does not dogmatize on the matter, but contents itself with putting a series of Socratic questions, of which these two are the most poignant: (1) 'If an architect has some specially developed service to offer the public, is there any reason why he should not let the fact be known, so long as he pays for his publicity just as any other person does?' (2) 'Is there any reason why architects cannot be broad- and fair-minded in their dealings, keeping abreast of the times instead of remaining in the

rut of a custom which might, perhaps, be more honored in the breach than in the observance?' We rather like that ancient tag about breach and observance, because our contemporary uses in it the right Shakespearean sense—a feat seldom achieved in this country. At the present moment we do not care to discuss this delicate question of advertising. We would rather suggest it as a good subject —which the Americans have made topical—for debate at a future 'Informal Conference' at the Royal Institute. Who will be bold enough to open the debate with an affirmative proposition?"

It will be interesting to note the expression of opinion by the profession in England, if this topic is debated in conference, and to learn if the wise course adopted by our own Institute is followed by the Royal Institute.

The Results of a Departure from Correct Ideas of Town Planning

Reviewing certain war-time aspects of the housing problem, *The Architects' and Builders' Journal* of London states:

It is pitiful to see the degradation into which many fine old streets and squares, not only in London, but in many country towns, have fallen. For their original dignity they owed much to a local and partial application of town-planning ideas; their deterioration has arisen from fortuitous departures from those ideas. The process of degradation seems to be somewhat as follows: First, a single owner builds a street, a square, or perhaps only a row of houses, in accordance with a general plan and purpose. In course of time there are many owners where at first the ownership was single. Then, even supposing that the "character of the neighborhood" is not yet changed, the houses gradually lose their harmonious agreement. They are "done up" separately and in diverse ways; or some of them are utterly neglected while others are painted and plastered, and modified in their external details, until the architect who designed them would hardly recognize them, and, in any case, would not care to father them. Finally, the hotch potch is completed by putting the houses to miscellaneous uses for which they were never intended. Some are "converted" into shops, others into offices or warehouses. Such of them as remain residences become dingy boarding-houses, or swarm with working-class tenants.

Is the rehabilitation of these fine old houses at all possible? As far as we can see, there is only one way in which this object could be secured, and that is by State or municipal purchase, and hence the re-establishment of central control. It would, we fear, involve an enormous cost, because there would be so many trading and other vested interests to satisfy. In some instances, however, it would be cheaper, and infinitely preferable, under the national housing scheme, to convert fine old houses than to build new cottages. It is difficult to see how otherwise the workers of London, or of certain large provincial centers of industry, are to get their fair share of the benefits of the national scheme. Cottages cannot be built near enough to the town-laborer's working-place. Land is too precious; full value can be got out of it only by considerable vertical extension of the buildings put upon it. Countless thousands of workers in London are dwelling within a three-mile radius of the city. Many of them, such as printers, are night-workers, for whom "easy transit to the suburbs" is either very inadequate or non-existent. Commonly they herd together, several families to a three-story house, using the sanitary conveniences in common, and in other ways lacking the privacy that is essential to the maintenance of a decent standard of self-respect. Everybody's house is nobody's home.

French Architect's Polite Protest

Only the French architect knows the climatic conditions of his own country, the possibilities of light, and, more than all, the habits of living of the French peasants and town dwellers, who will instinctively shape their new life to the mold of the old. The French Government, after considering the reconstruction problem for a long time, has instituted several competitions for young architects. Among the projects presented many have been worth while rewarding and retaining and could furnish inspiration for Americans who desire to help.

But forgive me if I say again that help will be most suitable if it is administrative instead of creative. It would be very sad, I cannot help but feel it, if we were to have in France an American village. We must have a new French village, though a modern one, if you like. The French architect knows the French spirit. Americans and Frenchmen are both democrats, I know. But in our lives we are organically different. The American has a genius for organization. The French have other geniuses. With American organization, you can be of an immense help after the war, but I assure you it will give the best results in collaboration. The combination of French taste and American practical support will be perfect.

This undoubtedly will stimulate our American confrères and encourage them in their turn to bend their efforts toward a common goal of artistic regen-

eration. America is a young country, generous and sincere. Between us we could—France and America—bring about a renaissance of the arts, improving tastes and elevating ideals.—Henri Caro-Delvaille in New York *Evening Post.*

Art to Assist War

The English and French idea of training soldiers, especially infantry and artillerymen and machine gunners, in the art of war through the medium of large landscape scenes, is to be tried in this country also.

These landscapes are done in oil on canvases varying in size from 3 by 6 to 5 by 9 ft. The pictures are of single distant objects such as trees, buildings, cross-roads, trains, and streams, outlined with great distinctness, offering strategical points of advantage either for cover or attack, and are typical of the general topography of France, and the country in which American soldiers are expected to see active service.

They will be used in teaching the men to visualize closely the country in which they are fighting, as range finding charts or landscape targets, in working out problems of offense or defense, and for this purpose are said by military experts to be obviously far superior to the regulation map or blue print. One great advantage is that they show the terrain over which the troops on French soil must fight, as well as the general conformations and topographical features of the country, lacking in military maps.

The pictures will also be used by machine gunners for sub-target practice, which is of the utmost importance in the judging of ranges in the checking of enemy attacks.

The pictures to be used are the first of about fifty donated by the Salmagundi Club, which is composed of New York artists, and are being distributed by the Art Relief Society.

Demand for Building Materials After the War

It is learned from a recent issue of *The Journal of the A. I. A.* that the British Minister of Construction has appointed a committee to report on the question of the supply of building materials after the war. The terms of reference as stated are to be as follows:

(1) To inquire into the extent of the probable demand for building material for all purposes which will arise in this country during the transition period and the extent of the available supply and form of such material.

(2) To inquire how far the quantities of material now available are capable of increase; what are the difficulties in increasing them, and how these difficulties can be removed; and to report to what extent an increase in production will affect the price of the materials.

(3) In the event of the supply of material or labor being insufficient to fulfill the total building demand, to consider the principles and method by which the priority of various claims should be settled; and to report what steps are necessary to insure that the manufacture of the materials, so far as they are at present inadequate, shall be extended in time to secure sufficient quantities for use when required on the cessation of hostilities; and to recommend what steps should be taken during the war to facilitate a prompt commencement of building work at that time.

(4) Generally to consider and report upon any conditions affecting the building trades which tend to cause unduly high prices, and to make recommendations in regard to any measure of control which it may be desirable to exercise over the charges, production, transport, or distribution of material.

Intensive Education Under War Spur

Even education is not to be without rewards from the present struggle. Witness the experiment in intensive training of technicians and mechanics, under the War Department's Committee on Education and Special Training. What does it presage for the boys and girls who, hitherto, have had to leave school at 14, and have found it impossible to receive special training because those courses took more time than they could give? How easy it will be, for educators with war-revised points of view, to slip in highly specialized intensive work of a practical character in the final year of the grade schools, to revise evening school instruction to accomplish present results in one-half or one-fourth the time, or with an expenditure of equal time to carry the student twice as far as he can now go. The experiment is starting well. Impelled by a serious war need, the control of the studies as to practicality will be very close. Unquestionably, new methods will be discovered, especially since, at the beginning at least, much latitude will be allowed the teachers. Central control will then quickly put into general use an obviously improved method, no matter where developed. A year hence, we can safely predict, we shall be able to record very considerable progress in special training of this kind.—*Engineering News-Record.*

The Longest Building in the World

It has been stated that the longest building in the world is shortly to be erected by the Bethlehem Steel Company at its shell-loading plant at Mays Landing. The structure is to be exactly one mile long and one and one-half stories high. It will be of frame construction, but the purpose for which it is to be erected is not as yet disclosed.

The Old Windsor Chair

The Windsor chair was a familiar household article in this country generations ago. It was a substantial piece of furniture, usually plain, and was manufactured in England, though doubtless many imitations were produced in this country. A late number of the *London Timber News* says that few of England's home industries are in a more flourishing condition than the making of chairs on the Chiltern Hills. The consumption of beech timber for this time-honored work is far in excess of what it was a few years back, and curious as it may appear, timber from these chalky regions is found preferable to any other for the making ot the well-known Windsor chair. The manufacture of these chairs gives employment of a lucrative kind to hundreds of workmen, while side issues connected either directly or indirectly with the flourishing industry form no mean part of a most important business in conjunction with the home-grown timber trade.—*Hardwood Record.*

"Old Hickory"

The mammoth powder plant to be constructed on "Hadley's Bend Land," in Nashville, Tenn., is to be known by the name of "Old Hickory."

This name has been decided upon as one which is eminently fitting in view of the proximity of the great plant to the burial place and former home of Andrew Jackson.

The same name is to be given the railroad station and the post office. That such a decision meets with the approval of all Tennesseeans goes without saying.

Housing Plans in Washington Now

There are now 2,000 more rooms in Washington than there are persons to occupy them. This information comes from Edwin S. Hege, manager of the central rooming bureau, working with the District of Columbia branch of the Council of National Defense.

"We are laboring hard to have the supply of rooms exceed the demands for them," said Mr. Hege, "because we realize that with the expected influx of 20,000 to 23,000 additional clerks who are expected here by July 1, Washington is going to have great difficulty to accommodate them. Government dormitories will be the solution of the difficulty, and they are, I think, certain to come later. It will take between three and four months to erect them, and in the meantime we must depend on the patriotic householders of the city to assist in housing this surplus population. We have met with a most gratifying response from Washingtonians. Later on we will inaugurate a house-to-house canvass to find just how many persons the city can accommodate in an extremity."

Airplanes and Architecture

Architects are aware of the controlling influence already exerted upon residence architecture by the automobile, says the *Building Review*. Those who are applying themselves to a study of city planning problems are forcibly reminded of the absolute dominance of traffic already assumed by the automobile. The necessity of providing parking spaces in the vicinity of public buildings, theaters, hotels, auditoriums, parks, and in the business districts, is making itself felt in all important new work.

The automobile's rapidly growing power of changing preconceived notions could be enlarged upon here considerably, but the present intention is to mention as a reminder another factor now looming up definitely as a further controlling influence of the modern city, and of the building of the future. This factor which is to be reckoned with is the airplane.

Six years ago Waldeman Kaempffert discussed the relation of "the flying machine and the roof." At that time the airplane's development had not anywhere approximated its latest achievements, and what was true then of Mr. Kaempffert's discussion of the modifying influence that the airplane of the future would exert upon architecture and the plan of cities, is true to-day with increasing force. The time is approaching, gradually and not with any degree of haste, it is true, but nevertheless surely, when the question of providing for the flying start, landing and housing of thousands, tens of thousands, of every-day airplanes will not be an abstraction but a crude reality.

Architects who are interested in the possibilities here suggested cannot too soon begin a study of the problem that will confront planners and designers both, for it has definitely a practical and esthetic side of which thus far there has been no general attempt at a solution.

California Puts Idle Land to Work

It is learned from *Engineering News-Record* that colonization in California is being pushed by the State on a 6000-acre tract, purchased recently, near Chico. The State proposes to provide the settler not only with land, but will erect simple modern houses, barns, silos and other necessary buildings, payments to be made on an installment plan with terms that may be met easily. One-third of the investment must be paid at the start, but 25 to 36 years' time is given to pay the balance. The prime requisite is a loyal, patriotic citizen not holding land in any other part of the State. Plans are made to invest at least $500,000 in the project at the start.

Will Make Survey of Warehouse Space in New York City

Building Industries of New York has undertaken to make a survey of the available warehouse space in each of the five boroughs of New York City, and a similar survey of available apartments and tenements for housing workmen engaged in war industries.

The Chamber of Commerce and real estate associations are co-operating with *Building Industries,* whose purpose it is to push the work with the greatest dispatch in order to present accurate information as quickly as possible to the proper Government departments at Washington with which it is working.

Discipline for the Cost-Plus System

Cost-plus in the Navy Department has had some development in the course of a year. When this basis of contracting was first used its nature was exactly indicated by the description—the Government undertook to reimburse for the actual expenditures and to pay a percentage for profit.

The later form sets an estimated cost, a lump sum for profit, and the contractor receives half of any saving he makes in the estimated cost. If the cost goes higher than the estimate the Government pays the excess, but the contractor's profit does not increase. All expenditures are scrutinized by the Navy's Compensation Board at Washington, under which there is a local cost-inspection board of naval officers at each yard which is at work upon the 435 vessels that are under construction.

According to this plan the contractor solicits bids for material he needs, and places the bids before the local cost-inspection board, which approves or disapproves. For expenditures under $10,000 the local board's approval suffices, but for larger expenditures approval must be obtained from the board at Washington.

"Costing," as the British call it, has become a highly important governmental function in these later days. By dint of much searching into other people's cost, governments themselves may in time reach the point of considering their own.—*The Nation's Business.*

Expansion Joints in Concrete Swimming Pools

A free use of expansion joints was the feature in the construction of two reinforced concrete swimming pools in Columbus Park, Chicago. Both pools are of irregular circular outline with the sides laid out on segmental arcs and tangents. One has an area of 28,420 sq. ft., and the other an area of 7,280 sq. ft., and both are built partly in excavation.

The side walls, which are from 6 to 12 ft. in height, are 16 in. thick at the top and 3 to 3½ ft. thick at the bottom. They were constructed in 60-ft. sections with expansion joints between the sections made with tapered form keys removed after the concrete had set. These joints were made water tight with crimped sheets of copper imbedded in both sides and with four-ply tar paper packings between the overlapping spaces of the concrete.

The bottom of the pools were poured in 30-ft. transverse sections separated by 1-in. expansion joints and 2-in. expansion joints around the outside, the lower part of the joints being filled with oakum and the upper part with tar. The concrete was a 1:3:5 mix and this was covered with a 1-in. face of 1:1 mortar.—*The Architect and Engineer.*

Obituary

George S. Orth, of the architectural firm of George S. Orth & Bros., Pittsburgh, Pa., is dead. Mr. Orth was an ex-president of the Pittsburgh Chapter, A. I. A. He practised in Pittsburgh during his entire professional life.

William M. Camoe, architect, died at his home in Philadelphia at the age of 66 years. He was at one time of the architectural firm of Furness, Evans & Co., but during later years was engaged in individual practice. Mr. Camoe was connected with many charitable organizations, with the work of which he was prominently identified.

Charles Snead McDonald, architect, of Salt Lake City, died and was buried at Surenne, in France, last month. Mr. McDonald was a member of the United States Commission for Civilian Relief in France at the time of his death.

Department of Architectural Engineering

Heat Transmission Through Various Types of Sash

In Two Parts—Part I

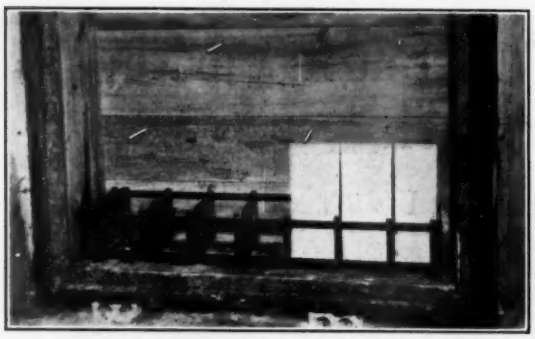
THE primary function of a window is to transmit natural light through an enclosing wall construction, and its secondary use is to provide an adjustable opening for ventilation. This service is a necessary one, although ventilation can be procured by other means. There is no justification for curtailing the amount of window surface required for satisfactory day lighting and this necessity is now generally understood to be based on economic and sanitary needs. The amount of daylight required is governed by the occupancy of the building, for which a well defined minimum amount has been established. The true basis for window design is to provide *enough* daylight for the needs.

Windows, however, possess the disadvantage of transmitting heat to a marked degree and this transmission takes place during the entire twenty-four hours of the day. It is therefore apparent that the window as a cause of fuel consumption is worthy of consideration. The importance of this point would be of greater interest possibly to establishments where night labor shifts were the rule. To supplement the articles on "Daylighting the Factory" in THE AMERICAN ARCHITECT of February 20 and March 13, there is presented the following data pertaining to the transmission of heat through windows.

It is a problem of first establishing the window area necessary to fulfill the requirements of daylight illumination and then considering the advantage of added area compared with the increased heating cost. In this connection there must also be considered the character of the construction employed in the enclosing walls and roofs. With the added knowledge on the subject of daylighting that is bound to come from the investigation and study given to this subject and the application of this knowledge to the other related factors, there will be established that correct proportion of window area which will serve the primary function of supplying daylight without omitting a proper consideration of the latter.

THE SASH ON FRONT OF TEST BOX, HEATER, BAFFLE BOARDS AND GYPSUM BLOCK SUPPORTS

To measure the transmission of heat through various types of sash was the purpose of a series of tests conducted by Mr. W. S. Brown, Mem. Am. Soc. M. E., under the direction of Mr. Arthur N. Sheldon, Mem. Am. Soc. M. E., in the laboratory of F. P. Sheldon & Son, architects and engineers, Providence, R. I. The information thus obtained was presented to the American Society of Mechanical Engineers at the annual meeting, December, 1916.

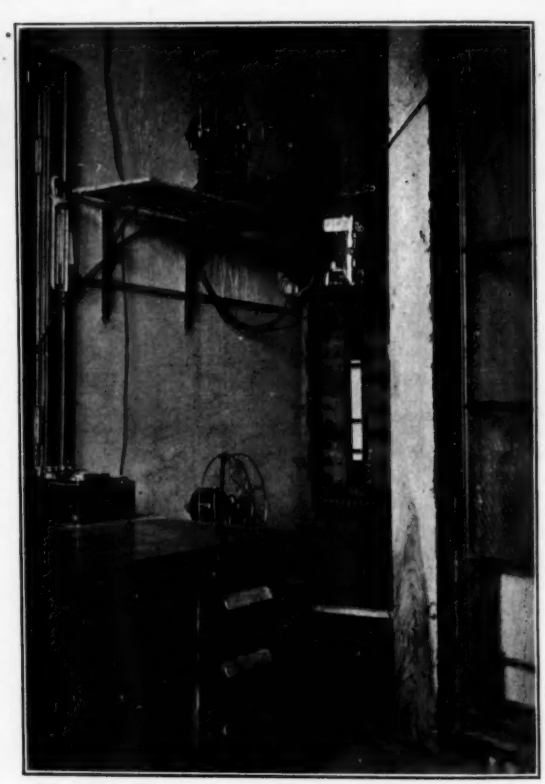


THE HEATER WITH FOUR ASBESTOS PLATES REMOVED AND INTERIOR OF BOX SHOWING THERMOMETERS

Of the apparatus employed in these experiments, the test box was 4 feet 2¾ inches wide by 7 feet 9½ inches high, and 1 foot 2 inches deep. The box was constructed of 2-inch t. and g. white pine, well seasoned, covered with 2-inch cork boards, the joints of the latter being made airtight with brine cement. The sash tested were screwed firmly to the face of the box at short intervals. To reduce the leakage around the sash at its line of contact with the box, a continuous strip of wood felt 1 inch thick was placed around the edge. The box rested on two gypsum blocks.

The box was set up on end, and an electric heater, supplied with direct current at 250 volts, was placed in the bottom. The heater consisted of six sets of nickel-steel resistance wires controlled by an external switch-board. The sets were arranged for control in three groups of two each. The wires in each set, varying in number from 14 to 18, were strung horizontally across the full length of the heater. Beginning at the bottom, the first two coils were designed to dissipate approximately 0.25 kw. each of electrical energy; the next two, 0.50 kw. each; and the uppermost two, 0.75 kw. each. The switching arrangement was so designed that any of the coils could be connected in multiple and by means of triple-pole switches any two sets forming one group could be connected in series, thus giving a total capacity of 3 kw., obtainable in steps of ⅛ kw. each. This was found of sufficient capacity to heat the test box to the desired temperature in a short time. To prevent direct radiation of heat through the lower panes of glass, ¼ inch white asbestos plates 15 inches high were fastened against the framework of the heater.

Twelve thermometers were used to observe the temperatures inside the box and were arranged as indicated on the record sheet. These thermometers were tested for accuracy before and after the experiments and were of the Fahrenheit long-scale chemical kind, protruding about 7 inches into the interior of the box through holes bored through the back of the box and its covering. In the vicinity of the heater, where the greatest variation of temperature naturally occurred, a double spacing was used,



THE FANS, SWITCHBOARDS, METERS AND GENERAL ARRANGEMENTS

there being two thermometers above and two below the heater. In the tests of wood and steel sash the thermometers above the heater were placed opposite the center of the various panes. The total average temperature was obtained by averaging the individual average temperatures behind each horizontal row of panes.

The creation and control of the conditions surrounding the test box was accomplished in the following manner. Air was circulated over the surface of the sash by means of two 12-inch fans, placed one above the other, 4 feet from the vertical center line of the sash. The air current was directed against the sash at an angle of 30 degrees and provided a positive circulation over it. It did not appear to be advisable to attempt to duplicate the actual conditions of wind on the wall of a building. Although Weather Bureau reports show that the average wind velocity in New England during the heating season is 11½ miles per hour, the average conditions of direction would be difficult to reproduce, as usually no more than two sides of a building are exposed to wind of this average velocity. The main purpose of the fans, therefore, was to provide a positive circulation of air over the sash, and thereby secure constant conditions in this respect throughout the entire series of tests. A number of anemometer readings showed that the average velocity of the air current directed against the sash was approximately 7 miles per hour. Considering that the average velocity of 11½ miles per hour is effective on two sides of a building only, it is believed that the conditions obtained in the test are not far from the average.

Vertical baffle boards were placed on either side of the box to protect the back and sides of the box from the air currents created by the fans. This was necessary because, as described later, the heat-transmission constants for the box alone were obtained under conditions of still air.

An accurate wall thermometer was hung midway between the two fans and by it the temperature of the air outside the box was observed. This thermometer registered the maximum and minimum temperatures and was used to determine the limits of temperature which occurred in the room during the tests. Constant room temperature was obtained by means of a thermostatically controlled steam radiator. This condition was desired because any appreciable variation of this temperature would materially affect the accuracy of the results on account of the temperature lag of the materials of which the box was constructed.

The electrical energy converted into heat units was measured simultaneously by means of two meters. The first meter was a standardized indicating watt-meter, guaranteed to be accurate within ¼ of one per cent, and compensated for temperature changes. The scale was graduated to hundredths of a kilowatt and readings could be estimated to thousandths. The other meter was a standard service watt-hour meter, installed and adjusted by the service company furnishing the power.

The humidity of the air inside the test box was kept as constant as possible throughout the series of tests by means of water saturated felt, and was measured by means of a wet- and dry-bulb hygrometer. The humidity remained constant during the period of each individual test.

It was thought advisable to conduct the tests based on a heat-head (temperature difference between outside and inside air) of about 40 degrees Fahr., corresponding to a room temperature of 76 degrees and an outside temperature of 36 degrees Fahr. This basis was selected, as the Government

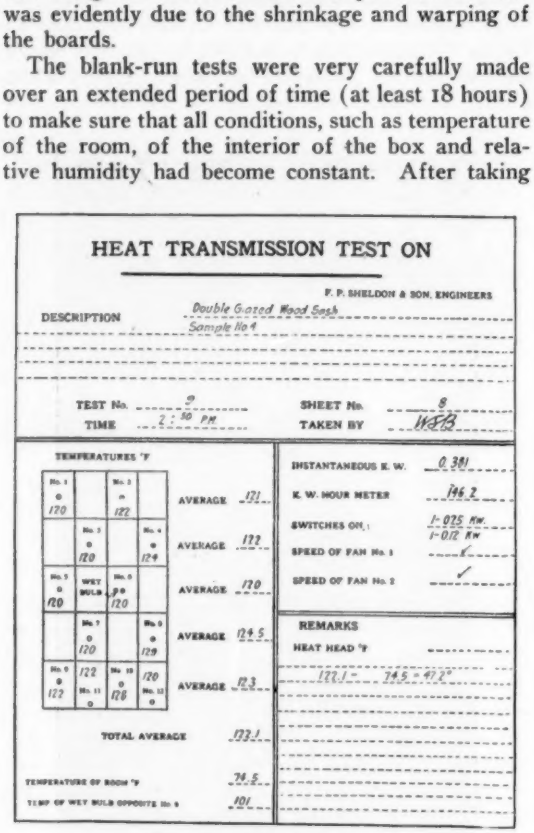
THE FRONT OF BOX COVERED AND READY FOR BLANK RUN TEST

Climatological Reports show an average temperature of 36 degrees Fahr. during the heating season in New England. For the purpose of greater accuracy and also to determine the relative heat transmission, during colder weather, there was conducted another series of tests based on a heat-head of about 70 degrees Fahr.

As the amount of heat transmitted through the sash would be the difference between the total amount of heat measured and the amount transmitted through the back, sides, top and bottom of the test box, it was necessary to measure this latter amount. This was accomplished by running "blank-run" tests, the front of the box being

covered with the same materials as the other portions of the box. The error due to the possible change in the conductivity of the box itself during the experiments was ascertained by tests made at heat heads of 40 and 70 degrees Fahr., both before and after the series of sash tests. It was found that a slight increase in conductivity occurred which was evidently due to the shrinkage and warping of the boards.

The blank-run tests were very carefully made over an extended period of time (at least 18 hours) to make sure that all conditions, such as temperature of the room, of the interior of the box and relative humidity had become constant. After taking



HEAT TRANSMISSION TEST ON

F. P. SHELDON & SON, ENGINEERS

DESCRIPTION: Double Glazed Wood Sash, Sample No 1

TEST No. 9 — SHEET No. 8

TIME 2:50 PM — TAKEN BY W.S.B.

TEMPERATURES °F

No. 1 170		No. 3 172		AVERAGE 171
	No. 2 170		No. 4 174	AVERAGE 172
No. 5 170	WET BULB 70	No. 7 170		AVERAGE 170
	No. 6 170		No. 8 179	AVERAGE 174.5
No. 9 172	172 No. 11	No. 10 178	178 No. 12	AVERAGE 173

TOTAL AVERAGE 173.1

TEMPERATURE OF ROOM °F 74.5

TEMP OF WET BULB OPPOSITE No. 9 70

INSTANTANEOUS K. W. 0.381

K. W. HOUR METER 146.2

SWITCHES ON 1-025 KW, 1-012 KW

SPEED OF FAN No. 1 ✓

SPEED OF FAN No. 2 ✓

REMARKS

HEAT HEAD °F

173.1 − 74.5 = 47.2°

TEST RECORD SHEET

several preliminary readings to demonstrate this fact, regular readings, including all temperatures inside and outside the box, relative humidity, instantaneous kilowatts, kilowatt-hours, were recorded hourly for at least eight hours. In general, during the period of tests, the temperature of the room varied from one to not over two degrees Fahr., the average temperature inside the box varying about one degree Fahr. and the heat head varying about one degree Fahr. These readings were recorded as shown on the sample hourly record sheet. During the blank-run tests the fans were not in operation, as the object was to obtain the rate of transmission through the box and covering under the conditions of the main tests; that of still air at the back, sides, top and bottom.

The sash tests were conducted in the same manner except that the fans were put in operation and readings taken to be sure that they were up to speed. In each separate test the watt-hour meter was calibrated for the load by timing it for ten minutes with the instantaneous meter and counting the revolutions of the disk. This, compared with the average of about thirty readings of the instantaneous watt-meter taken over the same period, gave the required correction to apply to the service meter. When the correction factors found in this way were applied to the readings of the watt-hour meter, the results agreed very closely with the average of the hourly indicating watt-meter readings, the voltage being nearly constant. During all tests a careful record was kept of panes of glass on which condensation occurred.

The heat transmission through the various types of sash has been worked out in terms of British thermal units in the following formula:

$$H = (L - l)/ad. \qquad [1]$$

in which

H = B.t.u. transmitted per 24 hours per degree Fahr. per square foot of opening.

L = total heat loss through test box and sash in B.t.u. per 24 hours, as computed from watt-meter measurements.

l = heat loss in B.t.u. per 24 hours through top, bottom, back and sides of test box, as determined by the blank-run tests and corrected for the actual heat head during the sash tests.

a = area of opening filled by sash equals 33 square feet.

d=temperature difference or average heat head recorded throughout test, degrees Fahr.

L = is found from formula

$$L = (w \times 3412 \times 24)/t \qquad [2]$$

in which

w = electrical energy dissipated in heater as measured in kilo-watts at average temperature d.

t = the number of hours duration of tests.

3412=the equivalent of 1 kw. in B.t.u.

In the same manner l is found from the "blank-run" tests by the formula

$$l = R\,(w \times 3412 \times 24)/t \qquad [3]$$

in which

R = the ratio of the area of the top, bottom, back and sides of the box exposed during the sash tests, to the total area of the box or that exposed during the blank-run test. As noted above l should be taken at the same temperature as L, by interpolation from known results if necessary.

The other terms have the same meaning as for the second equation.

Following is a sample computation for H for a

double-glazed wood sash. From a summary of the test sheets it was found that
$d = 47.3$ degrees Fahr. $w = 1.50$ kw. $t = 4$ hours. During this period the temperature of the room varied 0.5 degrees Fahr. and the average temperature of the box varied 0.4 degrees Fahr., the average relative humidity being 49 per cent. From curves previously worked up from blank-run tests, $l = 8600$ at a temperature difference of 47.3 degrees Fahr., correction being made for a very slight change of conductivity in the test box itself during the series of tests.

From the second equation

$$L = (1.50 \times 3412 \times 24)/4 = 30{,}700 \text{ B.t.u.}$$

From the first equation

$$H = (30{,}700 - 8600) / (33 \times 47.3) = 4.2 \text{ B.t.u.}$$

transmitted per 24 hours per degree Fahr. per square foot of opening.

Seven kinds of sash were tested, each being of suitable size to fit the test box opening and all were without ventilators. In the descriptions that follow, the word "pane" refers to a single sheet of glass and the word "light" refers to a section of the sash, or in the case of double-glazed sash, two panes and the air space.

Sample No. 1 was a standard make of single-glazed, solid, rolled-steel sash, with 20 lights, each approximately 12 x 18 inches, arranged four wide and five high. The panes were of ¼-inch rough wire glass and the putty apparently intact. The sash bar section was 1⅜ inches deep, glass bedded on front side and the putty at the back having a good ½-inch body. Glazing was done from the inside on account of the section of the bar. The exposed glass area was 28 square feet or 85 per cent of the total.

Sample No. 2 was a double-glazed, solid, rolled-steel sash of same make, size and arrangement of lights as sample No. 1. The outside panes were ¼-inch rough wire glass, the inside panes being single-thick plain glass. The panes were separated from each other by a galvanized iron channel, making a ¾-inch air space. The sash bar was 2⅜ inches deep, the outer was well bedded on the outside and the inner pane put on with a 11/16-inch body of putty. All putty appeared to be intact. The glazing, as before, was done from the inside owing to the section of the sash bar.

Sample No. 3 was a double-glazed, solid, rolled-steel sash of the same make, size and arrangement of lights as Sample No. 1. The outside panes were ⅛-inch factory ribbed glass (ribs inside), the inner panes were single-thick plain glass. The panes were separated by a galvanized iron channel, making a 3/16-inch air space. The sash bar was 1⅜ inches deep, the outer pane being bedded on the outside and the inner pane put on with a good ½-inch body of putty. All putty appeared to be intact. The glazing, as before, was done from the inside, owing to the section of the sash bar.

Sample No. 4 was an ordinary double-glazed wood sash of the same size and arrangement of sash as Sample No. 1. The outside panes were ¼-inch rough wire glass, the inside panes being double-thick plain glass, separated from the former by a ⅝-inch air space. The sash was made of 1¾-inch stock, muntin bars being 5/16 inch. The outer panes had a 5/16-inch body of putty, not bedded, and the inner panes ½-inch body of putty, bedded. All putty appeared to be intact. Glazing was done, as is usual on this type of sash, from both sides.

Sample No. 5 was a single-glazed wood sash of same size and arrangement of lights as sample No. 1, and was obtained from No. 4 by taking out the inside panes of plain glass. This left a sash bar section practically the same as an ordinary single-glazed sash of this size. Glazing was done from the outside.

Sample No. 6 was a double-glazed, hollow metal sash. On account of the larger muntin bars required by this type of sash, it was decided to make the lights larger in order to obtain more light and more closely approximate the probable actual design of a sash of this size. The sash was made 3 lights wide and 4 high, each light being approximately 14½ x 21 inches. The outside panes were ¼-inch rough wire glass, the inside panes were single-thick plain glass, separated from the former by a ¾-inch air space. The exposed glass area was 23½ square feet or 71½ per cent of the total. The sash bar was 2⅛ inches deep, formed of No. 26-gage galvanized iron. Muntin bars showed an external width of 1¾ inches. The outer panes were bedded on the outside and the inner panes were bedded on both sides.

Sample No. 7 was a single-glazed, hollow metal sash of the same arrangement of lights as Sample No. 6, being obtained from it by removing the inside panes of plain glass, together with the galvanized iron formed sections which held them in place. This left the muntin bars 1½ inches deep.

Industrial Information

New Square D Catalog

The Square D Company, Detroit, Michigan, manufacturers of Square D steel enclosed safety switches, have just issued a new catalog, number 24-B. This is an attractive booklet, giving prices and descriptions covering their entire line. It is of convenient size and can be carried in one's pocket for ready reference purposes. An outstanding feature of the catalog is the table of wiring data for single phase, three phase and D. C. motors. This catalog should prove particularly useful to architects, engineers and electricians as a reference book.

The Concrete Pedestal Pile

The MacArthur Concrete Pile & Foundation Company, 120 Broadway, New York City, has issued a book for architects, engineers, etc., descriptive of the pedestal concrete pile. In this book the method of driving the pedestal pile is fully and clearly shown by the use of photographs, line drawings and accompanying text. There is a discussion of the merits of various types of piles, with tables of carrying capacity in each case; there is an analysis of the pedestal pile, data regarding tests on pedestal piles, and information as to the reinforcing of the pedestal pile.

The material is presented in a simple and thoroughly intelligible manner, yet it constitutes a very adequate discussion of the subject, and should be of interest to the architectural profession.

"White Pine in Home Building"

The White Pine Bureau, Merchants' National Bank Building, St. Paul, Minn., has issued the seventh edition of its charming booklet, "White Pine in Home Building." The book opens with "White Pine's Romantic History," which is a resumé of the use which has been made of white pine since the early days of this country. It is well and amply illustrated with photographs of early Colonial houses, the Old Meeting House at Hingham, Mass., Christ Church at Cambridge, and many other notable examples where white pine has been used.

The rest of the booklet is given over, in large part, to the reproduction of modern houses in which white pine has been used. This material is very well presented photographically, and in some instances details of costs are given, based on 1915 market prices. Comparison is made of costs when white pine and substitute materials are used. Floor plans, details of entrance, porch, pergolas and the like are all shown, and in such a way as to make the frame house appear a most fascinating type of dwelling. The booklet ends with a discussion of "Some Important Aspects of Financing the Purchase and Building of a Home."

"Creo-Dipt" Thatch Roofs

The Creo-Dipt Company, Inc., North Tonawanda, New York, has recently compiled a book entitled "Thatch Roofs," comprising an assemblage of the photographs which this company sends out from time to time, enlarged and amplified. The houses illustrated have been chosen as representative of the effects which can be obtained with this company's products, and cover a wide range of styles and types of houses. They are also representative of the various sections of this country in which the company's products have been used.

In addition to the thatched shingles this company manufactures "Creo-Dipt" stained shingles, in thirty shades, seventeen grades and in three sizes. It is stated that the life of the thatched shingle roof is greater than that of the regular shingle roof, due to the fact that in the former instance the exposure of the shingle courses is only 3 inches, while the regular shingles are laid with an exposure of anywhere from 4½ to 8 inches to the weather.

VIEW OF COLISEUM AND PALATINE, ROME