# THE AMERICAN ARCHITECT
## The ARCHITECTURAL REVIEW

VOL. CXXII · WEDNESDAY, AUGUST 30, 1922 NUMBER 2401


# THE RELATION OF PIPE ORGANS TO ARCHITECTURE

BY CALEB W. CAMERON*

IN considering this subject, it will be seen at first glance that a very definite limit can be fixed as to the types of buildings which are to be included, under this caption, and they may be grouped in three general classes, viz.:—

(a)—Churches.
(b)—Public Halls, Auditoriums and Theatres.
(c)—Residences.

In the buildings of each of these classes, the tonal requirements are wholly diverse, by reason of the use to which they are to be put, but in all there should be a most intimate relationship between the designer of the structure and the organ builder. This is true, even though it is too often lost sight of, because of the comparative infrequency with which Architects are required to contemplate such a problem, save by those who specialize along that line.

Divided Chancel Organ
Second Congregational Church, Holyoke, Mass.
Allen & Collens, Architects

It will be admitted that, to have such an installation, space must be provided within the building, and immediately the question arises as to *how much, and where.*

Upon reflection, it will also be conceded that the fundamental responsibility for the successful installation of an organ *rests on the Architect,* for it is in his province to select the location, and it is equally safe to say—as a general rule—that that matter is one of the least of his worries. The result is often found in the wretchedly inadequate spaces which are allotted, and termed, on many of the plans,—"organ chambers."

In no other matter of preparation for the equipment and furnishing is this lack of forethought so apparent, for one finds that careful study is made as to radiation in order to arrive at the proper size of heating apparatus, and provision for ample space for the boiler room, for coal shortage — and easy access thereto, for the removal of ashes, for adequate window openings for light and air, and especially as to the size, number, and convenience of exits, dependent upon the seating capacity of the auditorium or church.

The matter of acoustics must have intensive study—and that at the hands of the Architect—for the organ builder must take the building as he finds it. It is unfortunately the fact that many a fine organ is handicapped from the start because of strange neglect regarding this important factor.

This also applies to the interior furnishings of all these types of buildings, and their arrange-

* *Of Skinner Organ Company.*

ment is largely decided by the necessity for affording proper accommodations therefor.

Were a pipe organ of a standard size and shape, like pianos, beds, washtubs, and the many other usual accessories to our modern civilization, or like the pews or chairs in a church, or seats in a theatre—then the problem would be vastly simplified, but we are confronted with the fact that this is not so.

An organ is an aggregation of units, which, in themselves, have a peculiar individuality as to all dimensions, and which, in addition to those dimensions which are usual, also have this very important and additional requirement—to wit—that there must be an opening from the chamber in which the instrument is located, of sufficient size to permit the tones to escape unimpaired into that portion of the structure in which they are finally and usually to be heard.

Unless this is adequately supplied, the instrument may be seriously choked, and no builder can remedy such a fundamental error.

Again—it must always be remembered that—structurally—an organ is rectangular and oblong, and that its basic measurement is that of length—with a fixed minimum of ten feet (10′—0″) for the manual chests, the depth depending entirely on the number of units (or stops) which are set on that particular chest.

Hence we have this axiom—that the space designed for the installation of an organ should be rectangular—not curved—if the floor area is to be conserved to the best advantage.

The use of the building has, of course, a determining effect upon the proper location of the organ, and essentially, upon the amount of space required, hence no hard and fast rule can be made which will apply equally to each of the three types heretofore mentioned.

The mechanical development of the organ, which has been made possible by the invention and perfection of the electric action during the last twenty years, has been so tremendous in extent, and has so completely revolutionized its makeup, that very few, save those who are intimately concerned with that branch of the Arts, have a comprehensive idea of its resources and necessities.

There has been but little printed which is available for the handy information of the uninformed, so it is perhaps fair to hope that these articles may contain something which will be found useful in solving the problems which attend such an installation, and bring about a closer, and more sympathetic understanding of conditions and cooperation between those who have the best results at heart.

## Part I

## The Location of the Organ in Churches

We find that Tradition has influenced, to a great extent, the placing of instruments in churches. It may seem strange to say, but nevertheless it is a fact, that following Tradition often results most unfortunately, for the organ of today is wholly different, mechanically and tonally, from the old Continental organs, which so firmly established precedent.

It may be taken as an axiomatic proposition, that the organ should be as close as possible to the singers, or choir. Yet this is not an absolute necessity, for, with electric action, the instrument may be at some distance, *so long as the console and the organist are with the choir*. This is imperative.

The ceiling of the organ chamber, wherever located, should be continuous with that of the main auditorium, or as nearly so as is possible, for it is well known that sound has the tendency to follow a flat surface, and any arch, in front of the chamber, which is below the line of the chamber ceiling, tends to catch the sound, and reflect it into the chamber.

A safe rule to follow is that a chamber should be twice as wide as it is deep, and as high as it is wide. Structural conditions sometimes render this impossible, but it is a good starting place, and one which should be striven for.

Again—an organ, massed together, (Fig. 2)—is always most effective; more so than when divided, and yet, when divided, this handicap can be overcome to a large degree by having the openings from each chamber opposite to each other. (Fig. 3.)

A chamber should never open into a transept, for, in that case, the tone from that section will travel in a direct line down the transept, and will not assimilate with the remainder of the instrument, and its tone will be the impression received by those sitting in that area—the rest of the organ being lost to them. (Fig. 1.) It is especially bad for the organist when the console is in the chancel, for he cannot possibly hear the tone as it is heard in the church, neither can he form any adequate estimate as to how it balances with the rest of the organ.

WEST END ORGAN

ASYLUM HILL CONGREGATIONAL CHURCH, HARTFORD, CONN.

Where there are side galleries, no opening from a chamber should abut thereon, otherwise the sittings there will be found to be untenantable.

Beyond any question, the most satisfactory results are obtained when the tone is delivered and directed at the singers or choir.

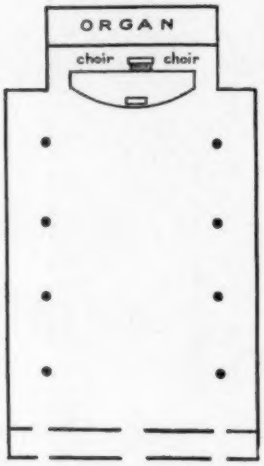
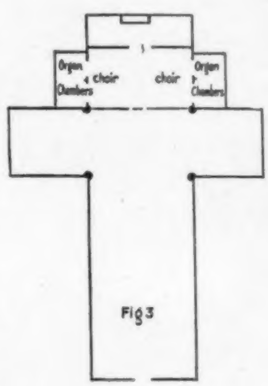


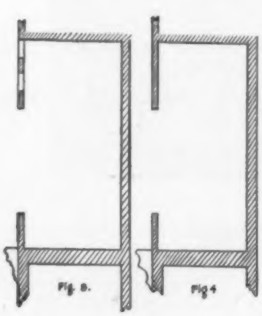

Fig. 2

An organ, *divided,* and on either side of the chancel in chambers of approximately equal size, (Fig. 3), having openings into the chancel, will always pave the way for a successful installation, for the tone will intermingle, and go into the nave as one solid sound, and an organ—so placed—will be tremendously effective in antiphonal work, either choral or instrumental.

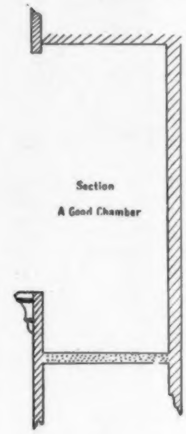
The effectiveness and solidity which characterize so-called *"West End"* organs are due, not so much to their contents, but to the fact that they are ideally located. They are high up in the church, in what is practically an open space, with no obstruction in front of them, hence the tone must, of necessity, come out into the nave in one unit or body, and there is no chance for interference with it in any way. With modern electric action, this location is entirely feasible even with a chancel choir, provided, as stated before, that the console is in the chancel.




We have in mind a location which is seldom found, but which, musically, is most satisfactory, and that is for the chamber to be behind the chancel, the tone coming out well up over the altar. In this case the opening must be treated architecturally with a mullion or a decorative screen, thus adding to the mystery of the installation.




An organ pipe speaks without any variation as to softness or loudness of tone—it has what may perhaps be termed a "static dynamic" — for the wind, which is introduced at the foot of the pipe, is at a fixed and pre-determined pressure, not subject to fluctuation. Hence, since the pipe is designed and built to "speak" on that pressure, the tonal result must be always the same. If the pressure is, for any reason, reduced the pipe cannot and does not "speak" the correct tone, and the need of some way to control the voice of the pipe, for the purpose of giving expression to the music, is a self-evident necessity.




Again—all stops, or sets of pipes, do not "speak" with the same volume or power, but there are certain stops which must be subject to the will of the performer, and these are always in the majority. This is done by placing certain divisions of the instrument within one or more "Swell-boxes" or chambers, in the front of which are set a series of wooden shutters or louvers, controlled at will by the organist, and which, when closed, confine the sound, and reduce the volume which escapes.

A structural "Swell-box" is by far the most effective, and should be planned and built as a part of the building. Its walls may be of concrete, or of terra cotta block, lathed and plastered, the finish coat to be of Keene's Cement, thoroughly smoothed, with all corners rounded, in order to insure the best possible reflecting surface for the sound. The floor should be of concrete, and have two coats of oil deck paint applied.

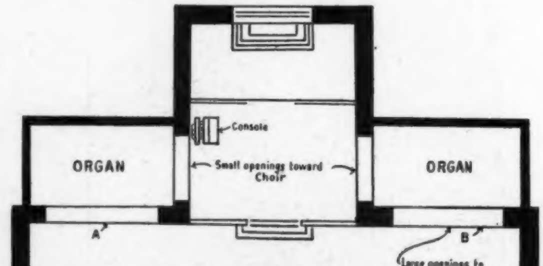



**Fig. 7. The above clearly illustrates all that should be avoided in planning chambers. Nothing could be worse**

The doors should be of the "refrigerator" type, with bevelled jambs to prevent any leakage of tone, and there should be a 4″ x 4″ wooden frame or buck set around all four sides of the opening at the front, fastened solidly to the floor and walls with expansion bolts, to which the organ builder may affix the swell-shades and their motors. As these shades must move ofttimes with great rapidity, absolute rigidity in the frame is of prime importance.

If the chambers should be—of necessity — very deep and narrow, which is unfortunate, the ceiling must be sloped upwards from the rear, with a minimum height at that point of twelve feet, (12′—0″), and if structural conditions at the front are such that there is a pocket at the front of the interior of the chamber—(Fig. 4)—between the top of the opening and the ceiling, the face of the wall at that point should be perforated to prevent the catching and reflecting backward of the tone. (Fig. 5.)

Of course, the higher the floor level of the chamber is as to that of the church, the flatter the ceiling therein may be, but it must be remembered that it is not possible to place one swell-box in front of another—they must be side by side, or one super-imposed. The former position is by far the best in every way.

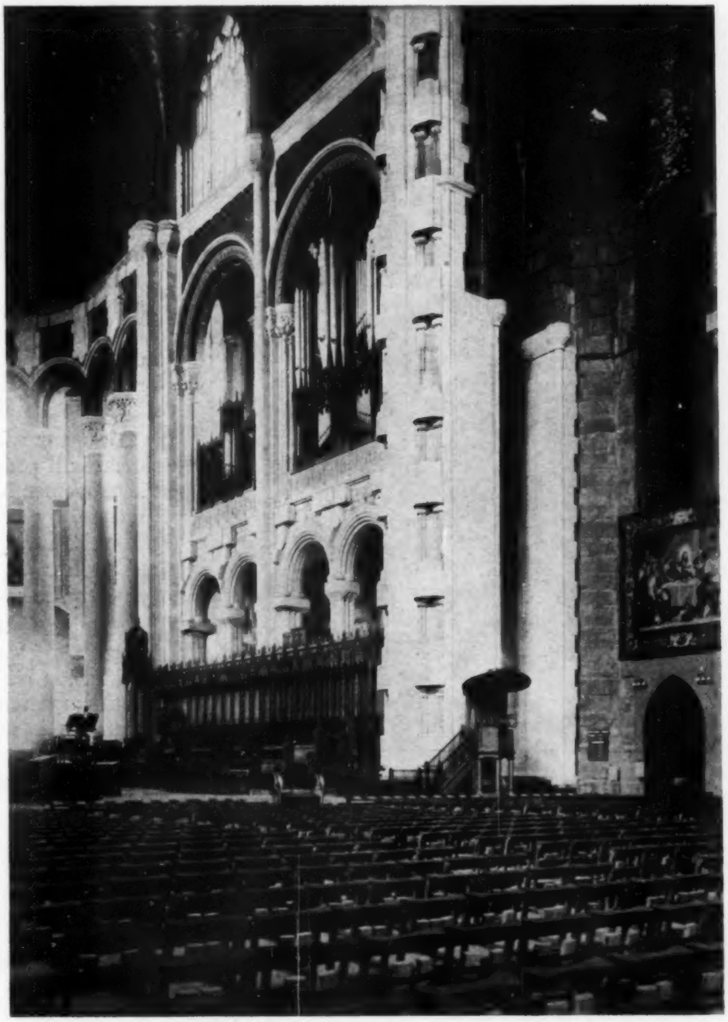


Fig. 1. Cathedral of St. John the Divine, New York

The unenclosed division can be located in front of a swell-box, without doing any injury to the tone from the latter, as no obstruction is incurred to the free speech thereby.

Thought should be given, in the preparation of the structural plans, to provision for carrying wind from the blower to the organ chambers. Each should have its individual supply, and the ducts for this should be installed as the building progresses, thus avoiding subsequent cutting and patching, or having to run them on the outside of walls or ceilings. This also applies to the conduits for the requisite electric cables, running from the console location to each chamber and to the motor room, for action work and control of the remote starter.

The blower should never be located in the organ chamber. It should be placed in a clean, dry room in the basement or cellar, with a concrete floor—say—eight by ten feet—where the mechanism will be easily accessible for observation, oiling, and general care.

The air which is sent from this room to the organ must be dry, and of about the same temperature as that maintained in the chambers, for cold air sent in will immediately put the instrument out of tune. This can be regulated by the installation of a radiator under thermostatic control.

In the case of a large organ, which has an Echo division, that chamber should be located as far from the main organ, and as high in the building as is possible.

Radiators, steam mains, ventilating ducts, rain leaders, or waste pipes, must, under no circumstances, be run through the space allotted to the organ. The writer has in mind an instance where, after he had laid out a chamber, the plans were sent to the Heating and Ventilating Engineer, for

Fig. 6. St. Thomas' Church, New York

him to lay out his plant, and, two years thereafter, when the organ contract was about to be let, it was discovered that he had run an eight inch live steam main directly through the center of the room. The removal and relocation of that main were a necessary, as well as a costly operation to the owner, but it had to be done.

Plumbing pipes or water mains *must not be run above the hung ceiling of the organ chamber.* Such an opportunity was taken advantage of by a Sanitary Engineer, and a burst pipe flooded the space above the ceiling, and ceiling and water promptly fell into the organ. The cost of that repair job ran over fifteen hundred dollars.

Nothing, save absolute destruction, will so damage an organ as water, hence the necessity for tightness of roofing, and of thoroughly flashing the outside walls and parapets. There should be no windows in the chambers, but they should be equipped with base plugs for electric lighting, thus eliminating the danger of fire.

As to the appearance of the instrument after installation, that depends largely on the style of the interior of the church. In many instances the openings are hidden from observation by the insertion of screens, more or less ornate as desired, of plaster or wood. If of plaster, care must be taken to avoid masses of solid areas, lest the tone be interfered with, and the openings in the screen should predominate. (Fig. 6.)

A copper wire mesh applied at the rear of the screen will prevent those in the auditorium seeing the movements of the louvers, and the wire will, in time, by reason of the atmospheric influence, take on a lovely patina, with a variegated color of red, yellow, purple, etc., which will be very satisfying to the eye.

The location of the console has, in the last analysis, a great deal to do with the success of the installation, (as has been indicated hereinbefore), for the organist must be in a position to hear what effects he is producing. This is sometimes difficult, but is worthy of study. The ideal location is—with a divided organ—in the center of the pulpit, but in Liturgical services this is impossible, and it must be placed at one side of the chancel. The organist can then hear—see the altar—and hear the organ.

Never should it be placed under the organ, or —worst of all—outside of the auditorium. This last has been made a condition in some installations which are in mind, and the result has been far from satisfactory,—in fact, they have proved absolute failures.

For the console, a space approximately six feet square must be apportioned, and it should, if possible, face the singers.

*(To be continued)*

# PAINT, ARCHITECTURALLY CONSIDERED

BY C. W. COUSENS

PAINT, aside from its use as a vehicle to create pictures, may be regarded by architects from two points. First, as a preservative of the surface to which it may be applied. This use of paint concerns both the architect and the engineer who know the necessity for the proper protection of materials that are to become embedded in the work, or the surfaces of metals in engineering structures that are exposed constantly to the varying temperatures and rigors of climatic changes.

These preservative features of paint have already been in part considered in the engineering section of this journal. Other articles dealing with specific uses of paint as a preservative are in preparation. Second, as a medium to give an effect of color to the surface on which it is applied.

In the present article it will be the endeavor to show how paint,—as color,—may become a very valuable medium, when intelligently used to accent the features of architectural design, not alone on new buildings, but also to rehabilitate, as it were, old structures whose merit of design and proportion have ceased to attract by reason of an unsightly, dilapidated appearance.

In travelling about the country in railway trains, it is often noticed that the appearance of cities, or that part of them that may be viewed from car windows, is unsightly. There is a generally down-at-the-heel appearance. The indiscriminating observer is apt to condemn the architectural aspect and, if he has an eye for color, will lament the dinginess that overspreads the whole aspect.

The average building is not as bad architecturally as it seems. Its form is often good, or not all bad, and what it lacks is a proper garb of paint to give it an air of respectability. Probably one of our shortcomings in civic pride is in ignoring the æsthetic value of good painting. A false economy postpones a necessary painting and the result is deterioration of value of buildings through neglect to provide a proper preservative, but also a very marked deterioration in civic pride. Unpainted, slatternly and slovenly neighborhoods are avoided by self-respecting people. A moderate expenditure of paint properly selected as to color and quality, would raise a given section from a purlieu to a desirable neighborhood. The enhancement in rent would be sufficient to pay for the cost of painting, and the attraction of a better class of tenantry would be inevitable. Communities that are striving for civic betterments seem to ignore the value of paint. Civic centers of beauty and good planning are designed, and the visitor in the rapidly moving motor car marks the quick transition from all this fine appearance in the heart of the town, to the squalid, unpainted and generally run down aspect of other localities. To use an old, well worn comparison but one that actually describes these things, there is "a Queen Anne front and a Mary Ann back."

Color in architecture, something every thoughtful architect is striving for, is not solely obtained by color of materials, but particularly as referring to suburban localities, simply a matter of paint.

Every wise man secures an architect to build his house. If his wisdom is broad enough, he will retain him in the matter of his decoration and furnishing. But too often is the idea of decoration confined to the interior of the house. It should be essentially a part of the architect's work not only to specify the quality of the paint to be used on the exterior, but he should be allowed to select the colors and to make sure that the fine elements of his design are not blocked up, or wiped out by an injudicious and inartistic selection of color and its improper application.

Architects should make emphasis in their specifications as to just what tints or colorings should be used for the painting work of exteriors, as well as of interiors. When left to the whims of the new owner or the false notions of the housepainter, many atrocities are committed. Cornices, columns, balustrades, trim and mouldings are eagerly seized upon by the painter as vantage points whereupon to display certain conceits he may have as to color combinations. He seems to feel that each new job presents fresh opportunity for the display of his talent for originality, and, running parallel to this disposition on the part of the housepainter, are the primitive ideas possessed by some new home builders that their houses must be different from any of their neighbors, regardless of rules or canons of taste. Really good lines and classical details of architecture are so maltreated as to give to the average frame house the appearance of a conglomerated mass of gingerbread.

The successful painting of the exterior of a house must depend upon an idea, and it goes without saying that the idea must be simple and consistent in its development.

All well planned exteriors have lines of architectural strength, and where the master hand has created the design, there is absolutely no need for emphasis in the application of paint or color. The creations of the architects demand simplicity of treatment by the painter. The effect produced by the application of surface tints, without the added embellishment of fancy colorings upon a rugged design is at once noble and dignified. The effect of light and shade and of proper background compel admiration, and while so-called imitations of stone work on a frame house are not to be tolerated, a most fitting model in the treatment of the frame house is the stone building. A castle of marble or of granite or any other rugged stone is a creation of beauty simply because of its "oneness," whereas the same design would be a nightmare if it were composed of variegated stones of different hues and texture. A sculptor would create a sensation if he chiseled a masterpiece of statuary out of highly colored and variegated marble, but after the first shock of surprise his creation would be viewed as a curiosity and not as a work of art.

Some frame houses need help; weak details need emphasis, but such emphasis as is made must be under the supervision of the architect. Good taste demands that projections which need emphasis should be highlighted, and that flat openings should be deepened and thrown into shadow. If tracery and detail are to be emphasized, the body of the house must be neutral and of deeper tint than the tracery.

There may be utilitarian reasons for painting the trim of a house in dark colors, but it certainly destroys the dignity of the design if, for instance, a frame house with body painted French gray, has cornices, mouldings, columns and balustrades painted a slate color. This combination may be serviceable because of wearing qualities, but for artistic effect the French gray house will appear to better advantage if the cornices and mouldings are painted either white or ivory tint.

We are aware that some consideration should be given to utility, and where there is an objection, because of accumulation of dust, etc., on projections, to having white or light colors, a compromise may be effected by having only a shade or two difference between the trim and the body of the house. The effect of severity and plainness will be saved, if the window sashes and frames are painted very dark, almost black. This will emphasize the shadows and thus give more solidity to the structure.

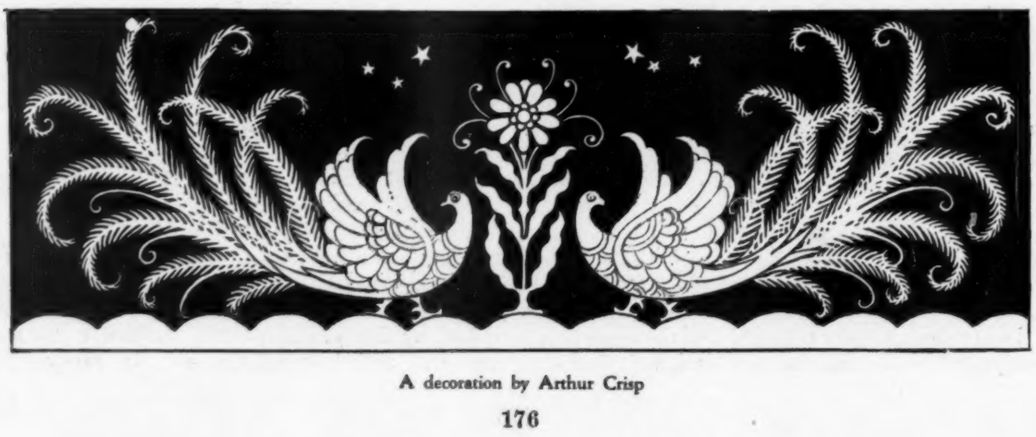
If the rule of simplicity is carried out to the limit in the painting of exteriors, suburban houses, especially, will show up to better advantage against the background of verdure. A simple color scheme will take into consideration that there are too many features to a house sufficiently prominent in themselves to need undue emphasis of striking color. For instance, we will consider the roof. Too often, this is the most conspicuous feature of the house, because of its vivid color treatment. The prevailing fashion for red roofs should not excuse the painting of roofs of buildings and barns on the farm with metallic red regardless of the color the buildings are painted.

We can readily understand why a red brick house should have red shingles or the new style tapestry effect, but we cannot understand or appreciate that sort of thing on a painted frame house. Rather would we have the old, Colonial white house with green blinds and silver gray shingle roof. In this combination there are refinement, modesty and dignity.

That architect will be serving his client well, beside being a great benefit to his client's community, who insists on simplicity of color treatments of exteriors and depends upon the usefulness of several shades of one color for the general scheme, rather than to permit the ambitious housepainter to use the colors of the rainbow on one job.

In conclusion, it may be stated that color whenever used must be handled with knowledge. The painter selects his frame to fit his picture. The architect has his frame (the surrounding prospect) rigidly provided at the outset. He will, of course, so design the lines of his house as to conform pleasingly to the lines of its background. He will, therefore, need to paint his house, not so it will blatantly proclaim its presence, or set up a continual war with its adjoining neighbors, but that it may rest quietly in its place and reflect the dignity of domesticity it was sought to secure.

It will, therefore, be seen that color may not be selected haphazard, but must be chosen with knowledge based on good precedent. These precedents are all about us, and it is desirable that they should be carefully studied.



A decoration by Arthur Crisp

Model of Estate of H. P. Burgard, Buffalo, N. Y.
Albert D. Taylor, Landscape Architect

# CARDBOARD MODELS—III

BY LEROY GRUMBINE

### Landscape Designs and Group Plans

A BASE the size of the finished model can be made of 1" x 1" wood strips, or whatever is suitable according to the size of the model. These strips should be spaced eight to ten inches apart and wood pulp board nailed on both sides.

Water pools, lakes, or rivers, if there are any, should be considered first. It gives better results to model the bottom approximately. This should be painted a sky blue tending slightly to green. Over this place a piece of glass for the water. For the effect of waves use pebbled glass with the smooth side uppermost. Otherwise use clear glass, the underside of which give a coat of ground glass substitute.

On a piece of woodpulp board lay out the roadways, walks, etc., and cut these out with a jig saw or knife. In the same way lay out contours, if at 20′ scale, every four feet, if at 16′ scale, every three feet, or whatever number of feet corresponds to the thickness of the board. Wherever there is a road or walk corresponding to those previously cut out, cut the contour back on the edges of the road to the next contour above. This will result in a groove into which the roadways may afterwards be inserted, giving the correct grades. Intermediate contours can be cut out of thin board if more accuracy is desired. After the contours are cut out, placed one on top of the other, and secured in place by gluing and nailing, the whole is given a coat of thin shellac. It is well to drive numerous flat-headed nails in various places to help act as a binder for the plaster, keeping the heads below the grade line.

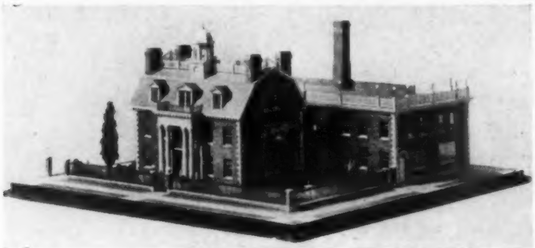
After the buildings have been made as previously described, and fastened to the model, the grading is completed by filling in the spaces between the contour edges, first with a plaster composition made of asbestos pulp and plaster of Paris, about equal parts, to which a small quantity of glue is added. After this is thoroughly dried, it should be sandpapered, and gone over again with a finishing coat of plaster, this time using whiting in place of asbestos, mixed with plaster and glue. When thoroughly dry, give a coat of thin shellac. Then paint with oil colors. Avoid uniform colors, but mix and vary them as in painting a picture. Sometimes a little touching up afterwards with pastels is quite effective, especially on roadways.

For sketch and study models, plasteline of suitable color can be used for filling in instead of plaster. The color can afterwards be modified by dusting with dry color, or it can be shellaced and painted, but in time the oil in the plasteline will work through.

Planting can be shown by using sponge or paper pulp. The former gives a much better texture and color, and should be used on the better grade of models. The latter is easier to model and useful for sketch models.

The cheapest sponges such as are found at five and ten cent stores are best for this purpose. They should first be dyed the desired colors, with dyes such as are used for clothing; wool dyes are better. Hot water is not necessary. Mix a solution of light green, comparatively strong, and weaker solutions of orange, yellow, and perhaps blue, red and brown. Dip the sponge in green and then in one or more of the other colors, especially orange, until the desired shades are obtained. A variety of color will result which is desirable.

Apply thick blue where shrubs and flowers are to go, and while the glue is tacky, with a small pair of tweezers, place bits of sponge to form the shrubbery, tacking in place with small pins and light hammer. The pins can be removed next day with pincers, giving a gentle twist before pulling. Flowers can be suggested by oil color as it comes from the tube, spotted on the sponge with a tooth pick.

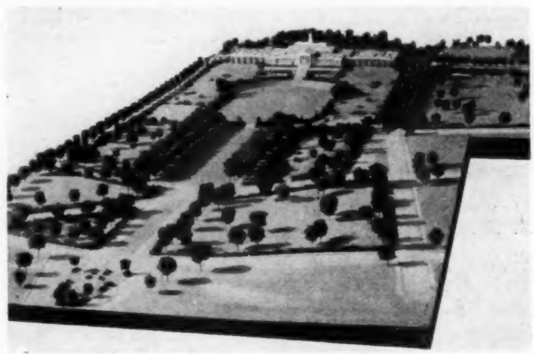


⅛ Scale Model of Northwestern Miller Building, Minneapolis
William Channing Whitney, Architect

Trees are made by sticking several pieces, usually three, of black wire, through pieces of sponge, built up to form the tree, running the wires up from the bottom through to the top, giving the end of each wire a turn backwards after it comes through to hold the sponge from slipping off the wire. The other ends of the wires are twisted together like a rope, to form the trunk. The tree is shaped with the hand, spreading the sponge as much as possible, to make the tree light and airy, and trimmed with scissors where necessary, cutting with the points of the scissors held towards the center of the tree, notching with many cuts. A heavy pair of curved or manicure scissors is best. Better shapes are usually possible by building up trees with several horizontal layers of flat pieces of sponge, rather than to try to use one piece for a tree. The wire can be cut slantingly to form points so it will penetrate the sponge more easily. By careful shaping, the most characteristic varieties of trees can be suggested, such as elm, oak, apple, willow. The trunks of the trees are stuck into small holes drilled into the model. Evergreens are made by using fine-textured sponge, colored a darker and bluer green, cut pointed and further shaped by rolling between the fingers, the bottom clipped off square and glued on the model, or else stuck on a stick or nail or pin with the head clipped off, for a trunk.

Scale - $\frac{3}{8}$ — 1'

Plaster pulp is made by tearing tissue paper—paper towels answer the purpose very well—into small bits, soaking in water, and thoroughly stirring and beating. Then drain off the surplus water, add about half as much plaster, some glue, green dye and a little bit of orange dye. Mix thoroughly. This mixture can be very easily handled and modeled by means of a large pair of V shaped tweezers, building up shrubbery and trees on the model, a little at a time, allowing to set and dry between applications.



Model of Handley Schools, Winchester, Va.
Walter R. McCornack, Architect

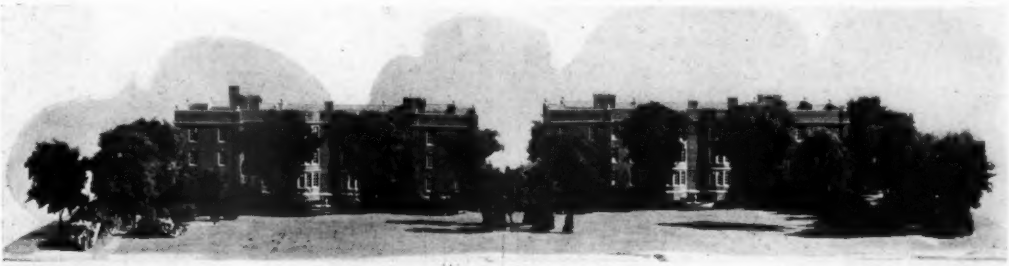
Trees are made by driving large-head wire nails into the model for trunks. Reed or broom corn, split to form branches, can be used for elms. Paint the lower part black or brown, and coat the heads with shellac. Then mix some clear plaster, thick, and apply around the heads of the nails. When set apply some more, until there is sufficient surface on which to apply the pulp.

Mixing this composition is a matter of a little experience, and proportions can be varied to suit conditions. The pulp gives the texture of foliage to the modeling; plaster makes it stiff and firm; glue makes it tacky so it will cling while wet, and makes it tougher after it is dry. Too much water makes the pulp soppy and heavy, so it falls off before it dries. If the pulp is applied too dry, it won't stick and form a binder. Too much glue has a tendency to make the edges curl up and get pointed, and turn dark.

It is difficult to get a satisfactory color by dyeing pulp. The correct color can only be approximated. It is better to have it too light than too dark. It is impossible to reach every spot with a brush afterwards, and this is the reason for dyeing the pulp when making it. The color can be corrected, modified and varied, by painting after the pulp is dry, with thin solutions of dyes dissolved in alcohol, or oil colors thinned with turpentine.

A cover should always be made for a model if it is desired to preserve the model, for it is almost impossible to remove dust and dirt. If the model is to be exhibited publicly, the cover should be made of glass.

The lighting is very important in exhibiting a model. Only one principal light should be used, placed at one side so as to throw the light at an angle of about forty-five degrees. If the building is white, the light should be placed so as to throw long shadows across the building. If the building is dark, more direct lighting is better. The effect should be as much like sunshine out-of-doors as possible. Suitable reflectors, or other weaker lighting may be necessary in some cases to prevent the shadows from becoming too deep. These same principles of lighting are even more important when having the model photographed.



Model of Garden Apartments, Cleveland, Ohio

George B. Post & Sons, Architects—Albert D. Taylor, Landscape Architect

This model is made at scale of $\frac{1}{16}$″ to the foot, and shows how effective a small model can be. It is 25 inches long and the buildings are three inches high

Theological College Gates, Salisbury

Jesus College Gates, Cambridge

Cains College Gates, Cambridge, England

*(From Photographs by Robert M. Blackall)*

# ·EDITORIAL·COMMENT·

THE FIRST SUGGESTION that the American Institute of Architects organize a committee "On public information" was made in the editorial columns of THE AMERICAN ARCHITECT some five years or more ago.

The idea was to have a committee that would take up from time to time the various misstatements and often libellous references to the profession of architecture, and over an authoritative signature correct them, if possible, through the columns of the paper that first gave them publicity.

The constant omission in the public press of the name of the architects of buildings whose dedications or opening were the subjects of columns of news, was another matter that needed to be brought to the attention of editors and reporters on daily papers.

During the Convention in New Orleans the *Picayune* referred to the "President of The Builders' Association, now in convention" as one of the leading "builders" of the country, and in almost every report in the daily press during conventions, the author of the "write up" showed not even simple knowledge of the profession of architecture, the American Institute of Architects or the purposes of its meetings in Convention.

It was to supply "public information" to the public and to a lot of poorly informed newspaper men that a committee was suggested by this journal.

The publicity work among newspapers as proposed by a circular of the Committee on Public Information, and in which it urges co-operation among chapters, is of a nature that would be read by the very class of people who already know and appreciate the dignities of architecture and the men who practice it. A campaign to give public information that will give best results will not be one carried forward by the preparation and publication of a series of theses, but one of constant alertness to detect ignorant expressions or a distortion of facts, and promptly to correct them.

Writing to the editor is a "favorite indoor sport" of a large number of people. Editors are human, and they are, as a rule, men whose time is absorbed by many details. The average communication that reaches an editorial desk is never written so that it may be printed as received. It must be rewritten or largely edited, and to do this takes time and thought largely in excess of the value of the matter in question. When an editor does receive a communication that he can without further effort set up and print, he is disposed favorably to regard the motive of the writer, and he is happy in the possession of so much good space-filling material.

If a Committee on Public Information of the Institute will prepare good copy, in the same way that a good newspaper man prepares it, it will find no difficulty in securing its publication, and will find that it is clipped and recopied all over the country. And in most instances this "copy" will not need to be more than a printers' "stickful" to accomplish a desired purpose. While the Committee on Public Information will naturally appreciate the importance of its work and believe that it should prepare long and finely written articles for the public press, editors will want terse items, as they know where and how to get articles.

* * *

FIVE YEARS AGO, the view from the editorial windows of THE AMERICAN ARCHITECT was unbroken, save for the group of tall buildings two miles South that fringe the battery and create the wonderful silhouette that impresses the foreign visitor. With each succeeding month this vista has become more limited. The location of the garment making industry in the district South of Forty-second Street and West of Seventh Avenue, has resulted in the erection of many towering structures. A location that up to but a few years ago was one of varying types of the earlier New York City residence is now the center of a very actively employed business community. As from day to day we have noticed the antennæ of steel that, climbing skyward, marked another new building, we have set forth on a tour of inspection to learn if there might not be found some material that would be worth while illustrating. In many instances it was learned that the buildings were erected by construction companies. In these instances, who is the architect? And almost invariably we have been told, the plans and specifications are by the construction companies' own architectural department. There was a condition that annoyed us. Roughly calculated, there were many million dollars' worth of new construction right in the very foreground of the view from the editorial windows and no architect of record to be discovered. Naturally a condition such as this makes for serious thought. The problem was,—find the architect,—and if it was not possible to find him, then learn the reasons for his absence.

Of course, there's a reason for everything and in the present instance there will be a wide divergence of opinion and many offered reasons. Possibly, if the construction element is questioned, it will say that for a number of years architects have been shouldering details on to contractors that really are part of the architects' obligation of service. In this way contractors have been compelled to perform functions that were "not in the bond," and that with each succeeding year, the contractor has been learning,—(being taught by the architect himself)—how to get on with a minimum of architectural service.

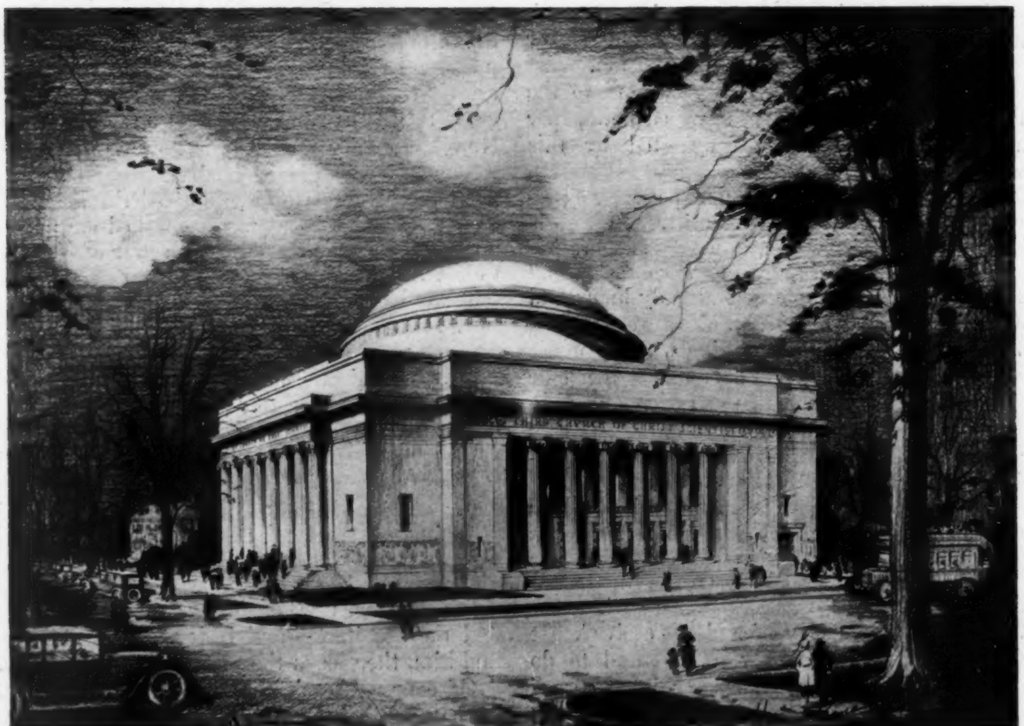
Let's take, for example, the drawing of plans. Work submitted to this journal for publication has been accompanied by poorly made pencil drawings. On flimsy transfer paper, the originals, none too "plucky" at the outset, have been dimmed and blurred by many blue printings and much handling. To illustrate just what this lazy method involves, let it be explained that if these plans and sheets of details are to be reproduced, they must be retraced. Just what it means for some disinterested person to retrace sheets of details need not be explained to an architect. Now, an editor, who wants to preserve all the verities of every drawing he reproduces, dreads these retraced results. They never are as crisp in their outline as the originals and there's always present the chance of error.

But there is another phase of the sloppy, tracing paper pencil drawings that may be one of the many contributing conditions that have eliminated architects in the building to which we refer.

In a contractor's shanty, perched upon the top of a builder's arcade, we one day found the superintendent of construction. He was pouring over a faintly printed blue print, and using a large magnifying glass to read, if he could, the lines and dimensions. We told him we would like to learn the name of the architect of the building. He angrily tossed the blue print to us, saying, "Architect? There's the way he puts it up to us."

This actual occurrence is not, as we have taken occasion to learn, a rare example. Unfortunately, it's too common. The result is one that does not serve to enhance the architect in the respect of the contractor and his assistant. And it would be but a usual trait of human nature if the contractor, in a moment of irritation, laid the matter before the client with many citations of other shortcomings.

For now these many years this journal has been accenting the necessity for architects to become better business men, while they yet maintain the highest position as artists. When we urge these practicalities on the profession, we have in mind the full performance of business obligations. Dodging a responsibility, even to so slight a degree as the sending forth of indifferently prepared plans, is a business error that it would be well to correct.



Competitive Sketch, Third Church of Christ, Scientist, Detroit, Mich.

C. Howard Crane, Architect

ELEVATION TOWARD LONG ISLAND SOUND

HOUSE OF LORENZO D. ARMSTRONG, ESQ., RIVERSIDE, CONN.

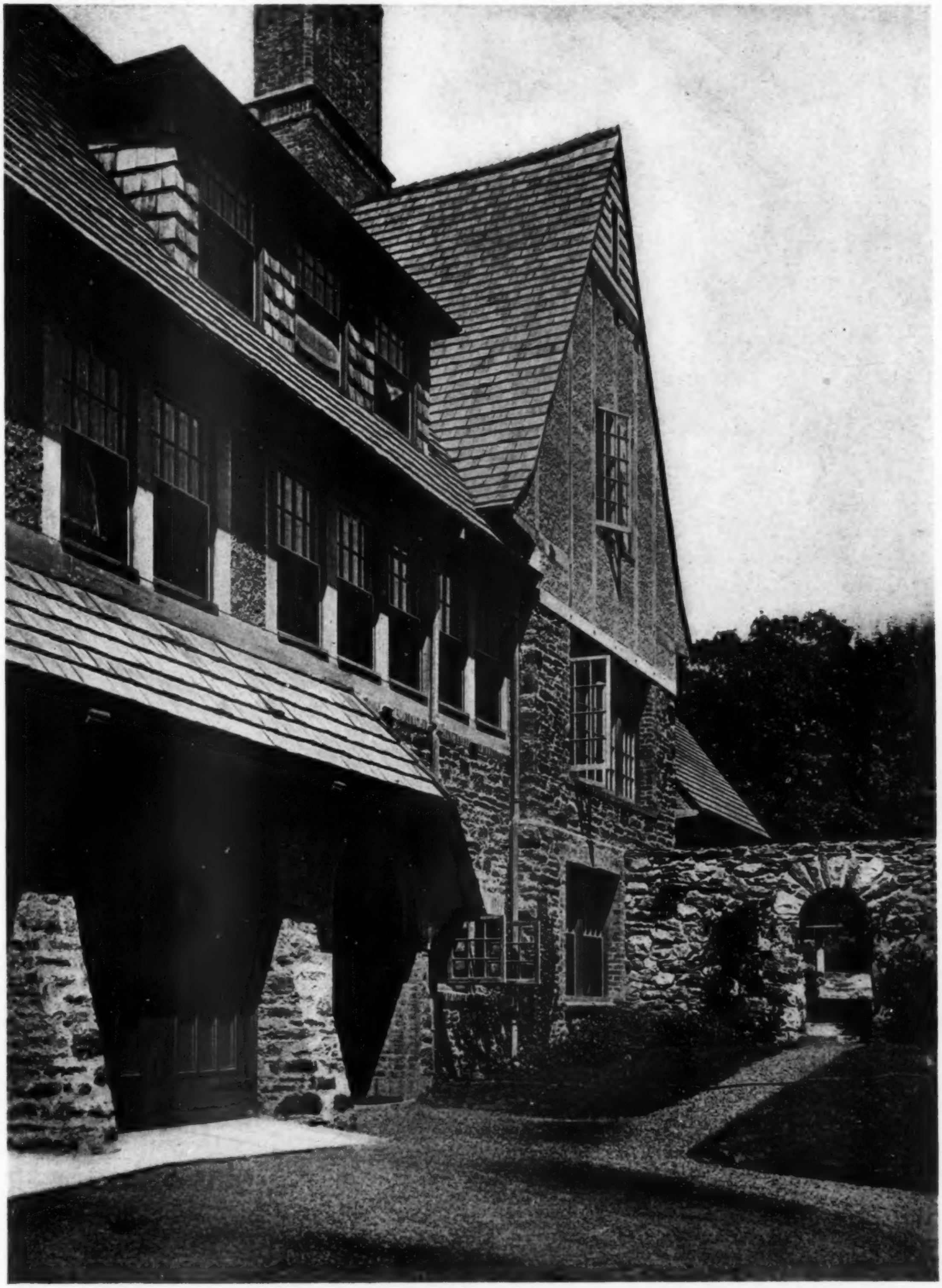
DONN BARBER, ARCHITECT

(For floor plans of this house see page 190)

ENTRANCE END

HOUSE OF LORENZO D. ARMSTRONG, ESQ., RIVERSIDE, CONN.

DONN BARBER, ARCHITECT



SERVICE ENTRANCE AND GARAGE

HOUSE OF LORENZO D. ARMSTRONG, ESQ., RIVERSIDE, CONN.

DONN BARBER, ARCHITECT

FIREPLACE IN LIVING ROOM

HOUSE OF LORENZO D. ARMSTRONG, ESQ., RIVERSIDE, CONN.

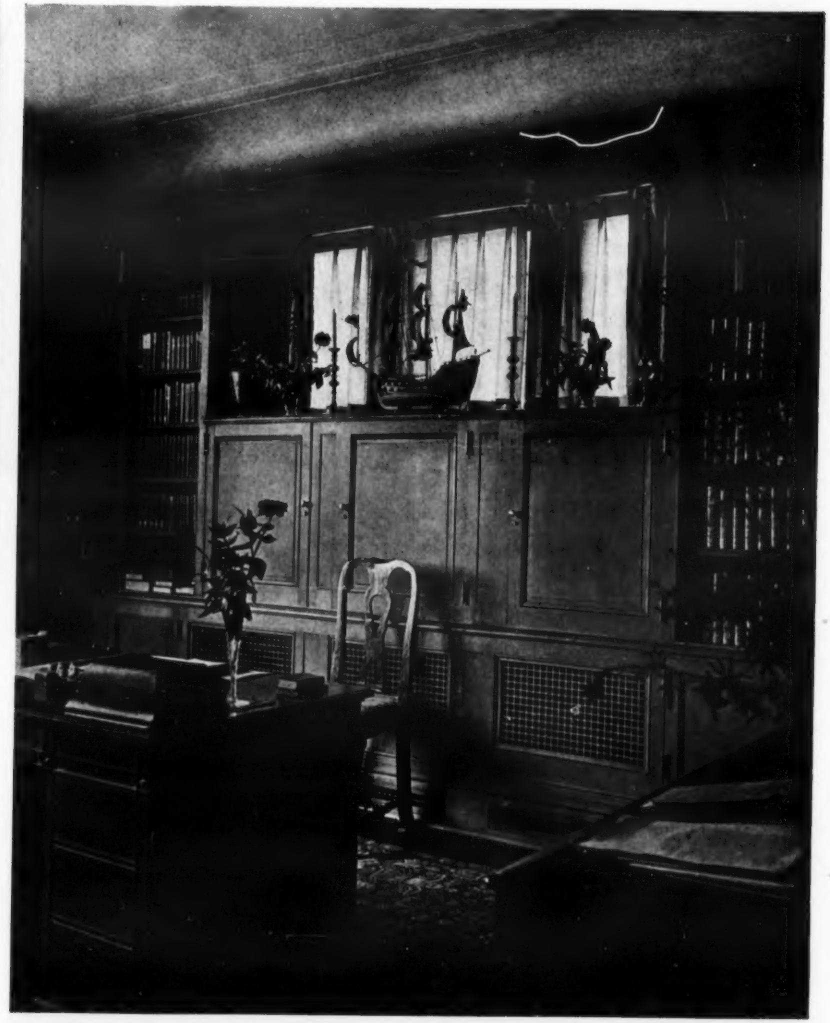
DONN BARBER, ARCHITECT

DINING ROOM

HOUSE OF LORENZO D. ARMSTRONG, ESQ.,

RIVERSIDE, CONN.

DONN BARBER,
ARCHITECT



DEN

FRONT VIEW

HOUSE OF C. C. STANLEY, ESQ., PASADENA, CAL.

MARSTON & VAN PELT, ARCHITECTS

SIDE VIEW

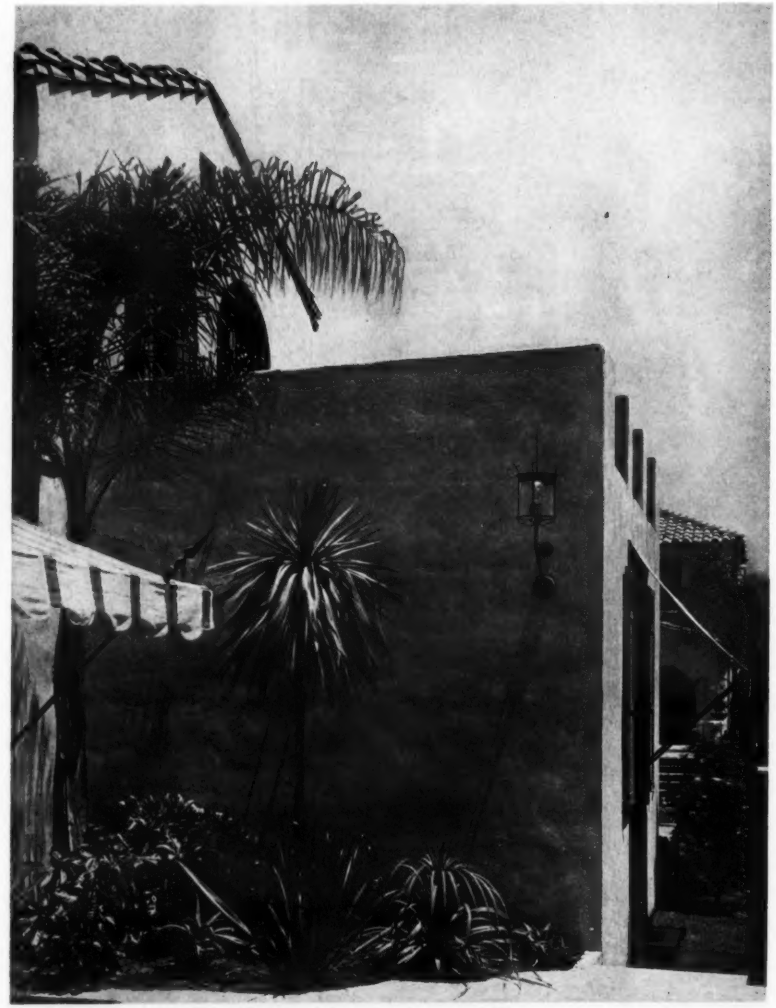
HOUSE OF C. C. STANLEY, ESQ., PASADENA, CAL.

MARSTON & VAN PELT, ARCHITECTS

REAR VIEW

HOUSE OF C. C. STANLEY, ESQ., PASADENA, CAL.

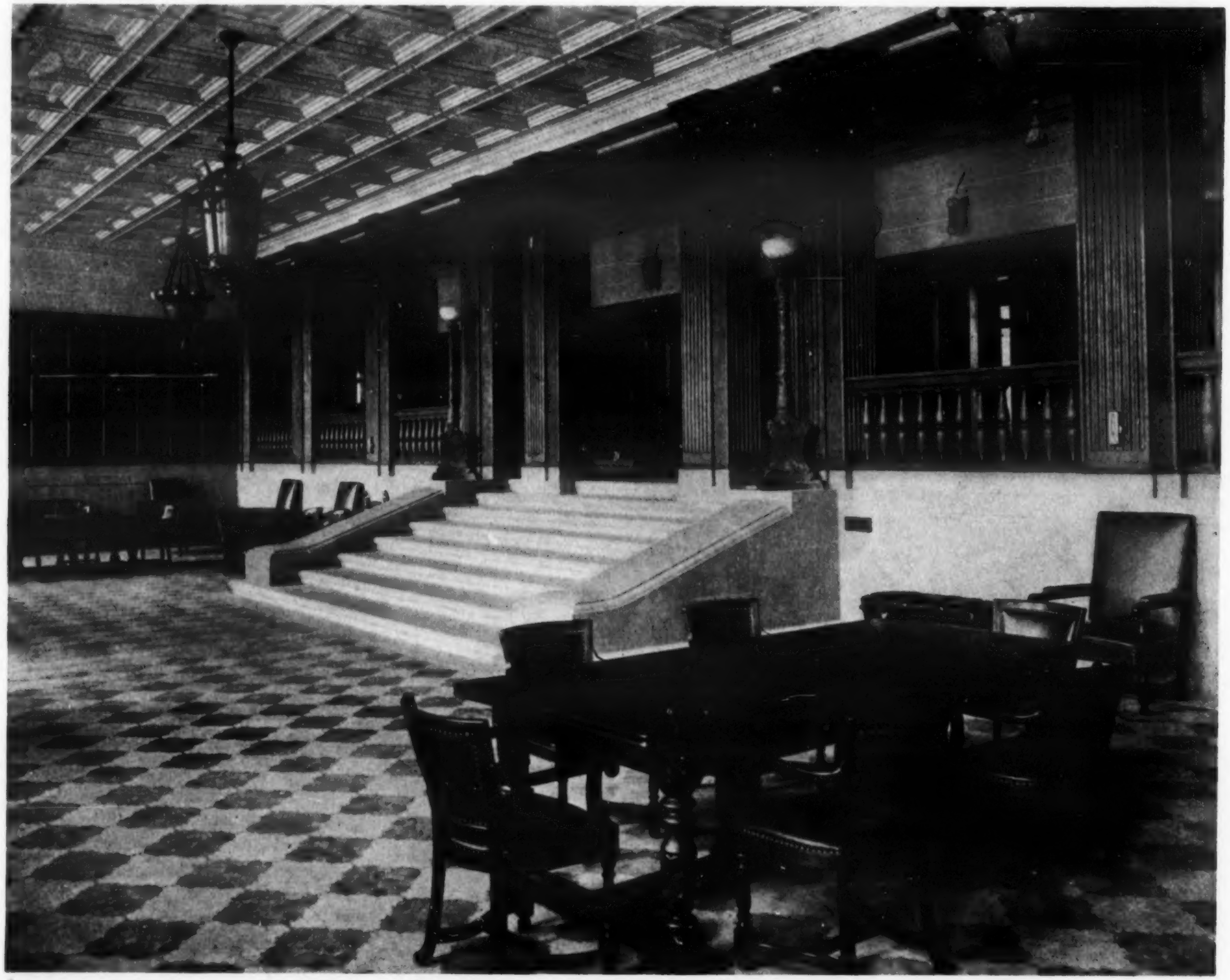
MARSTON & VAN PELT, ARCHITECTS



TERRACE


BUILDING FOR WILLYS-OVERLAND CO., TOLEDO, OHIO

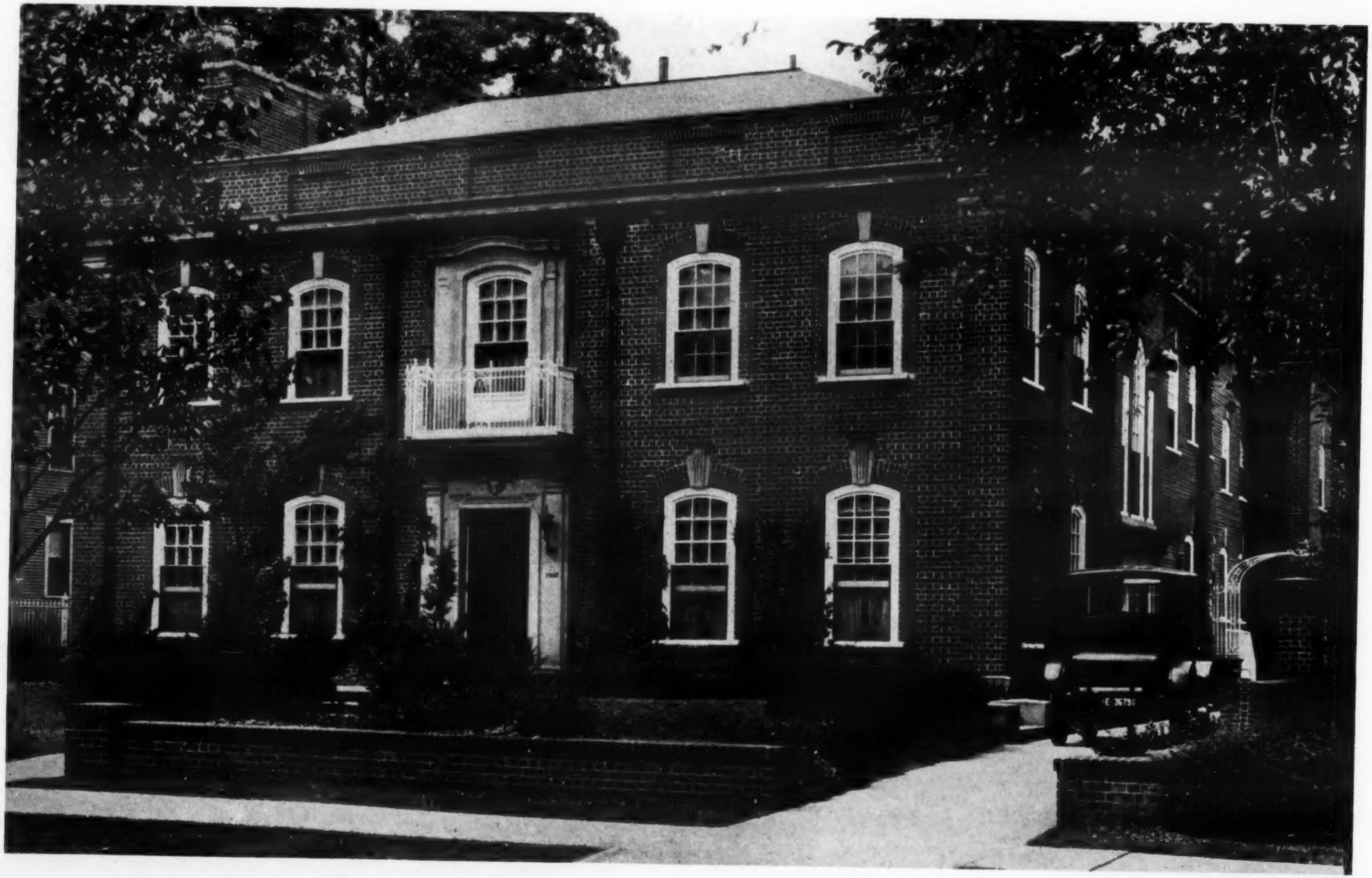
MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS



MAIN LOBBY

BUILDING FOR WILLYS-OVERLAND CO., TOLEDO, OHIO

MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS



HOUSE OF H. T. DUNN, ESQ., TOLEDO, OHIO
MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS


ENTRANCE DETAIL

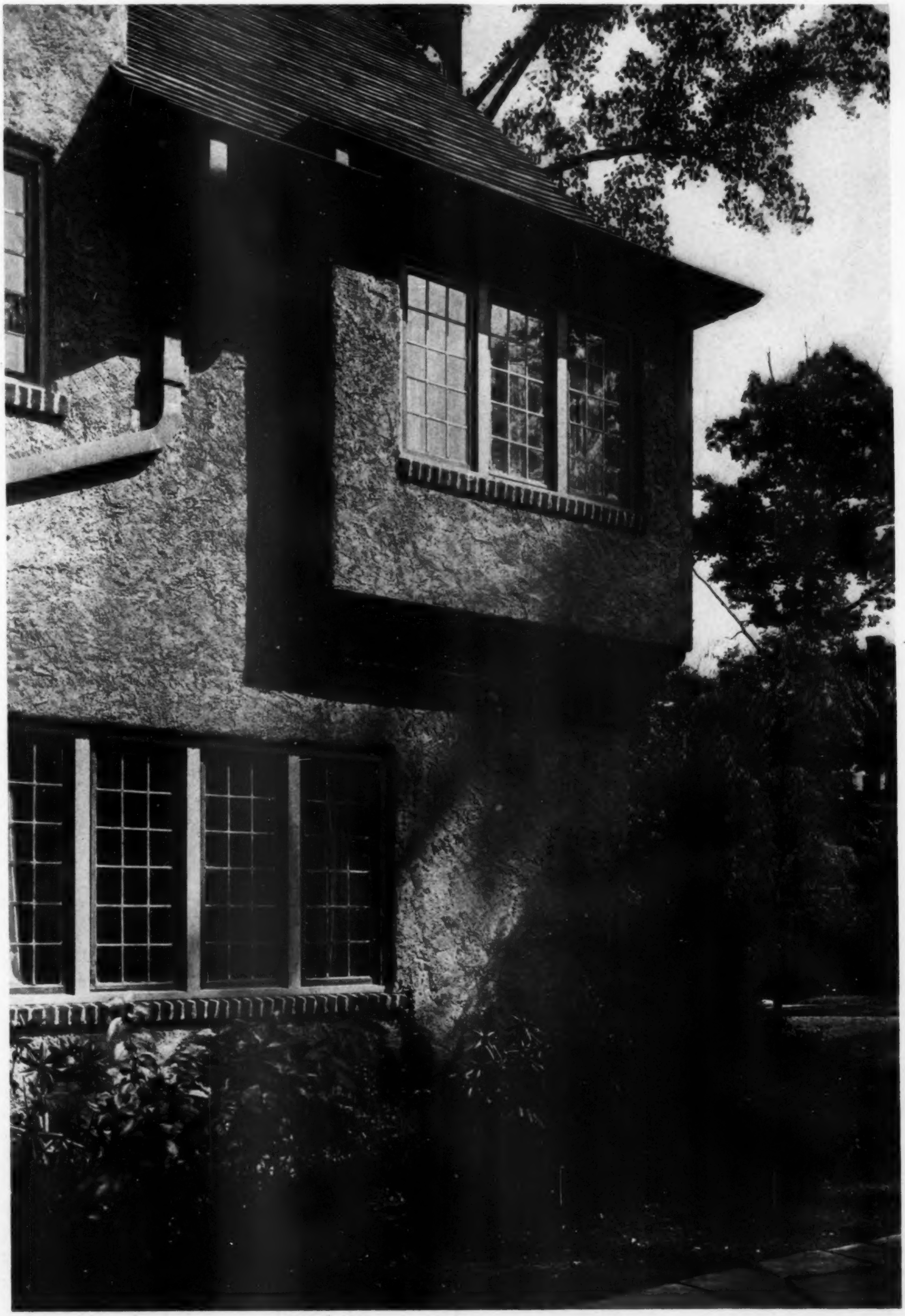
HOUSE OF H. T. DUNN, ESQ., TOLEDO, OHIO

MILLS, RHINES, BELLMAN & NORDHOFF, ARCHITECTS

HOUSE OF MRS. MARY McKELVEY, SPUYTEN DUYVIL, NEW YORK
JULIUS GREGORY, ARCHITECT

HOUSE OF MRS. MARY McKELVEY, SPUYTEN DUYVIL, NEW YORK

JULIUS GREGORY, ARCHITECT



HOUSE OF MRS. MARY McKELVEY, SPUYTEN DUYVIL, NEW YORK

JULIUS GREGORY, ARCHITECT

INTERIOR VIEW, HOUSE OF WELLES BOSWORTH, ARCHITECT


ONE OF THE FIRST OF THE PERMANENT FOREIGN EMBASSY BUILDINGS TO BE BUILT BY THE UNITED STATES GOVERNMENT

FRANK L. PACKARD, ARCHITECT


UNITED STATES GOVERNMENT BUILDING
RIO DE JANEIRO
FRANK L. PACKARD, ARCHITECT

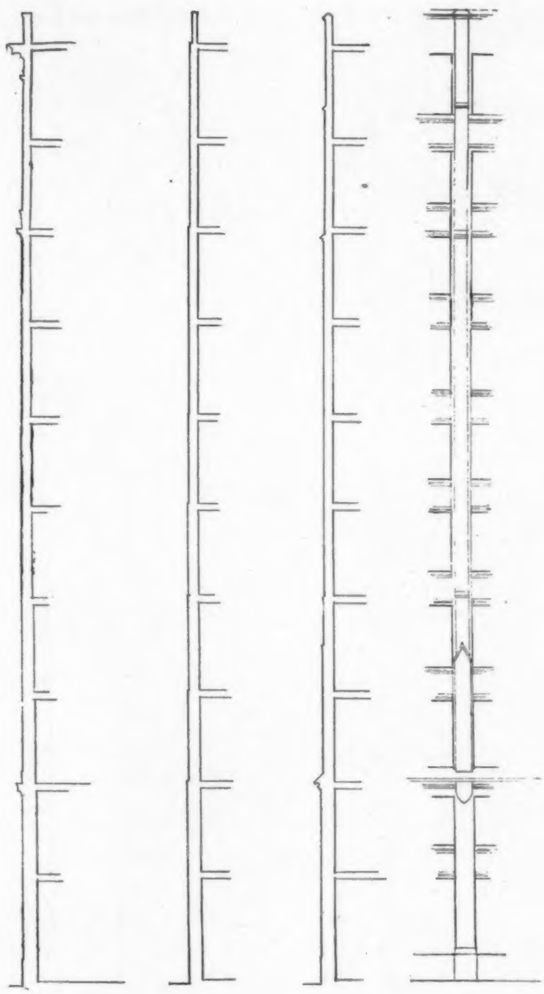
THE United States Government Building at Rio de Janeiro is designed in the Portuguese Colonial style harmonizing with the Brazilian mode of architecture. The construction is of granite, with reinforced concrete walls, floors and stairways finished in tile and marble. The roof will be of mottled colored tile. The walls enclose a patio or open court in which are a fountain and tropical garden. A wide corridor or gallery surrounds the patio with large arched openings on three sides and a main staircase on the fourth side on which all rooms of the first and second stories open. The walls of the patio, corridors and main staircase will be finished in a soft buff Caen stone, with the frieze and soffits of the overhanging cornices and the tile inserts of the walls all in high color, giving this central feature of the interior a striking and pleasing architectural and decorative effect which will show distinctively a Latin-American spirit.

The roof of the structure is a perfectly plain hip roof without a break or dormer. The window and door openings of the first story are covered with ornamental wrought iron grills. The climate makes it necessary to have doors and windows open, and these grills serve as a protection. Grills are characteristic of the Latin-American architecture and add distinct charm to the general exterior appearance. The building is located on the Avenue of Nations, along which will be the permanent buildings of the following nations: Japan, France, Great Britain, Italy, Denmark, Norway, Belgium and Portugal. The Brazilian authorities are reported to have said that when the other countries learned that the United States intended to build a permanent exposition structure for use after the Exposition for embassy purposes five other countries adopted the same idea.

The building is being constructed for the United States of America from plans and specifications by and under the direction of Frank L. Packard, Architect, of Columbus, Ohio, by Dwight P. Robinson & Co., Inc.

VARICK STREET BUILDING, NEW YORK
HELMLE & CORBETT, ARCHITECTS


DETAIL OF PRINCIPAL ENTRANCE
VARICK STREET BUILDING, NEW YORK
HELMLE & CORBETT, ARCHITECTS



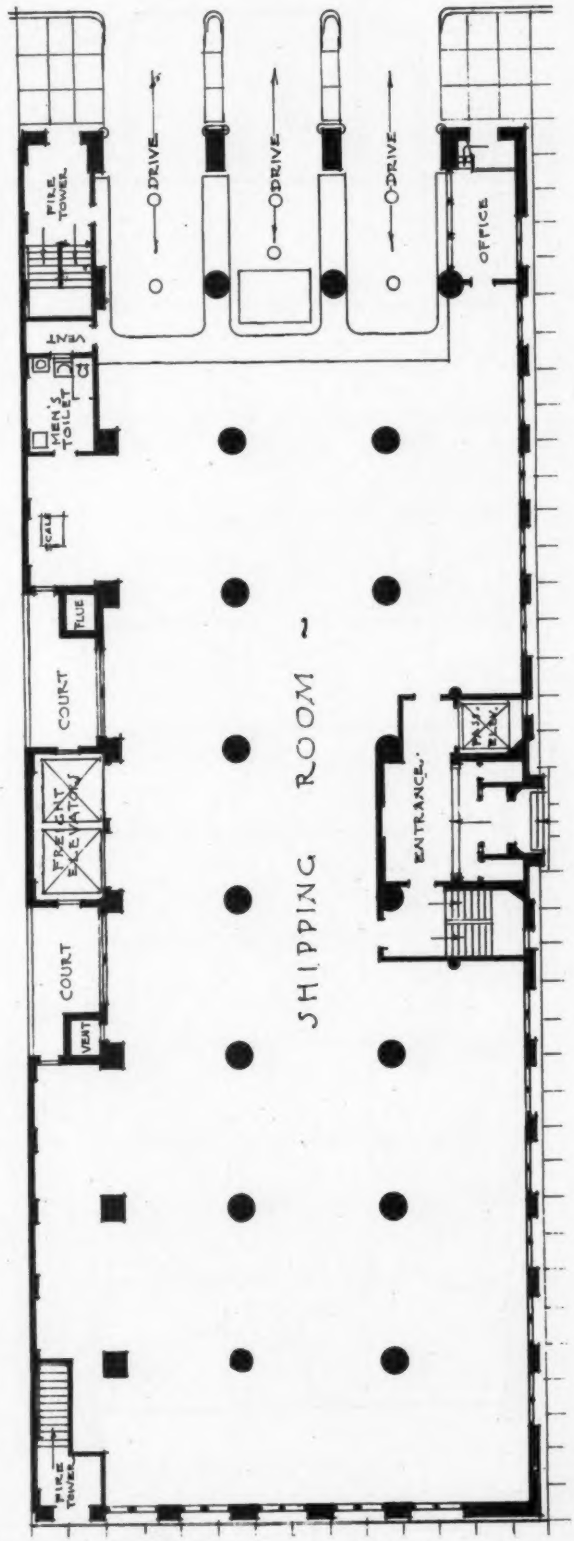
A B C D

A. Section through concrete building pier with plaster and cornice treatment—off-sets on interior face of pier.

B. Section through structural pier with off-sets on exterior face.

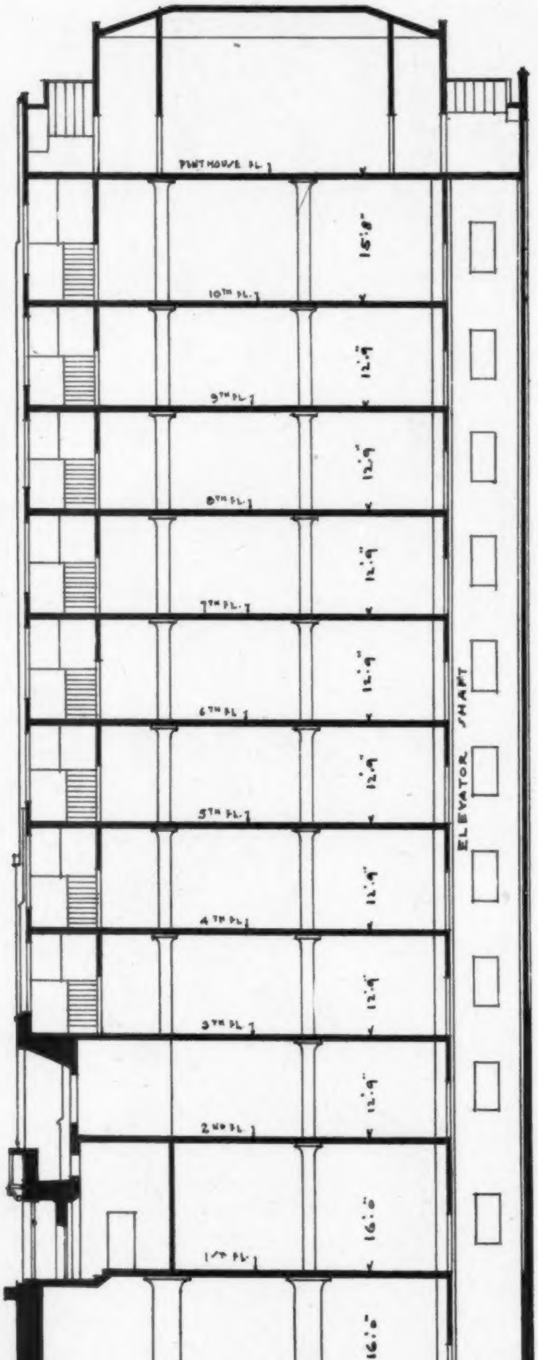
C. Section through structural pier with buttress and cap treatment, expressing structural conditions with off-sets on exterior face.

D. Exterior elevation of buttress and cap treatment.

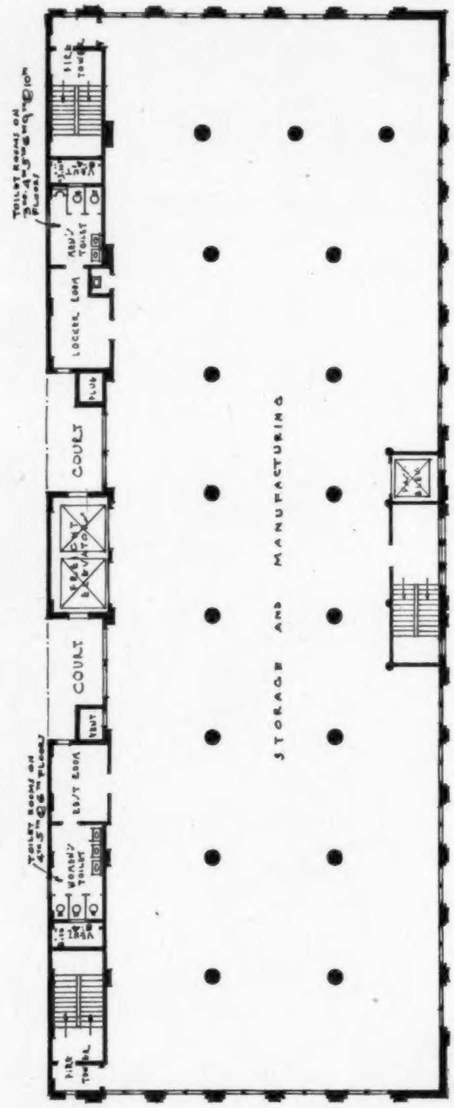



VARICK STREET BUILDING, NEW YORK

HELMLE & CORBETT, ARCHITECTS




CROSS SECTION




TYPICAL FLOOR PLAN

VARICK STREET BUILDING

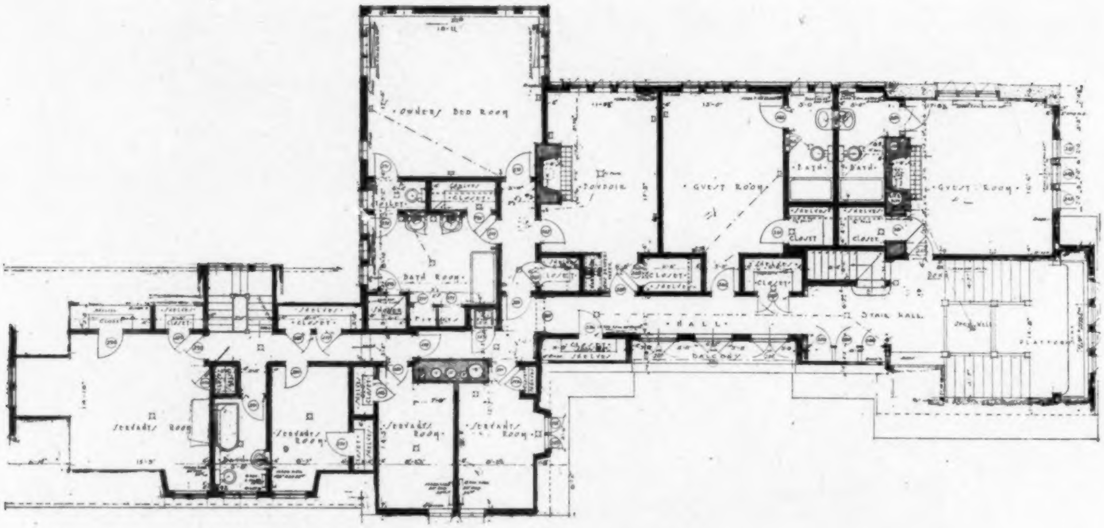
NEW YORK

HELMLE & CORBETT, ARCHITECTS

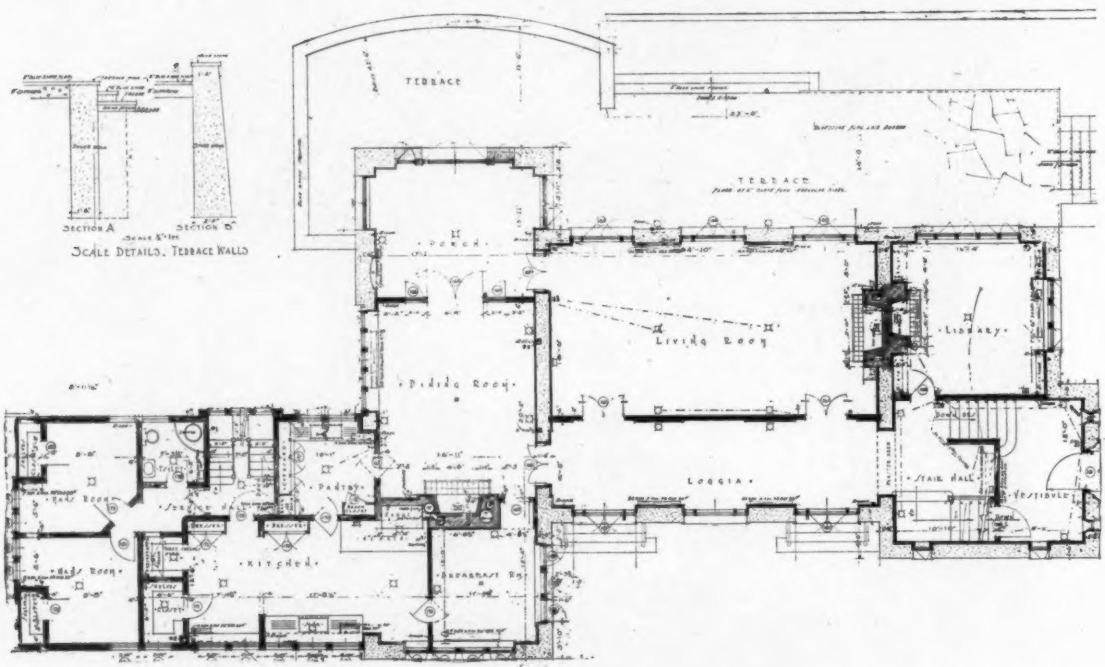
CHICAGO AUTOMOTIVE & ATHLETIC ASSOCIATION BUILDING

ALFRED H. GRANGER, ARCHITECT

*(From the Chicago Architectural Exhibition)*




SECOND FLOOR PLAN

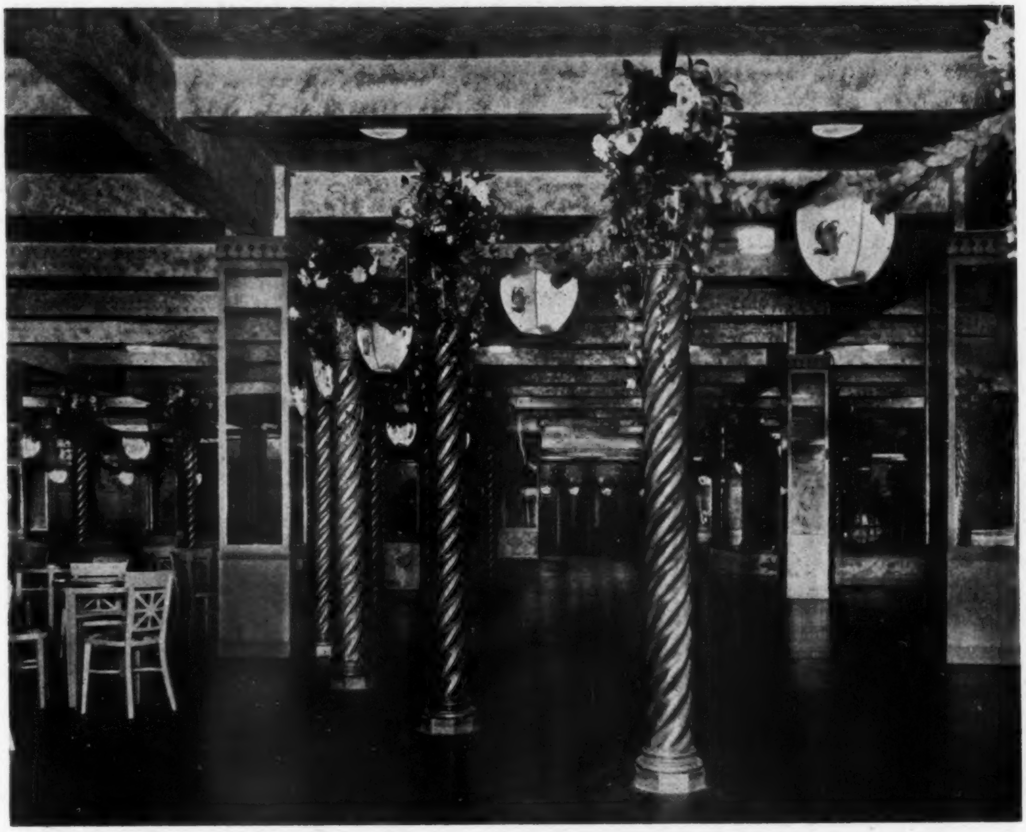



FIRST FLOOR PLAN

## HOUSE OF LORENZO D. ARMSTRONG, ESQ., RIVERSIDE, CONN.

DONN BARBER, ARCHITECT

*(See Plate Section for photographs of this house)*



A glimpse of the large ball room floor

# CLOVER GARDENS

## A So-called Dancing Palace in New York

### ARTHUR CRISP, PAINTER

THE work of Arthur Crisp as a decorative painter has for many years been an important feature of the decorative section of the annual exhibition of The Architectural League of New York. Mr. Crisp's ability as an artist, combined with his architectural training, enables him to approach an unusually difficult problem, such as was presented in the Clover Gardens dancing hall, in the most competent way.

A floor in the Grand Central Palace, on Lexington Avenue, New York, was to be converted into a modern dancing hall. This floor, covering an entire city block, has an area of approximately one acre. The ceiling height is but 13 feet 4 inches and the usual number of concrete columns made it impossible to treat the entire space as a whole, architecturally. The problem, therefore, became purely a decorative one, in which a proper combination of color and form would insure the best possible result under the most adverse conditions. A "unit" scheme of decoration was evolved. The problem of the low ceiling, cut with concrete beams, was first undertaken and solved. Starting from the floor with a relatively heavy color scheme, and as the ceiling was approached, lightening this scheme and over the ceiling a coat of aluminum spotted with light ochre, an effect of lightness and indefiniteness was obtained, with a flicker of light on the ceiling, which visually lifted it at least 2 feet. The main columns were boxed and panelled and by the verticality of their treatment, were made to accent the ceiling height.

The general scheme of decoration and the architectural character of the various retiring rooms may be judged by the illustrations.

The principal interest to architects in a work of this character lies in the results that may be obtained when an area designed for purely commer-

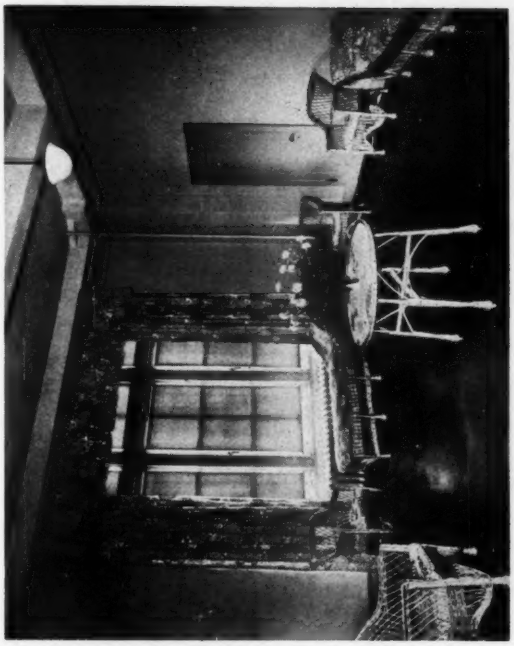
The Abduction of Columbine

The Return of Columbine

Clover Gardens, Grand Central Palace, New York

Decorated by Arthur Crisp

Women's Club room



Women's Rest room

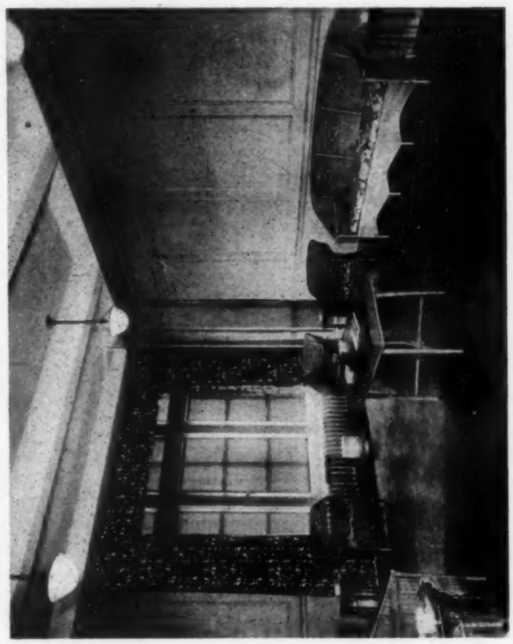
CLOVER GARDENS

Grand Central Palace

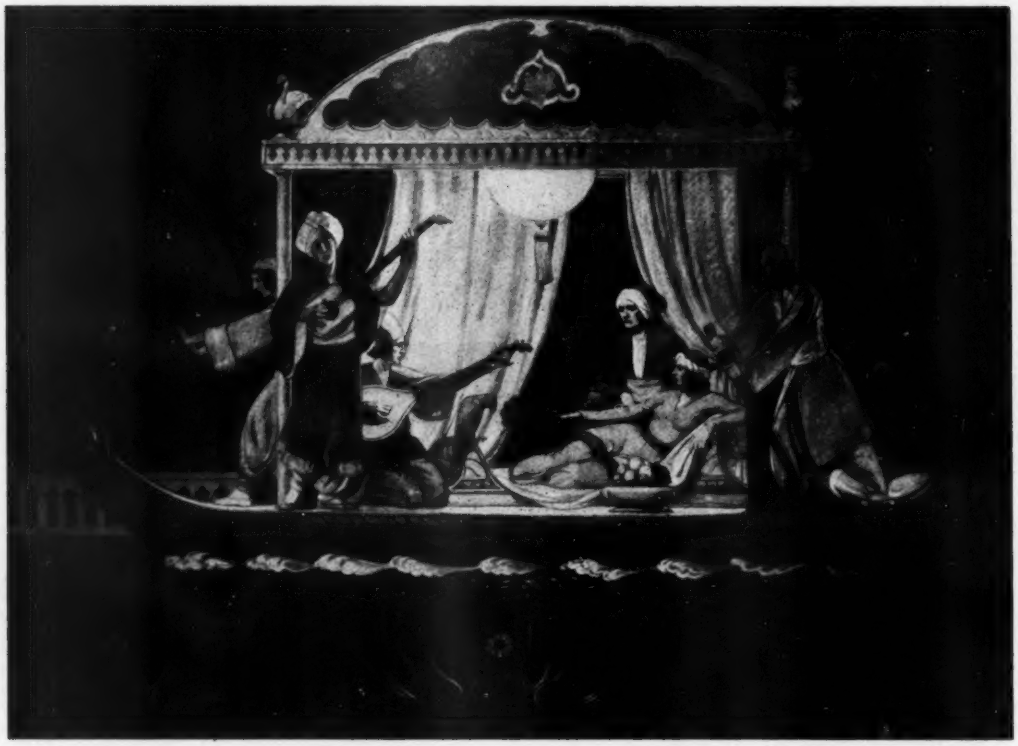
New York

Decorated by Arthur Crisp

The Powder-Puff room



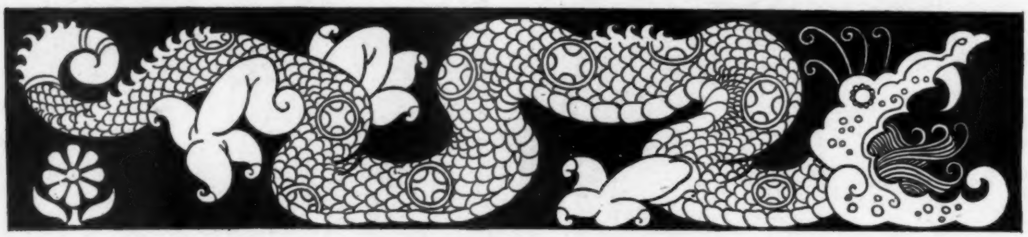
Men's Club room



The Persian Love Boat

cial purposes is transformed into one so widely different, as in the present instance.

A "dancing palace" in our large cities is a place of democratic assemblage. Its frequenters are from all the various ranks of society and the decorative elements are necessarily in keeping with such patronage. But it is possible to preserve in such decorations, principles of good color and correct form, together with selection of good decorative motifs and thus lead the people to a better knowledge of good art. This result appears to have been accomplished in this instance.



Design on base of Band stand

# DEPARTMENT OF ARCHITECTURAL ENGINEERING

## THE DESIGN OF WARM AIR HEATING PLANTS

### New Methods Adopted by Manufacturers for the Installation of Warm Air Furnaces in Residences

MANY years ago Mr. Kidder said, referring to the heating of houses by warm air, "The cause of the unsatisfactory heating of a great many houses by furnaces is the refusal of the owner or builder to pay the necessary price for a first class furnace and for the best workmanship and materials. The same carelessness and skinning that is sometimes permitted with furnace work, if permitted on a steam or hot water apparatus, would in most cases prevent its working at all." The foregoing statement is taken from an early edition of Kidder's Architects' and Builders' Pocket Book.

Warm air furnace heating always has been popular in North America because it is a heating and ventilating plant when properly installed and attention is paid to the operation of the fresh air supply. Another reason for its popularity lies in the low first cost as compared with steam or hot-water plants. Unfortunately the low first cost idea has been an obsession and many unscrupulous contractors have installed inadequate systems so that in some localities warm air furnaces are in disrepute. Manufacturers furnished rules for installation to contractors who sold and installed their furnaces but there were so many rules all based on empirical data, or based on no data at all, that in time heating contractors developed rules of their own.

A speaker at a convention once divided heating contractors into three classes, one class installing heating plants by "rule of thumb" methods with no pretense of trying to do anything more than figure in such a way as to obtain the contract; the second claiming to be more scientific in that a rule was used that called for some "figgerin'," inaccurate though it might be; the third class discoursed learnedly on the B. T. U. and tried to win favor by thus doing. When it came down to obtaining a contract the customer found little difference in the sizes of furnaces, leaders and registers, the rule-of-thumb man being apt to give larger pipes than the others at one time and smaller pipes at another time. Much depended upon the buying ability of the contractor.

Furnace manufacturers many years ago realized the need of definite rules so that architects would be able to write specifications for a heating installation in a more satisfactory manner than merely to require a guarantee of performance. The Federal Furnace League was organized and carried out extensive experiments. A manual was printed and widely distributed but the League did not live long because of the empirical nature of the rules and its failure to bring together all manufacturers. Something more scientific was needed and for a number of years men engaged in the warm air heating business have been trying to settle upon methods for figuring dimensions of furnaces, pipes and registers. At the annual conventions of various interested societies the matter occupied much of the time of meetings and discussions sometimes became warm. Finally it was agreed to have a committee of six men work on the matter of formulating a code, three to be appointed by the American Society of Heating and Ventilating Engineers, one each by the National Warm Air Heating and Ventilating Association, an association of manufacturers of warm air furnaces, the National Sheet Metal Contractors and the Western Furnace and Supply Association. A seventh member was later added in the person of Professor Willard, in charge of the warm air furnace investigations in the Engineering Experiment Station of the University of Illinois.

A code was prepared by the committee but approval of it by the American Society of Heating and Ventilating Engineers will go over until the next January meeting. Some details remain to be ironed out before this body of disinterested men feel like giving it full approval. The other societies, however, feel it is such an improvement over anything heretofore proposed that it should be approved and placed in use immediately, such changes as may be suggested by the engineering society to be made from time to time.

Professor Willard believes that until a maximum allowable air temperature at the registers is fixed, we may hear of small furnaces apparently doing the work of large furnaces. With a good chimney it is possible to increase the combustion rate from 4 lb. to 10 lb. per square foot of grate. This is not desirable but it does increase the heating capacity of the furnace more than 150 per cent. He believes the temperature at the register should be held down to a maximum of 175 deg. F.

The code contains some clauses relating to the construction of buildings. Contractors complain that many warm air heating plants are installed in buildings so poorly constructed that no method of heating would be satisfactory, no matter what the size of the furnace. Credit for Article No. 3, dealing with methods for determining sizes of pipes, stacks and furnaces is due to Mr. P. J. Dougherty, of the International Heater Company, his rules being based on results of the furnace tests made at the University of Illinois. In a future issue the derivation of his rules will be given, as they are scientific and take into consideration heat losses expressed in B. T. U's. Some heating engineers believe that his factor of 8, for obtaining pipe areas, should be 9. This will be discussed when the argument is presented on which the rules are based.

The code is said to give results equal to "better than average" work heretofore done. Experienced and reliable contractors of the highest standing are said to have installed some systems superior to those the code calls for as a minimum standard. It is now possible for architects safely to specify sizes and methods of installation of the essential parts of warm air furnace heating systems and insist upon contractors following the design and specifications. All contractors will then be obliged to figure on a definite specification so their bids will be comparable. No guarantees of performance will be required for in the past such guarantees have never been enforceable. The sizes given cover the usual requirements in guarantees. Future changes will deal with allowances for severe exposures, prevailing winds and other factors, which, naturally, will vary with localities.

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## Standard Code Regulating the Installation of Warm Air Furnaces in Residences

### ARTICLE No. 1

#### Meaning of the Term "Warm Air Furnace Heating Plant"

Warm air furnace heating plants, to which this code refers, shall consist of one or more warm air furnaces, enclosed within casings, together with necessary appurtenances, thereto, consisting of warm air pipes and fittings, cold air or recirculating pipes, boxes and fittings, smoke pipes and fittings, registers, borders and face plates, the same being intended for heating buildings in which they may be installed.

### ARTICLE No. 2

#### Section 1—Provisions to Be Made in Building Under Construction for Reception of Warm Air Furnace Heating Plants

(a) The following provisions shall be made by the owner or building contractor, in any building wherein a warm air heating plant is to be installed.

(b) Where warm air boxes or pipes are installed, joists shall be set sixteen inches (16") on centers and shall be butted and not lapped. Studding shall set directly over and under joists, leaving a space of not less than fourteen inches (14") between studs and joists. Wherever joists are cut, headers must be put in to support joists.

(c) All first story single or sub-floors shall be continuous. In all houses having studded exterior walls, these floors shall be extended to the outside sheathing and all spaces between studding shall be closed at the attic line.

(d) It is strongly recommended that the attic be tightly floored to reduce heat losses.

(e) All partition walls (or sections of these walls) carrying heat stack to second floor rooms, shall be built of six inch (6") studding to second story floor joists.

#### Section 2—Chimneys

(a) The owner shall provide a suitable chimney to which the furnace shall be connected by a tight metal smoke pipe not lighter than No. 24 gauge of the full size of the collar on the heater throughbut its entire length.

(b) It must be absolutely smoke tight throughout its entire length, and must extend at least three feet (3') above a flat roof or two feet above the ridges of peak roofs.

(c) If built of a single thickness of brick or of cement block, it shall be lined throughout its entire length with fire clay flue lining, having not less than three-fourths inch (¾") thickness.

(d) The furnace flue and smoke pipe connected thereto must have no other opening for attaching any fireplace, furnace, stove, range, water heater, gas or ventilating connection.

(e) If necessary to offset the flue, it must be done in such a manner as not to reduce the cross sectional area or provide a ledge or obstruction, where loose material may lodge.

(d) Its narrowest dimension shall not be less than eight (8) inches and no flue smaller than 8x8 rectangular or eight (8) inch diameter round will be considered suitable when hard coal is to be burned, or 8x12 inches rectangular or ten (10") inch round for soft coal or wood; nor one having a height above the furnace grate of less than twenty-six (26') feet.

Note: *It is strongly recommended that all new chimneys be built in strict accordance with the ordinance recommended by the National Board of Fire Underwriters.*

## ARTICLE No. 3

### Method for Determining Size of Warm Air Pipes, Stacks and Furnaces to Be Used in a Residence

### Method of Determining Size of Warm Air Pipes:

(1) First Floor Rooms:

Add glass in square feet, divided by 12, Net Wall in square feet divided by 40, and Cubic Contents in feet divided by 800, multiplied by 8 equals net area in inches for first floor pipes.

Use no warm air pipe less than eight (8) inches in diameter.

(2) Second Floor Rooms:

Add glass in square feet divided by 12, Net Wall in square feet divided by 40, and Cubic Contents in feet divided by 800, multiplied by 6, equals net area in inches for second floor pipes.

(3) Third Floor Rooms:

Add glass in square feet divided by 12, Net Wall in square feet divided by 40, and Cubic Contents in feet divided by 800, multiplied by 5, equals net area in inches for third floor pipes.

Note 1. *It is understood in using the above values for warm air pipe capacity that the warm air pipes run straight and are not over* 10 *to* 12 *feet in length. All registers shall have free area at least equal to the area of the respective warm air pipes. All rooms are heated to* 70 *degrees F. and the outside temperature is zero. For* –10 *degrees F. add————— to all warm air pipe area.*

Transition from leader to stack shall be made with a well designed elbow or boot and no stack shall be less than 60% of the warm air pipe area.

For cold ceilings add ½ net area to net wall. (A cold ceiling is one not covered by a tight floor).

### Method of Determining Size of Registers

All registers shall have a free area at least equal to the calculated warm air pipe area.

### Method of Determining Size of Furnace

Add together the actual warm air pipe areas in sq. in. as obtained above, and select a furnace having a free area not less than the sum of all the warm air pipe areas.

## ARTICLE No. 4

### Installation

### Section 1—Location of Furnace

The location of furnace shall equalize the length of warm air runs as far as possible, yet giving necessary preference to pipes supplying living rooms, dining rooms and main halls.

### Section 2—Foundation

Furnace foundation of brick, cement, or other incombustible material must be provided. Said foundation to extend at least fifteen (15″) inches at rear and sides of furnace casing and at least thirty-six (36″) inches in front of furnace casing. Foundation to be level.

### Section 3—Setting or Assembling of Furnace

(a) The base ring of the furnace shall be cemented to the foundation, making an air tight joint. The furnace parts shall be assembled plumb and level, and in a workmanlike manner.

(b) All sections and joints shall be properly fitted. Joints requiring cement shall be well filled and all bolts shall be drawn up tightly.

### Section 4—Casings

(a) Warm Air Furnaces shall be enclosed in metal casings or walls of brick, tile or concrete.

(b) Portable. Sheet metal casings including casing tops shall be made of galvanized sheets, not lighter than 26-U. S. Standard Gauge. They shall fit the castings and casing rings closely, so as to be dust tight, and shall be securely fastened to the front. The casing shall be lined from the upper casing ring down to a line on a level with the grate.

(c) When side casing collars are used the casing top must be of sufficient height so that the largest warm air pipe can be taken from side without ovaling. In no case shall a distance less than eight (8) inches be maintained between the top of any furnace and the top of casing or bonnet.

(d) Any furnace, the casing top of which shall come within sixteen (16) inches of a combustible floor, ceiling or joist, shall be protected by a metal shield, extending not less than eighteen (18) inches beyond the casing of said furnace. This shield shall be suspended at least two (2) inches below wood work, allowing free air space between shield and wood work. No furnace casing or top coming nearer than six (6) inches of ceiling or joists shall be allowed in any case.

(e) Openings for side casing collars shall be cut into the casing top, so that the tops of all openings are on a level. Casing collars shall be fitted into place with a proper flange, or bead, on the outside and drawn up on the inside, making a dust tight joint. All collars shall be of same size as the warm air pipes to which they are to be connected.

(f) Brick set, cement or hollow tile casings shall be constructed as follows: Walls shall be not less than eight (8) inches in thickness, and shall be constructed air tight. Rectangular casing shall be, with least inside dimensions the same as that of the portable casing of a corresponding size of furnace. Walls shall be carried to the same height as the portable walls, allowing not less than eight

(8) inches between the top of the furnace and the bottom of the top cover. After placing the collars for the warm air pipes, continue the masonry up even with the top of the collars, lay spacing rods of bar iron on edge or angle irons across the furnace top, cover these with sheet iron, cover the sheet iron with masonry and run the side walls four (4) inches above the masonry bed.

(g) Provision shall be made in the walls for a manhole ingress to heater.

### Section 5—Warm Air Pipes in Basement

(a) It is recommended that all warm air pipes in the basement shall have an upward pitch of not less than one (1) inch per running foot.

All warm air pipes shall be made of bright tin not lighter than IC, or galvanized iron. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter ($1\frac{1}{4}$) inches and such joints shall be beaded and soldered or riveted. All pipes shall be properly secured to ceiling or joist. No solder or riveted joint required where round pipe slips over casing collar. Any pipe twelve (12) inches or greater in diameter shall not be made of material lighter than IX tin or No. 26 galvanized iron.

(b) No warm air pipe shall run within one (1) inch of any woodwork unless such woodwork is covered with asbestos paper and the paper covered with tin or iron.

(c) All warm air pipes in the basement shall be provided with dampers not more than two (2) feet from the casing.

(d) Where warm air pipes pass through a masonry wall, a metal thimble shall be provided, having a diameter at least one (1) inch greater than the pipe, and pipe supported in such a manner that air space is equidistant on all sides.

### Section 6—Wall Stacks

(a) Single Stacks. All single wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin or galvanized iron and shall be covered with not less than one thickness of 12 lbs. per one hundred (100) square feet of asbestos paper. All studding and other woodwork facing said pipe shall be lined with metal and metal lath used in place of wood lath. An air space of not less than three-eighths ($\frac{3}{8}''$) of an inch shall be allowed on the two sides nearest the vertical studs. All such pipes shall be braced in a proper manner so as not to obstruct the flow of air, but to retain the full capacity throughout. All joints shall be locked and held in place by means of lugs, or straps. No joint shall depend wholly upon solder to make it tight.

(b) Double Stacks. All double wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin, not lighter than IC or galvanized iron and shall be made double, from and including the boot or foot piece in basement to the top of each and every stack and register head on all floors. There shall be continuous uniform air space of not less than five-sixteenths (5/16″) of an inch, which must be maintained between the outer and inner walls of all such pipes and fittings of all kinds, styles and descriptions, such pipes, heads, boots and other fittings to be of the styles, or equal to those accepted by the National Board of Fire Underwriters. All pipes and fittings to be secured firmly in place by lugs or straps attached to the outer walls of stacks and fittings, and no nails shall be driven through these stacks or fittings at any point. No wall pipes or fittings shall be used which depend wholly on soldered joints. The various members shall be so made that all joints are locked and soldered and the several members shall be attached to each other with slip joints, which are for the purpose intended, air tight.

### Section 7—Registers

(a) When baseboard or wall registers are used, they shall be properly and permanently attached to the stack head in such a manner that will prevent any leakage of air between the head and the register.

(b) Floor registers shall be provided with a register border or double register box of tin or galvanized iron with an air space of not less than five-sixteenths (5/16″) of an inch between inner and outer boxes.

(c) Registers for warm air and warm air pipes shall not be located in outside walls. The warm air registers in the various rooms shall be located in or near the inside walls in all cases.

### Section 8—Air Supply to Furnace

(a) The air supply to furnace for warm air heating plants may be taken from outside or from within the building or may be taken partially from outside and partially from within. In no case, however, shall air be supplied to any furnace from any basement or furnace room.

(b) The cold air intake, or return where air is taken from within the building, shall have a net area of not less than the combined net area of all warm air pipes leaving the furnace and this may be maintained in one or more ducts.

(c) When the cold air supply is taken wholly from the outside of the building the supply duct at its most contracted area must equal or exceed eighty (80) per cent of the combined area of all warm air pipes.

(d) Cold air ducts shall be constructed of metal, tile or other incombustible material having smooth inner surface and shall maintain a constant net area throughout their entire length and shall be made air tight. Where a boot or shoe is connected to the casing at the base, the opening shall not extend higher than a line on the level of the grate of the furnace. The width of the shoe shall be of proper measurement to make the same area as that of the round or square pipe to which it is connected.

(c) Wherever the space between joists is used to convey cold air overhead, the joists and all wooden surfaces between such joists shall be lined with metal and a pan constructed to extend not less than six (6″) inches below said joists. The connection from this pan to the boot or shoe shall be made of galvanized iron not lighter than No. 26 gauge, and shall have a transition collar, the top area of which shall be 10% greater than the connecting pipe.

(d) The cold air face or faces shall be made of wood, or metal, set with top of same flush with floor and it shall have not less than 10% excess free area over the net area of the cold air pipe to which it is attached. Where cold air face is placed in a seat or side wall (whether furnished by owner, general contractor or furnace contractor) the open work of face must extend to within at least one (1″) inch of the floor line. The effective area of a vertical cold air face lies within twelve (12″) inches of the floor line, hence, the capacity of any vertical cold air face shall be determined by multiplying the base line in inches by twelve (12″) inches height and deducting for the grills or cross bars.

### Section 9—Smoke Pipes

(a) The smoke pipe shall be as short and direct as consistent with the location of the furnace, shall be made of either black or galvanized iron not lighter than No. 24 gauge. It shall be lock seamed or riveted, all joints shall lap not less than one and one-half (1½″) inches, and it shall be rigidly secured. Cast iron smoke pipe may be used.

(b) Where the smoke pipe enters the flue a thimble shall be cemented into the flue and the connections thereto made air tight. Should any smoke pipe come within sixteen (16) inches of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two (2) inch air space exists between this shield and the combustible material. This shield shall be no less in size than twice the diameter of the smoke pipe and of sufficient length to cover the wood at all points.

(c) No smoke pipe shall project through any external wall or window.

### Section 10—Pipeless or One Pipe Furnaces

(a) When but one duplex grating is used for both warm air and cold air in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the grating. Article 4, Section 4, relative to casing shall not govern when this type of furnace is installed, but the following specifications shall be followed: The inner and outer casing of this type of furnace may be made of either black or galvanized iron not lighter than No. 26 gauge. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the furnace be allowed closer than twelve (12″) inches to any ceiling or joists directly above the furnace.

(b) Where joists are cut to accommodate this furnace, headers shall be put in and braced so as not to weaken the structure of the floor above the furnace.

(c) Article No. 3 for determining area of warm air pipe shall not govern in figuring a pipeless furnace.

(d) Where one warm air register face is used and separate face or faces for cold air supply are used, then Article No. 4, Sections 5 and 8, shall apply.

The code as given above was approved by the National Warm Air Heating and Ventilating Association, April 20; by The Western Warm Air Furnace and Supply Association, May 15, and by The National Association of Sheet Metal Contractors, May 17, 1922.

# FLEXURAL STRENGTH OF PLAIN CONCRETE*

### Discussion of Tests

The flexural strength of concrete beams is measured by the modulus of rupture. The modulus of rupture may be defined as the tensile stress developed by beam action, assuming that the stress and deformation are directly proportional to the distance from the neutral axis of the beam. The modulus of rupture of a rectangular beam freely supported at the ends and loaded at the one-third points of the span is determined by the following relation:

$$R = \frac{WL}{bd^2} \quad \ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where $R$ = Modulus of rupture of the material,
$W$ = Total load applied at one-third points,
$L$ = Span length,
$b$ = Breadth of beam,
$d$ = Depth of beam.

In case of most of the beams used in this investigation (width 10 in., depth 7 in., span 36 in., load applied at one-third points) the modulus of rupture is given by the relation:

$$R = 0.073W \quad \ldots\ldots\ldots\ldots \quad (2)$$

Where $R$ is expressed in pounds per square inch and $W$ in pounds.

In the reinforced concrete beams the modulus of rupture was calculated in the same way, that is, the presence of steel was disregarded.

With few exceptions the beams failed by nearly vertical cracks between the load points.

The values for 28-day tests show a fairly consistent relation between the modulus of rupture and the compressive strength regardless of the mixture, consistency, size and grading of aggregate, etc. This relation may be expressed by the equation:

$$R = 0.29S - 0.000032S^2 \ldots (3)$$

where $R$ = modulus of rupture of plain beams
$S$ = compressive strength of 6 by 12-in. cylinder.

The modulus of rupture is relatively higher for the weak concrete; at 28 days it is about 26% of the compressive strength for 1000-lb. per sq. in. concrete; 22% for 2000-lb.; 19% for 3000-lb. concrete and 15% for 4000-lb. concrete.

The modulus of rupture of concrete was only slightly affected by the depth of the beam. The values for beams 8 and 10 in. deep were about 4% higher than for the 4-in. beams.

There was no great discrepancy between the flexural and compressive strength of concrete made from pebbles, crushed slag and crushed limestone. Granite gave somewhat lower values, probably due to low absorption of the aggregate.

Both flexural and compressive strength of concrete cured in a damp condition until tested were proportional to the logarithm of the age.

### Flexural Strength of Other Materials

The following notes on the flexural and compressive strength of other materials than concrete may be of interest:

*Marble.* Tests made by the Bureau of Standards on 2¼-in. cubes in compression and beams 1½ to 2 in. deep, 3 to 4 in. wide, span 6 to 10 in. show that the modulus of rupture is uniformly about 15% of the compressive strength for marbles ranging in strength from 8000 to 28,000 lb. per sq. in. The tensile strength of marble briquets 1-in. square was about one-half the modulus of rupture. (Tech. Paper 123, Tests of Commercial Marbles, by D. W. Kessler, 1919.)

*Slate.* Tests made by M. O. Fuller showed modulus to vary from 75 to 100% of compressive strength. Modulus of rupture tests were made on beams 1 in. wide, 26 in. long and ¼, ½, 1 and 1½ in. deep; compression tests were made on 2-in. cubes. (Physical and Electrical Properties of Slate, Bull. Lehigh University, 1921.)

*Building Brick.* As a result of an exhaustive series of tests carried out by the Committee on Brick of the American Society for Testing Materials, the following values were found for different classes of building brick:

| *Class* | *Modulus of Rupture* | *Compression* | *Ratio, per cent* |
|---|---|---|---|
| A | 1482 | 8493 | 17.5 |
| B | 668 | 4171 | 16.0 |
| C | 621 | 2791 | 22.0 |
| D | 469 | 1762 | 27.0 |

Compression tests were made on whole brick, loaded flatwise; modulus of rupture tests on brick loaded flatwise on 7-in. span. (Proc. A. S. T. M., 1915, Part I).

*Gypsum.* Tests made by W. A. Slater showed modulus of rupture of gypsum 43 to 52% of compressive strength; 6 x 6 by 18-in. beams and 8 x 16-in. cylinders, 35% water, age at test, 10 days. (Jl. West. Soc. Eng., Sept. 1919, p. 441.)

*Cast-iron.* Kirkaldy's tests on 469 samples of cast-iron showed an average modulus of rupture

* *Continued from page 166 of our August 16 issue.*

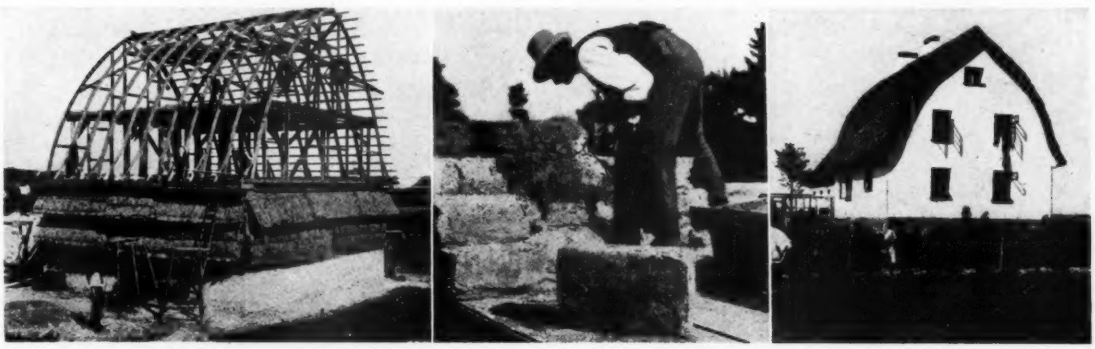
of 38,000 and a compressive strength of 121,000 lb. per sq. in. (ratio 31%). Modulus of rupture tests were made on bars 2 x 1 x 36-in. loaded edgewise. (Materials of Construction, by J. B. Johnson, 4th Ed., 1898, p. 447.)

The complete paper will appear in the 1922 Proceedings of the American Concrete Institute.

The modulus of rupture is a factor produced by the combined action of tension, compression and shear. It was used several generations ago in formulas for beam design to obtain the breaking load; this being divided by a factor of safety to determine the safe load. Today it is used only for materials in which it is difficult to determine the separate stresses, as, for example, clay products, stone and plain concrete. The moment of resistance, using allowable safe fibre stresses, is employed in computations for beams of wood, steel, iron and reinforced concrete.

# PRIMITIVE BUILDING MATERIALS

THE illustrations here presented appeared in the May, 1922, issue of *Scientific American*. Very little information is given about the method of using the clay, but much is said about



A building in Europe in which a return was made to materials in common use during the Middle Ages

the straw bricks patented by Mr. Feuillette, a French engineer. The fact is that in the devastated regions of Europe there is a return to primitive methods of building, caused by high prices and real scarcity of raw materials.

Clay, with or without straw, is one of the oldest materials used for walls of buildings. To Americans in the West and South the use of adobe is familiar. Within recent years it has become popular in some sections of California and a number of handsome homes have adobe walls. It is not cheap but the walls being poor conductors of heat, the houses are comfortable at all times. Love of the picturesque and a sincere desire for the retention of a regional type of architecture will serve to popularize the adobe house. Adobe is usually associated with sun dried bricks but the term may be applied as well to the construction of walls of tamped earth, which for many centuries has been used in France under the name of *pisé*, a description of which is given in all treatises on building construction written by Frenchmen.

Mons. Henry Guédy in *La Construction Moderne Pratique* says: "*Pisé* is a method of earth construction even more simple than the use of sun baked bricks. This economic method forms solid fireproof structures. Whenever walls of *pisé* are well made they form one piece and if they are well covered with good plaster on the exterior, they will last for centuries if not exposed to moisture. This material is employed only in localities where stone is very scarce and then only for unimportant constructions.

"All earths neither too rich nor too poor in clay are suitable for use in *pisé*. The best material is firm earth containing a little gravel which retains a block-like form when cut out of a wall and must be broken with tools in order to reduce it. To prepare the earth it must be crushed and passed through a medium size screen in order to remove pieces of stone larger in size than nuts. If it is too dry it is moistened by sprinkling until it contains just enough humidity so that a handful thrown on the pile, without too much violence, will hold the shape given to it by a slight pressure of the hand.

"It is possible also to make a mixture of clay, sand and earth in the following proportions:

| | | |
|---|---|---|
| 1. | Clay | 4 parts |
| | Sand | 1 part |
| | Small sandy gravel | 1 part |
| 2. | Clay | 2 parts |
| | Sand | 1 part |
| | Loam | 2 parts |
| 3. | Clay | 1 part |
| | Small sandy gravel | 1 part |
| | Loam | 2 parts |

"In several departments (of France) some straw or hay is worked in as water is added during the mixing and kneading of the mass, to prevent the formation of fissures when the walls dry out.

"Two methods are in use for making walls of *pisé*. For simple walls the mixture of earth and straw is merely tamped between lines fixed by stretched cords. For a carefully made wall the thickness is fixed by using panels approximately 3 x 6 feet in size, between which the *pisé* is placed in layers and tamped. When this form is filled the spacers and bolts are drawn and the panels are replaced to continue the process. The holes left by the spacers and bolts are filled with earth. By shortening the spacers little by little as the wall goes up the diminution in thickness proper for the stability of the wall is obtained, this being from 7 to 8 millimeters per meter.

"A covering of mortar composed of 1 part of lime to 4 parts of clay in which is mixed enough plasterer's hair to form a good bond, will protect the *pisé* against the action of air and rain. This covering must be applied when the wall is quite dry; the more dry the wall the better the covering will hold. Ordinary plaster is sometimes applied.

"In spite of well applied protective coverings of mortar this form of construction is quite susceptible to the absorption of moisture. The walls should never be built directly on the ground but should rest on brick or stone foundations. The walls may also be framed by exposed masonry corner piers but in such cases unequal settlement and shrinkage are apt to cause ultimate destruction."

Thomas Crane Young in an article on "The Housing Problem and Earth Masonry," in The American Architect, April 14, 1920, made a plea for a study of the possibilities of using *pisé* in the United States to lessen the cost of building. He later built a garage of tamped earth covered with stucco, descriptions of which appeared in a number of periodicals. The German dwellings here shown are evidently built of *pisé,* the mats shown in one illustration being perhaps of osier or willow covered with plaster and the space between filled with *pisé*. Such work was known as "wattle and daub" in England during the middle ages.

In France a wooden frame is usually erected and the spaces are filled with *pisé,* this being the original half-timbered form of construction. The Feuillette bricks of compressed straw are used alone in walls or as fillers in frames of wood. The walls are usually about 15 in. thick and the bricks are of equal width with a height of 7 or 8 in. The lengths correspond to the spaces between the uprights. Tarred paper is used for a damp course on top of the footings. Some buildings have a system of tubes inside the walls at the bottom through which a gaseous disinfectant may be liberated to keep the interstices in the straw free from vermin.

Metal lath is fastened to both sides of the wall as a base for stucco on the outside and wall plaster on the inside. Insurance rates are no higher for houses with walls of compressed straw than for ordinary construction. Nothing equals these walls in insulating value so they are comfortable at all times of the year. Compressed straw bricks being very light can be shipped long distances at a low cost, something that makes them formidable competitors of other materials in sparsely settled agricultural districts.

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#### Architects Needed by Interstate Commerce Commission

THE United States Civil Service Commission announces that applications will be received for the post of Architect, Senior Grade, with the Interstate Commerce Commission. Experience in design and construction of railway structures carries great weight.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.

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#### A Substitute For White Lead

ACCORDING to *The Manufacturers' Journal* of Sydney, a Sydney (Australia) firm is making an oxide of antimony product to take the place of white lead in paint. It is claimed to be non-poisonous and to give satisfactory results. The antimony used in its manufacture is taken from the Costerfield Mine, Victoria, and the oxide is produced at low cost due to an Australian invention.

# DEPARTMENT OF SPECIFICATIONS

**Outline for Concrete Specifications (Continued)**

XV. Structural Work

- A. If structural steel work is to be furnished by other contractors, state so, and also state whether the material will be delivered into the care of the Concrete Masonry Contractor
  - a. at the fabricating shop
  - b. at the building site
  - c. f. o. b. cars at nearest switch track
- B. If structural steel is to be furnished by the Concrete Masonry Contractor state so
  - a. State quality of steel desired
  - b. State whether or not the steel work will be inspected in the shop or at the mill
  - c. State kind of paint desired
- C. If structural steel is to be erected state so
  - a. Specify material to be handled carefully
  - b. Specify character of field connections, whether bolted or riveted, and if riveted, if by hand or by power tools

  Note: The subject of structural steel will be covered thoroughly in subsequent articles, which will contain suggested outlines for specifications for fabrication and for erection of the material.

XVI. Reinforcing Steel

- A. State whether the reinforcing steel is to be furnished at the building site by others or must be furnished by the Concrete Masonry Contractor. The details respecting fabrication and furnishing of all bar or rod reinforcing will be covered by subsequent articles and outlines
- B. In many cases where bar reinforcing steel is used there also is a necessity for wire mesh or expanded metal reinforcement, which for want of a better term should be called sheet reinforcing

  In such cases the specification should require that the Concrete Masonry Contractor furnish this material as it is not usually customary for bar reinforcement concerns to furnish sheet reinforcement
- C. If any material must be bent at the building the facts should be stated in the specifications unless the drawings are sufficiently explicit
- D. State general requirements governing the furnishing of media for the support, spacing and fixing of reinforcing, such as spacers, chairs, tie wires or similar accessories
- E. State general requirements governing the unloading of material at building, such as checking of delivered items against invoices, the reporting of errors in quantity or character and the sorting and piling of the material in convenient locations
- F. For the placing of reinforcing it is usually sufficient to require that it be placed as shown on the drawings. For minor operations the specifications may give the required spacing although usually the drawings should be the only medium for controlling this factor
- G. In placing reinforcing it is sometimes necessary to specify splices. The requirements of the designer of the reinforcing in this respect should be stated clearly; the architect should be consulted in the making of splices unless the desired method is shown on the drawings
- H. Specify minimum distances that reinforcing should be placed back of finished faces. Although design drawings usually show this, such a requirement can very well be made a standard clause
- I. State that reinforcing must be secured in position so that it will not be displaced while concrete is being poured. In the case of sheet reinforcing the use of clips and anchors will be necessary
- J. If sheet reinforcing is used state specifically requirements governing the placing of temporary bracing underneath the sheets to prevent deflection while concrete is being placed
- K. Upon completion of reinforcing it should be inspected and released by the inspector for concreting. Prohibit pouring of concrete before inspection has been made

XVII. Fireproofing of Structural Steel

A. Specify type of wrapping desired, either wire mesh or one of the several patented wrappings that are available

XVIII. Proportions of Concrete

State the proportions for concrete that is to be used for reinforced work and for unreinforced work. If several different proportions are necessary this matter should be given in schedule form

XIX. Mixing of Concrete

A. If mechanical mixing is required the specifications should be clear respecting the type of mixer that will be permitted. Regardless of the type specified, state that mixer must be kept clean. If hand mixing is permissible, state conditions governing the number of batches that are to be mixed to insure continuity of operations and specify platform to be fairly watertight and clean

B. In the measuring of ingredients require that cement be measured in its packed condition except where bulk cement is used in which case it would be measured as removed by the shovel. The fine and coarse aggregate should be measured as thrown into the hopper for all operations except those of an inconsequential character. Specifications should require measuring devices of some sort so that proportions may be determined as accurately as possible throughout the work

C. If it is desired to gauge the concrete to procure more even flow through chutes or to make concrete more compact and consequently dampproof if not waterproof, specify admixture of the medium desired and state how it is to be measured, that is, in proportion to cement used or in proportion to the total volume of mixed concrete

D. Water should be measured for each batch using measuring device of some acceptable sort

E. If machine mixing is used, state the time of mixing or the number of revolutions per minute

F. If hand mixing is used state the number of times the ingredients are to be turned over before water is added and after water is added

G. Specify the desired consistency, which may be given in general terms understandable to the workmen, or which may be specified by the amount of slump under the Joint Committee specifications; also specify that the consistency, unless measured by slump, should be varied to suit conditions both for mass concrete and for concrete in thin reinforced work; retempering of concrete should be prohibited

H. In cold weather the ingredients of concrete must be heated. The most accurate specifications will state the degrees Fahrenheit below which ingredients must be heated before being used

XX. Placing of Concrete

A. Forms must be inspected to give final assurance that reinforcing is in proper condition in accordance with the drawings. In warm weather forms must be drenched. In any case forms should be free of rubbish of any sort

B. Concrete should be placed immediately after being mixed

C. Concrete should be deposited in such a manner as to prevent separation of ingredients

D. When concrete is placed it should be deposited in layers approximately even in depth

E. Concrete should be rammed and agitated to move air pockets, to facilitate flow above reinforcing and should be spaded to produce smooth surfaces unless coarse surfaces are desired

F. If coarse surfaces are desired specify the character of finish and how it is to be secured

G. Require precautions against the formation of laitance

H. For work planes specify that they should be located so as not to have a bad effect on the completed work. Provide installation of proper keying and, if necessary, specify metallic watertight dams. Provide that in large forms, such as heavy girders and walls, bulk heads be provided to restrain concrete and to form vertical planes at proper points

I. When commencing the pouring of fresh concrete on concrete that has taken initial set, require that laitance be removed and the surface treated with a bonding medium

J. Require that bonding of concrete for beams, slabs, walls and columns be stopped at definite points to permit settlement through shrinkage before proceeding with superimposed concrete

K. If continuous pouring of concrete is desired so that any sections may be made monolithic state so

XXI. Construction Joints

If construction joints are shown on drawings specify that they be made in accordance therewith, treated unless otherwise shown, similar to the method of treating work planes. For construction joints not shown on drawings be more explicit in the specifications for their construction

XXII. Removal of Forms

A. Specify time that will be allowed for the removal of forms for:
  a. beams and girders
  b. slabs
  c. columns
  d. walls

and require that removal of forms must be accomplished in such a way as not to endanger the finished concrete work

*(To be continued)*

PERSIAN GROUP

FROM THE DECORATION IN CLOVER GARDENS, NEW YORK

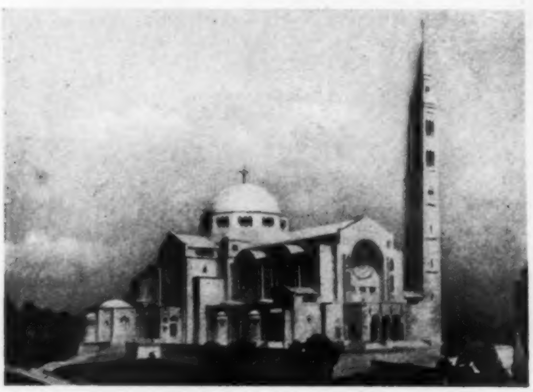
BY ARTHUR CRISP

# REVIEW OF RECENT ARCHITECTURAL MAGAZINES

BY EGERTON SWARTWOUT, F.A.I.A.

THE July number of *The Architectural Record* is interesting and has as its principal feature the design of Maginnis and Walsh and their associate, Frederick V. Murphy, for the National Shrine of the Immaculate Conception at Washington, set forth copiously in drawings and in photographs of the scale model. The shrine is on the grounds of the Catholic University at Brookland, very near the National Soldiers Home, and, according to the descriptive article, is visible from a great distance, and consequently the architects felt the need of some lofty feature. So much so indeed that they have supplemented the dome with a slender campanile some three hundred and thirty feet high; and the article further says that "The choice of historical style was developed more or less inevitably out of the study. It was a determining consideration

From "The Architectural Record"



National Shrine of the Immaculate Conception
Maginnis & Walsh, Architects; Frederick V. Murphy, Associate Architect

that the Byzantine system has that integrity of structure possessed by no other historical style of architecture except Gothic. The false or external dome of the Renaissance is only one of the insincerities of that particular tradition." This is decidedly a *non sequitur*. There is nothing in the various preliminary studies that shows the inevitableness of the choice of the Byzantine, and if for some reason, doubtless good, the architects decided to use that style, why defend it by throwing the well worn stone of insincerity at the Renaissance, particularly as at Rome, Florence and elsewhere the external dome was substantially the shell of the inner one? If St. Peter's is insincere because the roof covering is not applied directly to the vaulting of the inner dome, what is to be said of the roofing over the vaults of a Gothic Cathedral? Sincerity in architecture is a very much overworked phrase, and is generally applied to a style which the author does not happen to fancy. The Greek Doric entablature is insincere because it expresses in stone an original

From "The Architectural Record"

Interior View, National Shrine of the Immaculate Conception, Washington, D. C.
Maginnis & Walsh, Architects; Frederick V. Murphy, Associate Architect

prototype which was wood; the Roman work was insincere because the orders were used as applied ornament, and so on without end, until by process of elimination we get to the cave of the Cro Magnon or the igloo of the Esquimaux. All of these raucous cries come from a misunderstanding of what architecture really is. Architecture is the art of building well a structure which is adapted to the purpose for which it is built and which is pleasing to the eye. If it is not the latter it is mere building, or, as it is now called, engineering. From the earliest beginnings of architecture men have seized on and improved the ideas of those who have built before them. The Greeks conventionalized the wooden construction of their fathers and made their temples things of beauty; the Romans used the orders often as pure decoration, just as they lined their buildings with thin slabs of marble. The Gothic architects vaulted

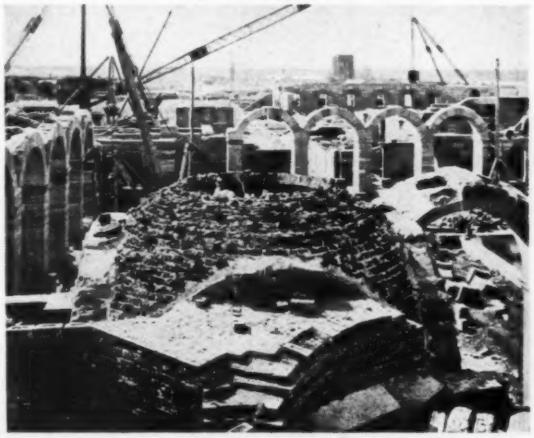
From "The Architectural Review," London

Secretariats, New Delhi
Large entrance hall to North block

their churches with stone for internal effect and scrupled not at all to cover these vaults with a wooden roof; the Renaissance artists sometimes expressed their domes with an outer covering which was designed for external effect. In all these cases the construction was sound and the effect beautiful; there was no insincerity about it. It was only when the use of steel came in that there was insincerity. Nowadays anything can be "designed" and erected somehow by means of a slide rule and a Carnegie handbook.

But all this has little to do with the Washington Shrine. There can be no valid objection to the use of Byzantine, if indeed it is Byzantine; the only question is, is it appropriate and is it well done. We are inclined to question the appropriateness. Washington is not a cosmopolitan city like New York. It is national, American, and its architecture, taking its inspiration from the Capitol and the earlier work, is Renaissance, Americanized a bit, but still decidedly Renaissance, and an exotic style such as the Shrine seems unnecessarily out of place, for such an important and monumental structure. This exotic feeling is increased by the addition of the campanile, which gives a somewhat mosque-like air to the building and seems to call for a crescent

From "The Architectural Review," London



Secretariats, New Delhi
Method of building domical vaults

instead of a cross on the roof. That it will be an interesting structure there is no doubt; the architects have done good work in the past and will undoubtedly do so here.

California has inherited a style of her own which is appropriate and except when done in lath and plaster, is sincere if you please, though the Lord knows we hate that word sincere; and

From "The Architectural Review," London

Secretariats, New Delhi
Domical construction and Indian methods of building

the work of Marston and Van Pelt in the Mission style is picturesque and generally charming. Their Italian house is good but the English house seems out of place. The little house for Garfield Jones is decidedly good. There are some delightful photographs of gardens by Antoinette Perrett and an original building for the Lawyers Mortgage Company by Renwick, Aspinwall and Tucker.

*The Architectural Forum* for July is rather dull. There is a church by Rossiter and Muller and some good interiors by Cross and Cross if we except the imitation marble Dining Room.

*The Western Architect* for July has an account of the recent convention of the Institute, in fact all the papers have that, which is as exciting as usual, but there is published a view of the old Fine Arts Building of the World's Fair of '93, which the Illinois Chapter are proposing to restore, not the Fair but the building, at an expense

From "The Architectural Review," London

A Pope's Peace Memorial
General View of the Church

of one million six hundred thousand dollars. As a matter of sentiment this is all very well, but is it worth it? Its central feature is a direct copy of a Grand Prix by Bénard, a design which was good as a projet but not particularly inspiring as a monumental entrance. Bénard's treatment of the detail was original and clever but the use of the Erechtheum Order by Atwood is banal. It isn't even respectable as a ruin; lath and plaster seldom are. There are better uses to which the million and a half could be put and there are architects in Chicago who could do better work.

The July number of *Architecture* has little of interest with the exception of some interiors by Delano and Aldrich. *The Architectural Review* of London has a frontispiece by William Walcot in his inimitable style and an account and some etchings of what is called a Pope's Peace Memorial in Rome, a design by Armando Brasini under the direction of the late Pope Benedict XV. The plan is fantastical and the design Baroque in the extreme, but we learn that "There is unfortunately a very small chance, at least for the time being, of seeing this truly magnificent plan translated into reality." The high price of labor and materials has some compensation after all. Writing of

From "The Architectural Record"

House at Pasadena, California
Marston & Van Pelt, Architects

the charm of the country town Professor A. E. Richardson describes King's Lynn in Norfolk very interestingly and shows some good photographs, one of which is herein reproduced; and

From "The Architectural Review," London

A Merchant's House, now a High School for girls, King's Lynn

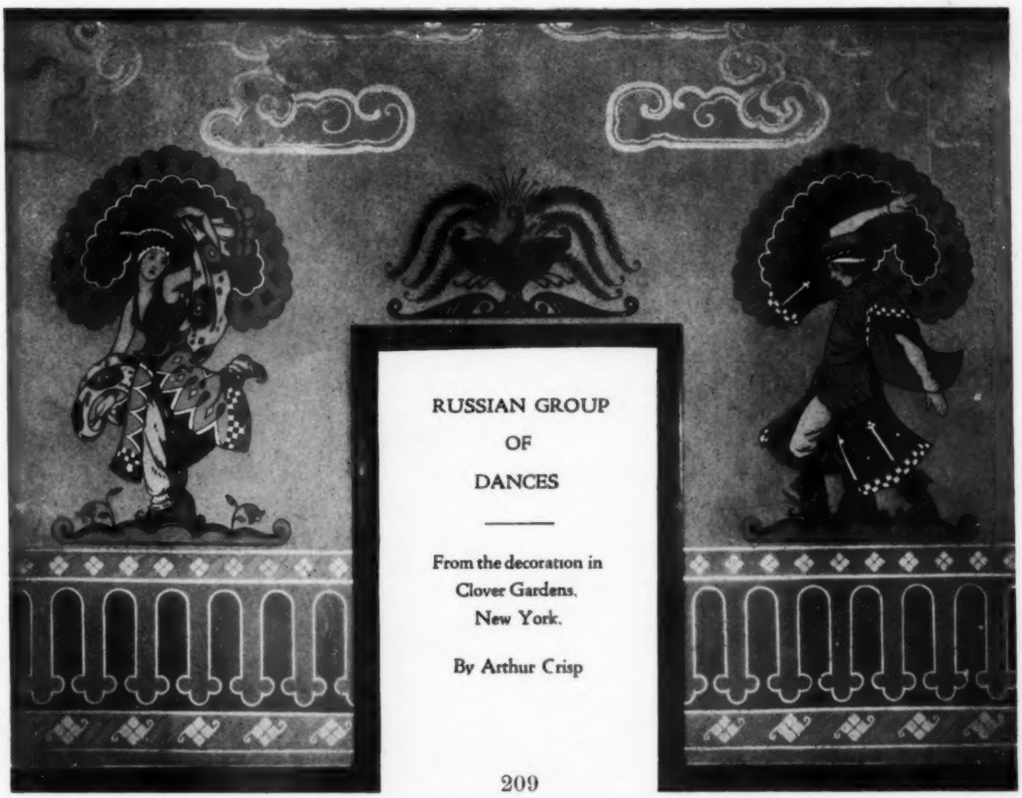
there is a profusely illustrated article on the Secretariats in New Delhi signed by Herbert Baker, F. R. I. B. A., a monumental scheme of extraordinary extent which is now in the course of erection. The photographs look more like excavations of ancient architecture than progress photographs, the interiors being apparently all masonry and carried up coincidently with the exteriors. The native methods of construction have been largely followed; for example, the domes in a vaulted corridor which are about twelve feet in

From "The Western Architect"

Fine Arts Building, World's Columbian Exposition, Chicago

diameter are built up with waste brickbats and without centering. When the courses reach the sliding angle men are employed to hold up the bricks until the ring is complete, a dome of this size being built by only one mason. For larger spans "The Indian method of building such irregular domical construction, which cannot be built without centering, is to run up any sort of ramshackle brick piers in mud mortar, and above them more ramshackle erections of posts and planks, on which they make a center of mud. The mud plaster is whitewashed, or in more difficult cases such as this, where the vaulting must be of concrete and not brick, the top of the mould is accurately floated with lime plaster.

These instances of Indian methods of vaulting may lead architects and archæologists to wonder how far such methods would have survived or would have even been possible in Western countries in which certain long periods of dry weather could be relied upon, and to speculate as to their influence upon the history of domical vaulting and the persistence of its tradition in the Eastern countries with their limited rainfall and their scarcity of timber." This latter method of constructing centers is in principle quite adapted to modern work. The writer has employed it many times for the soffits of reinforced concrete stairs and vaults, except that cinder concrete is used instead of mud. This cinder concrete, supported on a rough framework of wood, can be modeled so as to form a perfect reverse template of the vault, and warped surfaces can be developed in a much better way than can be obtained by the usual wooden template.



RUSSIAN GROUP OF DANCES

From the decoration in Clover Gardens, New York.

By Arthur Crisp

# THE AMERICAN SPECIFICATION INSTITUTE

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*THE Board of Governors represent memberships in the following national societies: American Institute of Architects; American Society of Civil Engineers; American Society of Mechanical Engineers; American Institute of Electrical Engineers; American Society for Testing Materials; American Concrete Institute; American Iron and Steel Electrical Engineers; which indicates the scope of activities of The American Specification Institute.*

THE American Architect and the Architectural Review *has gratuitously set apart this section for use by The American Specification Institute. The Editors and Publishers assume no responsibility for any statements made, or opinions expressed.*

*The purpose, simply stated, is to afford an organization which, it is believed, will become a most important element in architectural practice and building operations, a medium through which it may, without expense to itself, reach a class of readers that are most intimately identified with the field of the activities of The American Specification Institute.*

*Publishers,* The American Architect and The Architectural Review.

### Bulletins

THERE are now in course of preparation bulletins on Foundations, Roofing, Painting and Electric Illumination. The bulletins on Roofing and Painting are expected to present certain *modus operandi* that will assist in assuring the furnishing of material and workmanship in accordance with the standards the specification writer wishes to lay down.

It is recognized that the matter of specifications for all branches of work include under the general head of Painting one of the most important questions requiring solution. Several members have sent in very good suggestions for specifications for this work and more suggestions are needed.

For all of these bulletins the Board of Governors wish members to submit all suggestions that in their opinion will tend to clarify the conditions the specifications are expected to cover. In each instance bulletin Number 5 should be referred to as the gauge of matter to be submitted for consideration. It should be borne in mind that the elements of a specification require consideration of:

a. Economic values
b. Limitation of alternatives
c. Presentation of standards
d. Description of materials, methods and use
e. Instructions to all concerned

### Library

THE library of specifications can be added to without harm. Members have been requested to send in a copy of one of their best specifications and a fairly good response has been made. A file of catalogues and other data useful to the preparation of specifications is increasing slowly and it is hoped that members will contribute data that will be useful. The Institute must have a very complete library of its own. An attempt is being made to have all those interested in the production of materials used in construction work see that their matter may be found in our files. It is possible that many miscellaneous matters appear in the magazines that do not come to the attention of the specification writer except on special occasions. In our attempt to have in our files everything that has been published with respect to any one specific item, that is, as far as its specification value is concerned, we might miss some things of importance and we hope the vigilance of our members will assist in promoting the files as much as possible.

General Information

WE wish to direct the attention of all members and all non-members that completed bulletins can be obtained only from executive office.

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# ADDRESS OF SECRETARY HOOVER BEFORE AMERICAN CONSTRUCTION COUNCIL

THERE have been great numbers of efforts to bring the construction industries into some sort of unity of organization for the promotion of the better and higher purposes of the industry and up to the present time while many of these efforts have been fruitful of great results there has not been a successful organization of the Industry as a whole.

The numbers represented here cover practically all problems of our national plant and equipment: the problems of housing, of expansion, of our public utilities—in fact, the whole question of construction and the problem of construction increase in our national equipment plant, I believe, can be separated entirely from the problem of production. The organization of these industries so that they shall perform their best and highest functions is one of the things that we need above all others in the nation. There is an almost infinite number of fields in which the individual manufacturers, the individual contractor, the individual engineer and architect can do practically nothing in the forwarding of these industries in those directions that make not only for public interest but for the interest of the industries themselves and we have long since passed the time when purely individualistic action was of avail; there must be co-operation in our industries if we are to secure the most effectual relations from the industries: the greatest stability in the industries themselves and the greatest national service out of their functions.

There are a great number of directions in which co-operative action can be had. One of the problems that the Department of Commerce has been concerned with since this administration has come in has been that primary question of the kinds and qualities of materials; the establishment of standards as to the quality and as to the nomenclature by which the quality is described; in the lessening of freight on one thing; in the maintenance of better repute of the different contributing industries; in the lessening of litigation and the hundreds of other benefits that come from that one problem alone. There are problems of inspection of material, of the simplification of dimensions in material, that we may eliminate as much waste as possible both in the preparation of material and the volume of goods that must flow into distribution, the waste that must come in materials not adapted to their primary and many other elements. There is the question of specifications and contracts, the question of statistics and the primary fact that no industry can be conducted without stability. No business man can form right and proper judgments as to his own policies and course of action unless he is properly informed. Information of that type can not originate in the individual; it must take place by joint action in the collation and securing of that type of knowledge in a hundred directions. It ought to be possible for every business man in the United States to know the production and consumption of his commodity promptly, monthly and annually. It ought to be possible to know the volume of construction in progress, to know the demand among all of the construction industries so that their plans may be made and their materials laid out long in advance of its consumption, and unless there can be better judgment than there has been as to the probable need, we will always have a very high degree of speculation in these industries.

There are a great many problems connected with home building; encouragement of home ownership, the zoning of cities, the establishment of proper and economical building codes, the great problems of labor, the problems of seasonable employment, the reduction of the intermittency of employment of labor, the encouragement of those agencies that devoted themselves to the limitation of jurisdictional disputes, the advancement of apprenticeships, of educational training and, in fact, probably a hundred avenues where co-operative action is needed; not knowledge for increase of efficiency in industry, but for the maintenance of its own stability and by elimination from it of unnecessary speculation and, in fact, for a better functioning of industry in relation to our national needs.

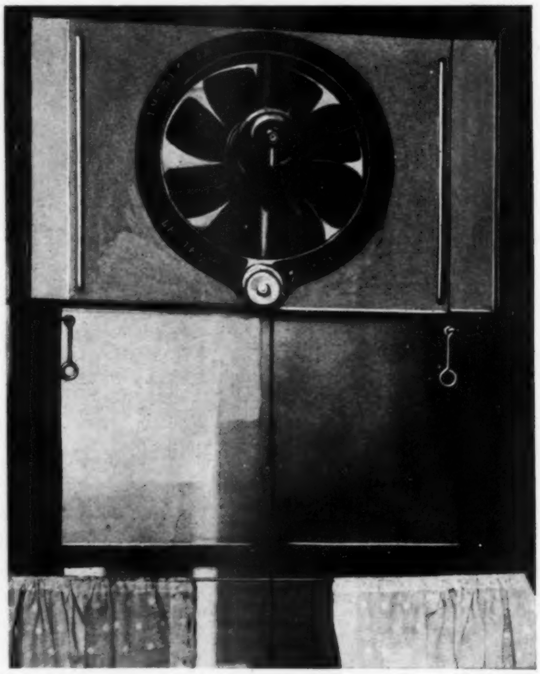
I do not believe these results can be accomplished by bureaucracy or government regulation and therefore if we would stem the tide of regulatory powers of government in an endeavor to answer every complaint arising in the country by which we now curtail the progress of industry itself, we would do much and in the organization of this Council you will have taken a great and fundamental step toward that end.

# INDUSTRIAL NOTES

### An Adjustable Fan Frame

VENTILATION of house kitchens and small rooms is greatly facilitated by a lately developed adjustable fan frame which firmly supports a small ventilating fan. This frame, built by the American Blower Company of Detroit and sold with the "Sirocco" Ventura Fan as a complete unit, is built of sheet metal. Being adjustable it fits any ordinary window and may be quickly installed by any man who can use a screw driver and hammer. Handles for raising and lowering the window are furnished with the frame together with all necessary bolts and screws.

Fans are furnished with reversible motors for either direct or alternating current and with a cord for attaching to a nearby lamp socket, to remove air laden with odors, smoke and vapors. By pulling the cord the motor reverses and the fan brings in fresh air.



An Adjustable Fan Frame

### A Large Luminaire

WHAT is believed to be the largest luminaire in the world was recently made by The Brascolite Company of St. Louis, Mo., for illuminating the domed rotunda of the State Capitol of Missouri.

The following data were furnished by the manufacturers: length, ninety-five feet; diameter, fourteen and a half feet; diameter of body ball, nine feet; ceiling plate, six feet; outside urns, two feet. Six thousand pounds of Government Specification bronze and fifteen hundred pounds of concealed structural iron were used in making it.

The fixture carries 133 lights for general illumination. Eight amber colored searchlights, concealed in the upper structure, throw a golden sheen over the decorated ceiling of the great dome.

### The Renascence of Wall Paper

THE Providence Biltmore, the latest hotel added to the John Bowman chain, has all its walls decorated with wall paper. Mr. Bowman states that wall paper will be used in some of the rooms in other Bowman hotels: "Because my patrons demand home surroundings."

Architects and builders have been noticing for some months past that wall paper is enjoying renewed favor and it will be to their interest to keep in touch with events. We learn from *Wall Paper,* a monthly magazine published by the Allied Wall Paper Industry of United States and Canada, 461 Eighth Avenue, New York City, that a vigorous campaign is under way to promote an increased use of wall paper and restore it to the place it occupied two generations ago when it was a decorative feature of no mean value in all homes.

### Standardized Steel Joists

TO simplify the work of designers and builders the Berger Manufacturing Co., The Central Steel Company and the Truscon Steel Company, manufacturers of steel joists, have collaborated in establishing efficient section properties and uniform safe loading tables, within the range of spans and loads for which steel joist floors are particularly adaptable. This uniformity eliminates the necessity for considering alternates submitted on the basis of different section properties.

### Hot and Cold Water Piping Data

ON a Brass-bound wall hanger, size 22 by 28 inches, the Copper and Brass Research Association has printed, in four colors, for distribution among plumbing contractors, a diagram showing a typical Brass pipe installation. This diagram should be useful as well to architects in illustrating to clients how hot and cold water circulate in houses.

Below the diagram, which is a view of the interior of a house, are four tables to use in determining the proper pipe sizes required.

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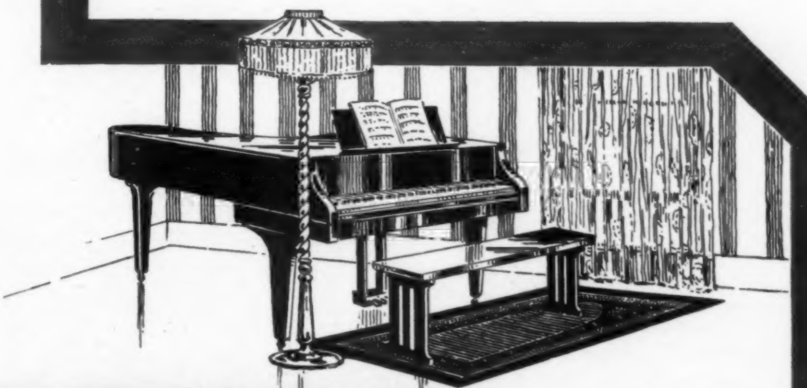

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### Carborundum Anti Slip Tile

THE American Abrasive Metals Company of 50 Church Street, New York City, the manufacturers of FERALUN, ALUMALUN, VULCALUN and BRONZALUN anti slip treads announce their appointment by the Carborundum Company of Niagara Falls to act as U. S. Sales Representatives through whom will be marketed the Carborundum Anti Slip Tile.

Samples and literature may be obtained for the asking from the U. S. Sales Representatives of the Carborundum Tile, the American Abrasive Metals Company, 50 Church Street, New York City.

### New Cast Iron Furnace Door

A NEW cast iron door, 15 in. x 16 in. in size, has recently been developed by the Conveyors Corporation of America, Chicago. It is designed especially for boiler settings, to be air tight and the makers claim it will positively prevent the ingress of air and the leakage of gases.

### Finish for Copper Roofs

THE following information is taken from *"Copper Roofing, Information for Architects and Roofing Contractors,"* a book recently issued by the Copper and Brass Research Association, New York, N. Y.

Copper will develop verdigris in a few months due to natural phenomena. When it is desired to obtain a verdigris finish immediately, it can be done by the use of one of the following methods:

(*a*) Dissolve 10 parts copper in 2½ parts of strong nitric acid and then add 150 parts of 20% acetic acid and 5 parts of ammonia chloride. The resulting solution shall be diluted with about 3 parts water and applied to surface with a brush and allowed to dry. Sufficient applications at one or two day intervals shall be made until desired effect is produced.

(*b*) Apply the following solution: 1 lb. of powdered sal-ammoniac to 5 gals. of water; dissolve thoroughly and let stand 24 hours. Apply to copper with a brush, covering every part. Let stand one day and then sprinkle surface with clean water.

(*c*) Use a solution of ½ lb. of salt to 2 gals. of water. Apply in same manner.

If a dark copper finish is desired it can be obtained by the following method: Rub off the copper with cotton waste soaked in boiled linseed oil. Touch up soldered seams with copper bronze.

### Notes on Warm Air Heating

THE Proceedings of the Ninth Annual Convention of the National Warm Air Heating and Ventilating Association are now available and may be had from the Secretary, Mr. Allen W. Williams, Columbus, Ohio. It contains on page 84 the "Standard Code Regulating the Installation of Warm Air Furnaces in Residences" with the amended Article No. 3, of the code on page 102. The association is composed of manufacturers of warm air heating furnaces and others who are interested in warm air heating and ventilating.

### Necessity for Roofing Standards

IN the interest of economy in building construction a movement has been started to standardize roofing materials. Readers of THE AMERICAN ARCHITECT are invited to write to the Editor their opinions on the subject, not for publication, but to be used in furthering the movement to standardize building materials.

One manufacturer claims to be making at present twenty-four different grades of prepared roofing, marketed (exclusive of private brands) under four different brands in varying weights. With the adoption of standards the number will be reduced to one brand in three weights.

### Standard Plug For Electrical Appliances

THE standard plug with parallel blades is the plug now in general use, having two blades set parallel to each other at a distance of one-half inch between centers, and the blades themselves measuring ¼ in. wide across their faces, says *Electrical Merchandising.*

These plugs are interchangeable as made by thirteen different competing manufacturers, and are now furnished with some 200 lines of appliances.

### Clay Pipes in Drainage of Buildings

PRELIMINARY announcement of cash prizes for the best paper entitled: "Use of Vitrified Clay Pipe in Plumbing Systems" is made by S. E. Dibble, Head of the Heating and Ventilating Department of the College of Industries, at Carnegie Institute of Technology. The total amount of prizes is four hundred ($400.00) dollars. The contest will be open to all practical plumbing and heating dealers, inspectors, etc., as well as to instructors and students in all educational institutions where drainage is taught.

The contest is a move toward increasing building operations, having in view, particularly, the reduced cost of drainage work. It is advisable that competitors for these prizes obtain copies of Mr. Dibble's printed report of recent experiments on the use of bituminous jointing compounds for Vitrified Clay Pipe. The experiments were conducted at Carnegie Institute of Technology. Copies of the report will be sent upon request by addressing R. S. Clark, Office of the Secretary, Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

# Tudor Stone Roofs

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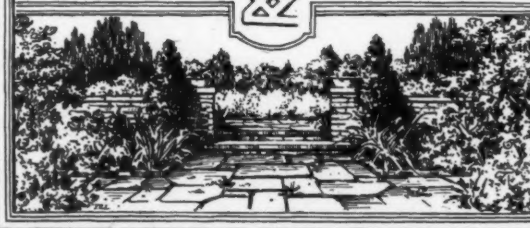

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# BOOK NOTES

## Geometry of Greek Vases

A Review by Arthur L. Barney

Geometry of Greek Vases by L. D. Caskey, a recent publication by the Museum of Fine Arts, Boston, will undoubtedly arouse an increased interest in Dynamic Symmetry.

Dr. Caskey states: "It is not published as an argument for or against the theory that the Attic potters consciously used the systems of proportion discovered by Mr. Hambidge, nor as an argument for or against the theory that a work of art designed according to these systems is 'better' than one designed according to another system, or according to no system at all. Its aim is to present in as complete and accurate and intelligible a form as possible the evidence furnished by the whole collection of Attic pottery in the Museum of Fine Arts."

In the preface he explains his own position as follows:

"(1) That coincidences are in so many cases so accurate, simple and logical that I find it less difficult to believe them due, in part at least, to conscious design, than to instinctive obedience to a mysterious aesthetic law, or to mere accident. (2) The proportion obtained by dividing a line in extreme and mean ratio, which plays an important part in Euclidean geometry, has for ages been recognized as an ever-recurring phenomenon in artistic design. It has been called by various names—divine proportion, golden section, ratio of Phidias, and the like; and it has been studied in many ways. By considering it as an area, rather than a division of line, and by emphasizing its relation to the $\sqrt{5}$ rectangle, Mr. Hambidge has immensely simplified the problem of investigating its significance."

The evidence in this book, so painstakingly compiled, together with the material previously published by Mr. Hambidge, seems to be rather more than argument. One is inclined to accept it as proof and in view of it, discard the use of "theory" in connection with Mr. Hambidge's studies and substitute the word "fact."

It seems certain that no human mind (and no one will argue that the Greeks had superhuman minds, in spite of their wonderful achievements) could so co-ordinate a design without the use of some method. And when the analyses of so many pieces fit so accurately to the principles described by Mr. Hambidge and used by Dr. Caskey, there remains little room for doubting that these pieces were designed in accordance with these same principles.

The book has 185 large line plates, each showing the geometric scheme of one of the vases in the Museum. The exact measurements of all these examples are given in millimetres. The plates are arranged according to types. These examples are also tabulated in the Introductory Text with smaller illustrations and in groups of those having similar over-all ratios. They are used in connection with a clear and concise explanation of the various rectangles of Dynamic Symmetry, giving methods of constructing and subdividing these rectangles.

In making these analyses, Dr. Caskey examined some 277 different proportions. Of these, certain were discarded because of restorations on the vases or because they did not fit any recognizable form.

The remaining 263 proportions are divided into two groups, the first group including those having no distinguishable error to those having a maximum error of 1 to 2 millimetres. There are 195 in this group. The remaining 68 are included in a group having an error of from 2 to 4 millimetres.

This in itself might be considered as a reply to a criticism of Dynamic Symmetry by Prof. Rys Carpenter, but Dr. Caskey's comparative analyses of vases by both Prof. Carpenter's linear unit and by geometric areas are even more convincing.

Dr. Caskey is Curator of Classical Antiquities at the Museum of Fine Arts, Boston, which is noted for its collection of Greek vases, one of the finest in existence. His experience as the former Secretary of the American School at Athens, his work in the field in Greece and his reputation as an international scholar particularly qualify him to write on this subject. Probably no one has had greater opportunity to do so and certainly no one has studied Greek pottery from this viewpoint more carefully than he. Those who are interested in Mr. Hambidge's ideas and particularly the many architects and artists who today are trying for themselves this new geometric instrument or who are waiting for further proofs before venturing will find perhaps not an explanation of how to use it, but at least strong evidence that it was used in the past by master craftsmen.

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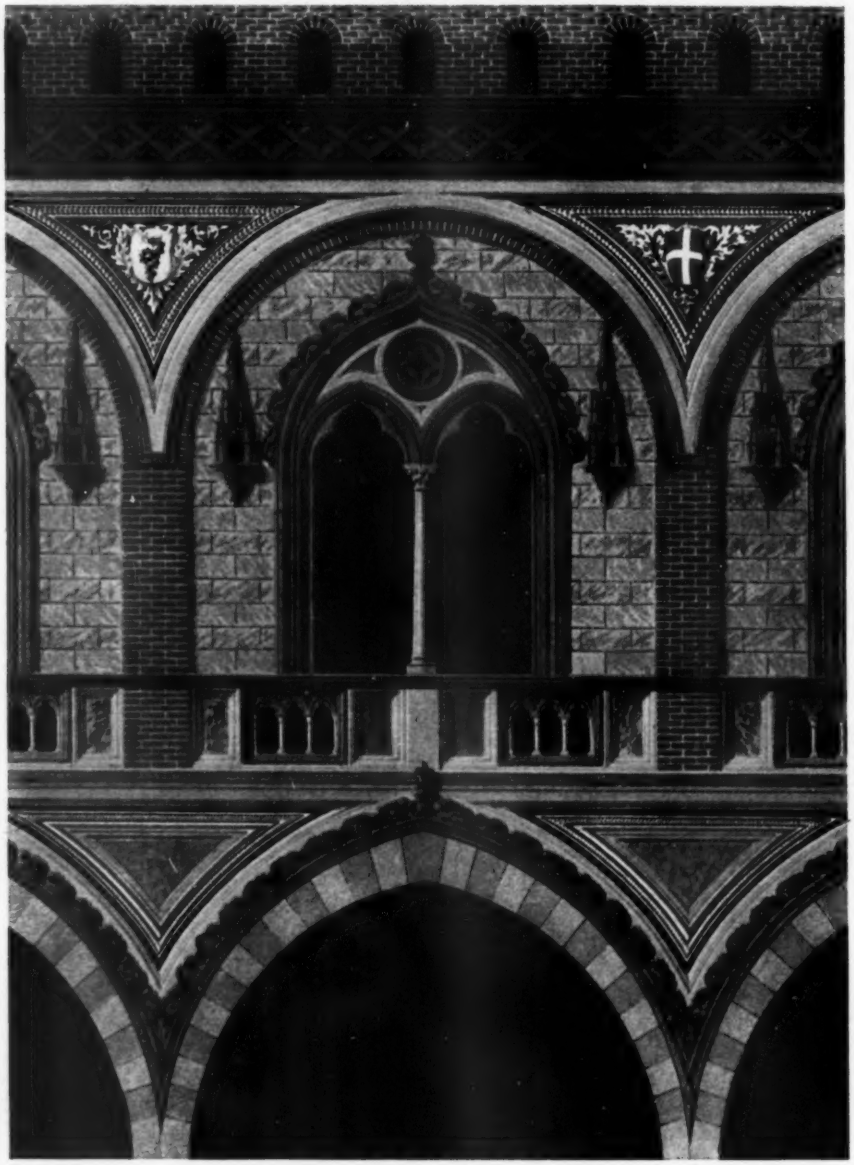
## Good Houses and Style in Architecture*

"STYLE is a quality, not a principle of design. When a house is expressive of a definite conception—as of dignity, elegance, picturesqueness, simplicity or homeliness—it has character; and character is style." Thus writes Russell F. Whitehead, architect, in an article which forms part of

** Good Houses. Typical Historic Architectural Styles for Modern Wood-built Houses. By Russell F. Whitehead, architect. Full cloth, 65 pp. Size 8x11 inches. St. Paul, Minnesota, Weyerhaeuser Forest Products. Free on request by architects.*



WINDOWS IN THE COURT OF THE PALACE OF GALEAZZO VISCONTI AT PAVIA NEAR MILAN, ITALY

FROM THE RESTORATION BY F. LOSE

*(Reproduced from The Terra Cotta Architecture of Northern Italy)*

But a fragment of this once magnificent 14th Century dwelling was standing in 1867 when the restoration above was made. Bernardino of Venice appears to have been among the architects responsible. The maximum of positive decision characterized the use of color in terra cotta, marble, brick and painted decoration