The AMERICAN ARCHITECT

CAPITAL OF LOWER PORTICO, PALACE OF THE DOGES, VENICE

PUBLISHED WEDNESDAYS IN NEW YORK—FOUNDED 1876

VOLUME CXV MAY 21, 1919 NUMBER 2265

Entered as second class matter January 6, 1909, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Publication office, 243 West Thirty-ninth Street, New York, N. Y. Subscription price in the United States and Possessions, $10.

BISHOPRIC SHEATHING

First 40 Houses; Then 10 Houses; Then 50 More Houses

Irvington, N. J.

Gentlemen:

Have specified and used your stucco board on some 40 or more houses built in the Weequahic Park section of Newark and elsewhere and have always obtained the best of results.

We did not hesitate to again use same on 10 houses of the 60 for the Mesa Housing Proposition that are now nearing completion at Irvington, N. J.

When your representative first spoke to us about your Bishopric Sheathing we kept it in mind. As you know, we ordered two carloads of it, enough for the other 50 houses for the above-mentioned Mesa Housing Proposition.

We are using it under shingles, wide and narrow clapboards, etc. Although somewhat skeptical at first about placing shingles over your sheathing, thinking it would be springy, we are no longer, this idea having long since disappeared. We find it everything ordinary sheathing could be and more. Being easy to handle, the carpenters liked putting it on.

Seeing its possibilities and the economy in using it, we will not hesitate to bring it to the attention of any of our clients who, in the future, expect to build.

Yours truly,

STROMBACH & MERTENS,
Engineers and Architects,
Victor H. Strombach.

An Engineering and Architectural firm which does big things in New Jersey has written us regarding its experience with Bishopric Sheathing on 50 houses it built in connection with the Mesa Housing Project at Irvington, N. J. Read the letter. It is more significant than anything else we could say about this modern Sheathing Board.

Note the list of institutions which have used Bishopric Sheathing either on Industrial Housing or Home Building projects:

Youngstown Sheet & Tube Company, Youngstown, Ohio; Virginia Shipbuilding Corporation, Alexandria, Va.; American Clay Machinery Company, Bucyrus, Ohio; F. C. Mesa Munitions, Irvington, N. J.; Hamilton, O., Home Building Co.; Petroleum Iron Works, Petroleum, Ohio.

The Bishopric Manufacturing Co.

904 Este Avenue **Cincinnati, Ohio**

PARAPET DETAIL—CHURCH OF S. MARK, VENICE

THE AMERICAN ARCHITECT

VOL. CXV WEDNESDAY, MAY 21, 1919 NUMBER 2265

PHOTO 10. MAIN DRIVE AT JUNCTION WITH ENTRANCE TURN
Note provision for lawn to right of drive and at living end of house. See A, fig. 7 also photos 11 and 19.

Garage and Entrance Turns—Part I.

By A. D. TAYLOR, *Landscape Architect and Town Planner**

THE introduction of the automobile and its present universal use both for pleasure and industrial traffic has developed a new problem. This problem is the laying out of garage turns and entrance turns, and is presented to thousands of owners of both small and large homes throughout the country. Road space once ample for the use of horse vehicles has become within the past few years entirely inadequate for the use of the automobile. These new problems of width of road and degrees of curvature have been most acute at the entrance to residence and garage, although in some measure they appear along the course of the entrance drive itself. These problems have been solved, not by definite rules deduced as a result of experience in designing these turns, but rather by "the rule of thumb" method.

This subject is worthy of detailed discussion, and it is the purpose of the present article to bring together for comparison and reference some of the results obtained in practice, as shown in the designs of various garage and entrance turns, each of which has been fitted to the actual curves of the wheel tracks under the conditions locally imposed by the size of the garage and the car, by the relation of garage location to property lines and residence, and by the direction of approach.

Unfortunately, there is very little available diagramatic data pertaining to areas and outlines of garage and entrance turns in which an automobile

*All illustrations are from work designed and photographed by the author.

Photo 11. Entrance turn opposite entrance steps showing relationship of house to garage, as yet unscreened by planting. See fig. 8, fig. 7 and photos 10 and 19.

may be operated conveniently, and without either waste of space or lack of space. The automobile has now developed to a point where experience has taught us that certain general outlines for entrance and garage turns meet the requirements. This discussion, with accompanying figures and illustrations. is an attempt to put on record certain fundamental information regarding the size and outlines of these areas. The factor of circumstance is so variable that the designer will often find problems for the solution of which the information in this article will serve only as a suggestive or partial answer. Each solution here shown is the answer to a practical problem viewed from the standpoint of the professional designer as adviser, and of the automobile driver as the user. Measurements have been carefully checked after the work was completed and in everyday use, so that the illustrations shown are virtually record drawings of work done.

Entrance and garage turns fall under one of four types, as follows:

A. Turn-tables.
B. Ovals.
C. "Y" turns.
D. Some combination of "Y" turns and Oval turns.

The first requisite of a well-designed turn is that it shall provide ample space of road-bed to allow ease of turning or reversing the direction of travel of any desired type of automobile. The second requisite is that while efficiency of operation is not to be unduly sacrificed, yet the total area of road-bed should be a minimum. The third is that wherever local conditions require it, space shall be provided in which to park the first automobile either directly in front of and close to the entrance steps or in some part of the turn, while a second automobile enters and departs.

Photo 12. An interesting solution of the garage turn and entrance drive. See fig. No. 12.

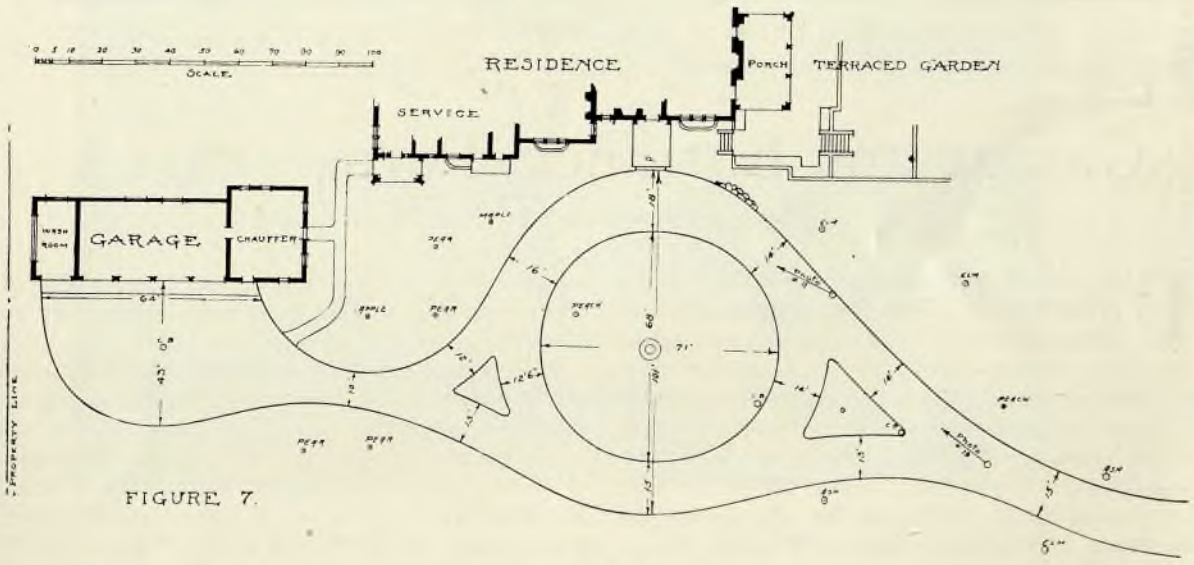


FIGURE 7.

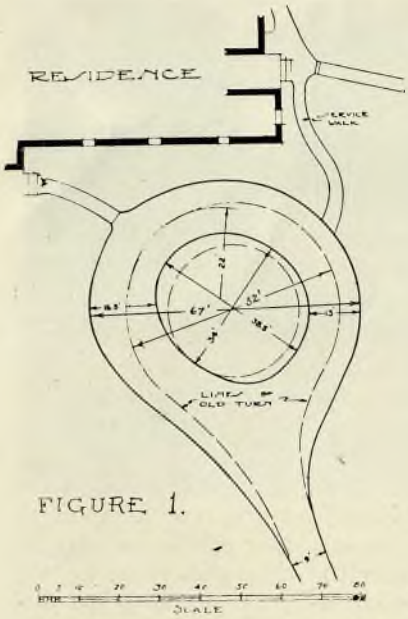


FIGURE 1.

In the actual execution of the work of developing an attractive and efficient turn, it is always essential to supplement the ground design of the turn with groups of plantings. These plantings will frame certain portions of the turn, thereby softening some of the uninteresting and particularly awkward lines as shown in photographs Nos. 13 and 15. On the other hand, these plantings often emphasize the interesting outlines of some of the curves, as shown in photograph No. 10. The relative value of plantings in these designs is seldom appreciated by the person who has not given considerable thought and study to

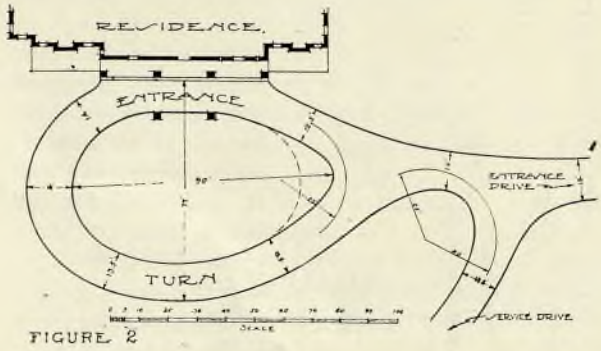


FIGURE 2

the effectiveness of these areas when properly framed with plantings.

In each of the illustrations the important measurements are indicated in figures. Other minor measurements may be scaled upon the diagram. Oftentimes if space is available these turns may be increased by from one to two feet in the major dimensions. The turns shown are the minimum space required for operating the automobile.

This article is compiled with reference to the space required by the latest models of large and small cars. This important question should be considered from all of its angles, with reference to both large and small machines, and there is no garage or entrance turn so small that it should not receive the careful consideration of the expert designer.

A—Turn Tables

Turn tables are mechanical devices for reducing the turning space required by any automobile to a minimum; that is, to its own length. These are to be recommended only where the conditions of

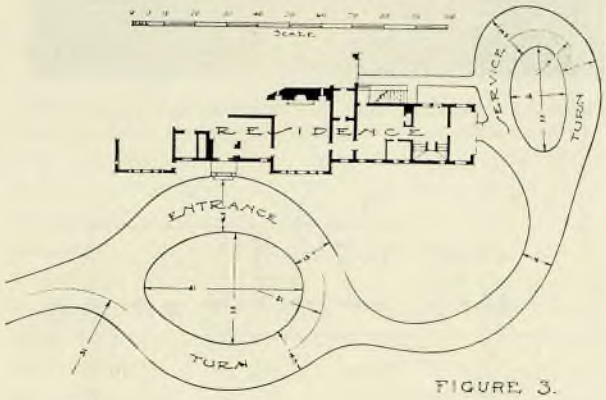


FIGURE 3.

restricted area require their use, and in northern latitudes where snow and ice abound they should be located only under roof in the garage itself. The width of the space required for the turn table must equal the length of the car, and as the length of an average car is over twice its width, it results in giving up to occasional occupation by the ends of the revolving car a space adequate for the storage of a second car all the time. This is manifestly an uneconomic utilization of cramped quarters. It may be placed before the garage doors, but a turn table in any location is apt to prove too slow in operation, as most autoists are impatient of delay.

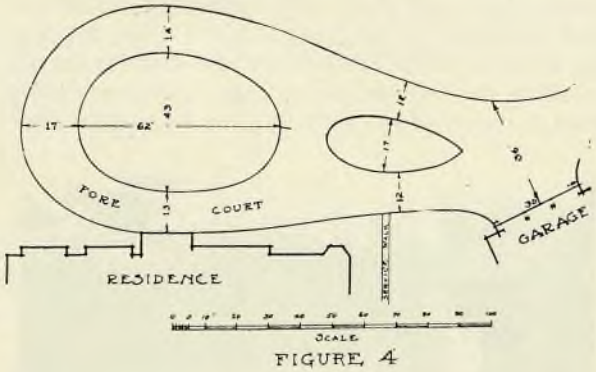


FIGURE 4

B—Ovals

Here the turning is accomplished by curving continuously during the forward motion of car until the car is headed back in the direction from which it came.

There are four general considerations requisite

Photo 15. Looking into the entrance and garage turn from a point opposite the entrance steps. See A, fig. No. 14.

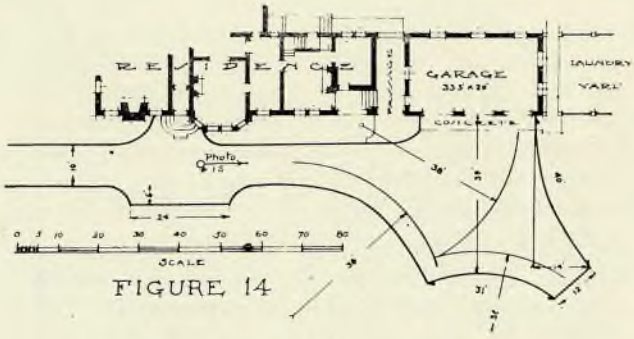


FIGURE 14

in a successful oval turn. The first is that a machine may traverse it comfortably at a speed of not over eight miles an hour without encroaching on the edges. This is more easily accomplished if the roadway of the oval is given a slope or "bank," high on the outer edge, rather than crowned, as in the ordinary road. The second is the provision of ample space for a standing and passing car before the steps by making the drive at this point not under fifteen feet, and preferably sixteen or seventeen feet in width. (Figs. 14, 12, 3, 7.) The third is the widening of the drive on the semi-circular curves to allow the rear wheels to take a shorter radius than the front wheels without going beyond the edge

Photo 13. The garage placed at an angle to provide space for planting seen in left of picture. See fig. No. 11.

Photo 18. Entrance drive parallel with side of house and framed with newly transplanted trees and shrubs. See fig. 14, photo 15.

of the road surface. (Fig. 2.) The fourth is the allowance of sufficiently easy curves adjacent to the steps, so that the rear door of the car may be readily brought parallel with, and close to, the house steps for convenience of receiving and discharging passengers.

In Figure 1, the oval turn is shown in its simplest form and dimensions, and is especially interesting in giving a comparison of size and shape required by the auto as compared with the old loop, as indicated in dash line, which was designed for horse-drawn vehicles. While a maximum diameter of 52 ft. answered for the horse turn, 67 ft. is allowed for the auto turn.

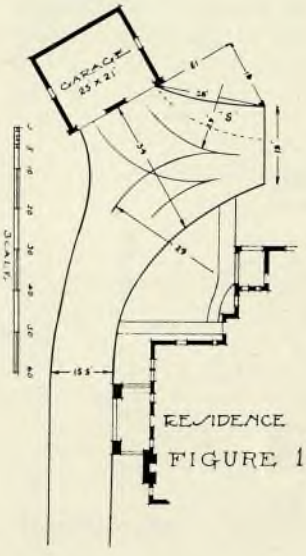


FIGURE 11

A loop is rarely best in the form of a circle, and the reasons have largely to do with limit of area. An oval with entrance steps on the long side occupies much less space than a circle which would give equal ease in bringing an automobile parallel with the steps. This is quite evident on reference to Figure 2. This is a typical and ideal front entrance turn on a large estate where no complications occur and the area need not be restricted. If the radius of approach to the steps were the radius of a circular loop, it would require a diameter of 160 ft. in place of the 77 ft. required by the oval. Figure 2 shows the type where the service road branches from the main drive before the loop

begins; this is excellent but frequently not possible. The intersections and the radii in this case are the resulting compromise between ease of use and objections on the score of too large road surface

Photo 19. Flower garden and shrub lawn looking from entrance drive over an informal artificial pool. See photos 10 and 11.

areas. This is quite clear on consideration of the dash line at the small end of the "egg." The dash line curve would have made easy the return to the steps. This is a comparatively infrequent use and the net result would have been a vast expanse of glaring roadway and extra cost of construction and maintenance. Note also that the width of the drive varies with the tendency to narrow on the direct route while on the large sweep, which different drivers will take differently, it exceeds the maximum of the drive itself. It is the small refinements of this character, made on the ground by eye, that do much to make the final result fit unobtrusively into the total scheme. The width of drive in this example, at the entrance steps, is limited by the width of the Porte-cochere.

Figure 3 shows the oval loop with service drive leading from it. The arrangement shown has in view two purposes: First, the creation of ample space for screen planting to hide the whole service area, and service wing of the house from arriving guests, and second, the passage of service teams by the front of the residence at as great a distance as possible. Ample space is provided before the steps for a car in waiting and room for another to pass. The Porte-cochere in Figure 2 prevents this, but passing space is a very desirable feature.

In the next example, Figure 4, we have a combination of main loop and a minor service loop where the drive approaches the house from the service end, and the service teams can turn back without passing the front door. The secondary loop also serves as a "Y" turn to the garage entrance. Here the service intervenes between the entrance to the grounds and the house entrance, being the opposite of the last example referred to.

This turn is perhaps open to the objection of large area of roadway with its original cost, its glare and its maintenance, but in this case the living side of the house is very definitely toward the ocean on the opposite side from the entrance, and this arrangement worked out very well. No space was allowed for the passing of autos opposite the entrance steps because of opportunities for easy turning, should occasion require, at the end of the service oval.

The double loop in Figure 5 is still more complicated. The original curves of the turn are shown in dash line. The service turn was retained contrary to the designer's desire, so the effort was made in relocation to make the approach to the entrance turn an easy sweep from both the garage drive and the main drive. The large loop is restricted by sloping ground and is in practice hardly adequate, the turns being difficult to negotiate. This turn should have a total diameter of not less than 60 feet. Also, there is an undesirable amount of roadway close to the house. A broad path from the garage drive to the service door and ice house, in place of the service loop, would do much to

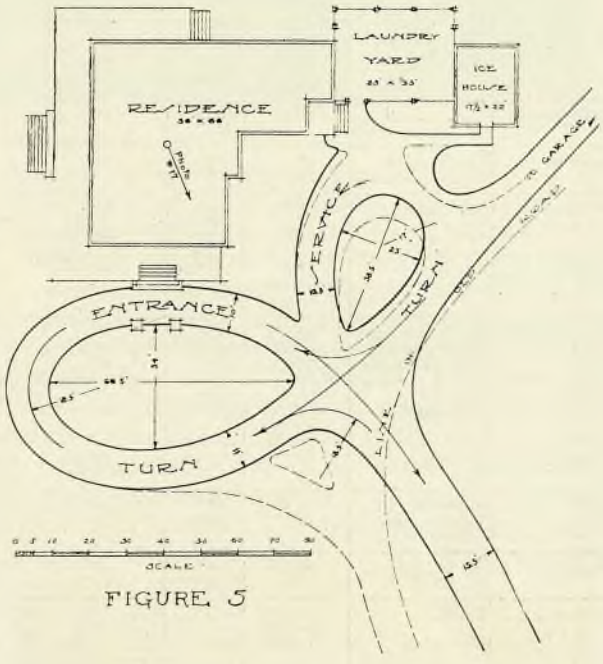


FIGURE 5

enhance the appearance as one approaches the house.

The next oval turn is in a highly developed formal forecourt with strong rectangular architectural framing and diagonal entrance and exit. (Fig. 6.) This is a rather unusual case, brought about by the narrowness of the lot upon which the large

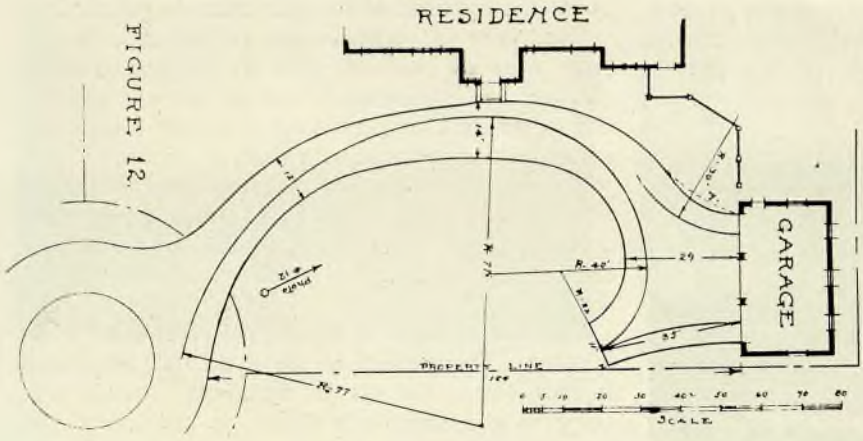


FIGURE 12.

residence stands. Here we have the service court beyond the house entrance, and the service traffic passes over the side of the turn away from the front door of the house. The oval becomes as nearly symmetrical as possible on the axes of the court and the cut-away of the sides to secure easy entrance and exit and close approach to the steps was very minutely worked out with a limousine, much gasoline, and many small stakes. In use and appearance the effort has been justified. No screen planting can hide the garage door from the front steps, but this could have been obviated by setting the garage further back and deepening the service court. This court is all road surfaced, and cars can drive all over it in reversing their direction.

The last example of the oval turn presents this type at its broadest development upon unrestricted area on a large estate. Every refinement of varying width is present, triangular islands make all curves easy sweeps and lessen the apparent area of roadway. While the service area is beyond the front door, all traffic to it is at a distance of 100 ft. away and several feet lower and is amply screened by shrubbery planting.

The broad swing of the driveway around the area devoted to terrace garden (See photo 19) gives a fine chance for developing this area next to the living end of the house, and presents to the visitor by this diagonal approach the best possible perspective view of the house facade. (See photo 10.) It is interesting to compare this with the more nearly parallel approach in Figure 2.

Photo No. 11 shows very clearly the minimum intrusion of the very large garage into the scheme, due to its being seen only "on end" as it were, and enframed behind softening foliage; yet the sweep from the garage to front door is short and easy. A circle in this situation would have appeared stiff and lacking in grace; and it is interesting to note that while there are at least four different radii in the major oval, most visitors on the ground would unhesitatingly pronounce it a circle. It is the knowledge of how far one may vary from geometrical forms without giving offense to the eye, wherein lies the secret of successful practical designing of this sort. In fact it is this license or liberty that when intelligently taken will give the best result in any artistic effort.

(To be continued)

The following is a summarized tabulation containing information with reference to the wheelbase and turning radius of representative makes of pleasure automobiles:

Make of Car	Type of Car	Overall Length of Car	Wheel-base	Turning Diameter
Cadillac.....	Roadster	15′5″	125″	Right 42′, left 50′ outside
	Limousine	15′10″ top down	132″	Right 23′, left 32′ inside
Packard.....	Short chassis	15′9″ top up	128″	45′
	Long chassis	16′5″ top up	136″	47′
Rolls-Royce...	.....	18′6″	140″-144″	48′
Stearns.....	Various bodies	15′	119″	43′
	Various bodies	16′	125″	43′
Overland.....	Light fours	13′6″	104″-106″	32′
	85 fours	14′6″	112″	36½″
Peerless.....	All types	15′7″ top down 2 tires on	125″	39′
Pierce-Arrow..	Standard chassis	19′	142″	50′
	Largest chassis	19′6″	147½″	59′
	Smallest chassis	18′6″	134″	43″
White.....	Smallest	14′	110″	.....
	7-passenger	16′ top up	137½″	42′
Hudson.....	All types	15′9″	125½″	39′4″ left turn
Ford.....	Runabout	10′10″	100″	28′
	Touring, top down	12′1″	100″	28′
Winton.....	Big Six	16′1″	138″	45′
	No. 33	15′	128″	41′
Dodge.....	Touring	13′9″ top down	114″	Tires 32x3½″ 40′ Tires 33x4″ 45′
	Limousine	13′9″	114″	Tires 32x3½″ 40′ Tires 32x4″ 45′
	Roadster	12′9″ top down	114″	Tires 32x3½″ 40′ Tires 33x4″ 45′
Buick.....	Roadster, Touring, Sedan	13′6″	118″	42
	7-Passenger Touring, with 2 tires	16′	124″	44′
Electrics, Baker Rauch & Lang....	Brougham	.....	92″	40′
	Coach	.....	102″	45′

DIRECTORS' ROOM

(*For other illustrations, see plate section*)

The People's National Bank of Brooklyn

THIS building, for which Koch & Wagner, architects, prepared the plans, is located at the southeast corner of Ralph Avenue and Quincy Street, Broadway, Brooklyn, New York.

The base course and columns are of polished Greens Landing Granite; the entrance and steps of tooled granite. Terra cotta with limestone finish form the entablature, columns and pier caps. The rest of the building is constructed of a grey, mottled brick. The panels in the frieze of the cornice are Golden Sunset marble. Entrance doors and frame are bronze, while window frames are steel.

The banking room within is 28 feet 6 inches high and has been so designed that a mezzanine may be installed when the future growth of the bank may justify. The floors are of Tennessee marble; the wainscot, counter screen, staircase, etc., honed finish Tavernelle marble. Above the wainscot, cream caenstone plaster is used for the walls. The upper part of the banking screen is gold bronze. The wicket grilles are operated by a foot mechanism, leaving the teller's hands free and giving positive security. The officers, who are located on a platform in the rear of the public space, may command a view of all parts of the building and have quick access to the security vault and work space. While in most banks this work space is placed against the interior wall, an unusual feature in the present building is the fact that this space is located on the street side. Thus there is at all times an abundance of natural light. The tellers are located 6 inches above the public space, and have a sweeping view over the embossed glass screen.

Desks and furnishings are of steel, mahogany finish, and the cupboards and drawers in all essential departments have fireproof rolling curtains.

The Directors' room is in the English Tudor Period style, with parquet floor, English oak wainscot, limestone mantel with Numidian marble facia. The large window is in leaded glass with Norman variegated slabs in wide, flat bars to give an antique effect. The safe deposit department is in the basement at the foot of the marble staircase.

A Fine Example of French Craftsmanship

A MAGNIFICENT example of French eighteenth century furniture in the Louis XVI style, a cylinder desk bearing the royal arms of France, has been presented to the Metropolitan Museum of Art by Jacques Seligman of Paris, "In memory of Mr. J. P. Morgan, and as a souvenir of the help which the Americans have given to France during the war. In every way this splendid desk of mahogany and ebony, richly decorated with ormolu mounts, is a piece of capital importance. The Bourbon lilies surmounted by the royal crown, which appear in a cartouche upon the front and back of the desk, would seem to indicate that it was made for the king, Louis XVI, as the style of the desk is clearly that of his reign.

A small key opens the upper right-hand drawer. Here is kept a large key with a handle which unlocks the cylinder top. To insert the key, it is first necessary to press a hidden spring concealed in the ormolu mounts of the upper central panel. When this spring is pressed, the mask of a woman's head drops down revealing the keyhole. But there are further complications. When the big key is entered, it is necessary to make a half

FRONT—OPEN

turn to the left, push in the key entirely, and then make eight complete turns from right to left. The key is then pulled out half-way and pressed toward the right, while at the same time, the sliding cover of the desk is raised.

The desk chair, upholstered with leather, may now be pulled out from the front of the desk, of which, when closed, it forms an integral part. The leather-covered tablet is then drawn out. At the back are three compartments with sliding covers. The central part may be opened up so as to form a sloping pulpit or desk. When this is raised, access is had to three sliding boxes and a large hiding place. The inner drawers, concealed when the desk is shut, open by pressure on springs. Two narrow drawers, faced with mirrors, on either side of the central compartment, may be pulled out without further ado. An interesting feature of the compartment, which is closed by two small doors, is that the back panel may be slid to one side so as

BACK—OPEN

to provide an opening through which the user of the desk might communicate with the secretary, for whom, as we shall see, facilities were provided on the back of the desk. At each end of the desk is a slide. The top of the desk is covered with a marble slab surrounded by a light gallery of gilt bronze.

Coming now to the back of the desk, we find that the upper part, composed of three panels, forms one leaf which opens downward when unlocked, revealing a series of small drawers and shelves. This lid is covered with leather and serves as a desk; a central part opens to form a pulpit. When the lid is let down, it is supported by a section of the desk, which is pulled out in the same way as the chair on the front of the desk. This, in turn, has several drawers, and the top may be raised so as to form a pulpit, if the section is drawn out while the lid is closed.

From the purely artistic side, the interest of the desk lies in the attractiveness of its severe but beautiful forms, and in the skilful use of ornament in gilt bronze to emphasize constructional lines and to relieve the simplicity of the form of the desk by the exquisite detailed work of the

various garlands, rosettes and mouldings. The metal mounts, delightful works of art in themselves, contribute largely through their decorative value to the effectiveness of the desk. In the period of Louis XVI, furniture design and construction reached a height of perfection which has rarely, if ever, been surpassed.

The reproductions are made through the courtesy of the Metropolitan Museum of Art.

Architectural Criticism

WRITING of architectural criticism, a contributor to the *Architects' Journal* of London, who signs his article H. J. B., states: "The individual patron who was often a person of great culture, is rapidly giving place to the State and the smaller governing and public bodies, as the architectural employer, and until these realize their responsibility, much that is rightly deplored will continue to exist."

The solution suggested is the creation of a school of scholarly criticism. Of just what essential elements would a school of scholarly criticism consist? Are we asked to educate in the higher branches of reasoned criticism the many different types of men who control the regulation of our architecture in the national, state and municipal governments? Just what is reasoned and scholarly criticism? Of course it consists of a sane and intelligent appreciation of good art as applied to architectural design, but with the many interpretations of what that measure of good art is as set forth by men whose judgment should be reliable and whose opinions are undoubtedly honest, we are confronted with adversity of opinion that leads to no definite end. "Who shall decide when doctors disagree?"

The fault of much of our architectural criticism today lies in the ignorance of the critic of the media of expression. This is equally true of a large number of critics in the field of the fine arts. This shortcoming of critics with other interesting phases of architectural criticism is very ably discussed in the article referred to. It is worth careful consideration, and believing this, we are reprinting it below, with due acknowledgment.

The article states:

The function of criticism has been variously described—one dare not say defined. Matthew Arnold regarded it in a general sense as "a disinterested endeavor to learn and propagate the best that is known and thought in the world." It has come, however, to possess a more specialized meaning, as the published account, either of the ideas or the sensation obtained from the contemplation of a particular creation in literature or the fine arts, or an analysis of their qualities and characteristics, taking an independent literary form, which may in itself be—and, indeed, often is—a production of much beauty.

The objects with which æsthetic criticism deals—music, literature, and the various accomplished forms of human life—are but the objective manifestations of the natural forces and virtues within mankind, and the questions to which the critic must answer—put in their very simplest and most direct form—are, What aspect of life does this work reveal to me? Is it revealed truthfully and with beauty?

The history of art criticism is a study of much interest, and brings with it many great names, of which the earliest is Aristotle, who may be regarded as the founder of literary criticism. Thus note may be made at the outset of the fact that the functions of creator and critic are often combined in the same person, of which the student would have many opportunities of observing. At various periods in the development of criticism attempts have been made to stultify it and prove that it can claim for itself no place of permanency in the intelligent scheme of things, and to no less a person than Disraeli is attributed the harsh and unjust statement that "the critics are the men who have failed in literature and art," but the fact of its continued survival constitutes an eloquent testimony to the contrary. Useless adjuncts in a structure display a tendency toward atrophy. Some of the finest, noblest and most suggestive passages in English literature, Francis Thompson's Essay on Shelley, Walter Pater's Renaissance, the writings of John Ruskin, to name but a few random examples, are in the form of art criticism. But even the production of such beauty is perhaps insufficient justification, and it is, indeed, but a fragment of all that exists; for the critic by his utterances stimulates the interest of the public, on whose behalf as a layman he speaks, and this interest in its turn reacts on the artist, spurring him ever toward a higher goal. Thus is the circle completed.

All writers of the finer forms of literature have their counterpart in journalism, with their consequent broader and less specialized appeal, and the art critic today has a definite place in the social hierarchy, his function being, as it were, to epitomize, to guide, and to stimulate public opinion. His position is, therefore, at once one of great importance and responsibility and for the wise and conscientious fulfilment of it certain qualifications are necessary. It addition to a general breadth of vision and generosity of spirit—for an embittered critic is a source of much evil—is required, above all, a deep knowledge of the difficulties and limita-

tions of the medium, be it words or music, marble or pigment, with which the work is created, and an historical knowledge of its traditions and past achievements. It is possible, however, that some of these limitations in their broader conceptions are arbitrary; the fact of their survival is no indication that they may not at some time be subject to readjustment. Thus, Lessing in his "Laocoon" maintains that the domain of literature is time while that of painting is space, a ruling which certain modern painters are tending to defy. A sound judgment is only to be acquired by a patient study of all that is best of what survives, and a knowledge of the problems with which the artist has been confronted; problems variously imposed by limitations of form, selection of matter, and possibly certain impositions particular to the undertaking. By such means a good critic should almost without effort accept that which is good and satisfying, while rejecting that which is meretricious and specious. By so doing he fulfills the purpose of assisting the less specialized public in their taste and in their selection, and, when new efforts appear, in overcoming their prejudices, since uninformed opinion is always hostile to what is unknown. Thus today the moment a new work of art appears the critic performs his task, and the power which he wields must not be underestimated. In one branch of art, however, the critic remains consistently silent. A new building never receives any genuine criticism from a qualified source. The reason for this anomaly is hard to find, but the result is bad and far-reaching. It is, indeed, strange and sad that architecture, which is the most democratic of the arts, should arouse so little public interest. Painting, music, sculpture and, indeed, literature are personal, but architecture is vitally bound up with the life of a people, surrounding it with beauty or ugliness. The character of a nation is read in its buildings.

It is the great love for their work which many architects bear that enables them to overcome public apathy and ignorance and to produce so much good work; but there can be no doubt that much that is bad and ignoble would never have found three dimensions had there existed a reasoned and responsible tradition of architectural criticism, which would have built up an intelligent critical and enlightened public. It is not now too late; the time is opportune. Reconstruction is the need of the moment.

What common quality lies in such diverse works as the Temple at Paestum, the Library at St. Mark's, Chârtres Cathedral, St. Sophia, the Cavalry Club, Piccadilly, William Pain's Doorways, Inigo Jones's Banqueting Hall? (The writer by the exclusion of modern work does not wish to insinuate that in his opinion none is worthy of inclusion, but he does not set himself up to be an architectural critic. The works which he selects have stood the test of time.) Is it not just some delicacy of touch showing itself in restraint and selection of detail, in massing and balance—all manifestations of the master mind—some ineffable quality which makes the shell upon the shore or the wild flower by the wayside a thing of beauty? And is it not desirable that the public should acquire just this capacity of discrimination? By so doing, not only would it bring a new interest into its own life, but it would be in a position to assist in the building up of more beautiful towns; for however much the individual architect may strive and succeed to produce the best results, the larger aspect of our towns must ultimately reflect the outlook of the people, just because architecture is not a personal art, but depends in its realization upon the assent and collaboration of untrained minds who are always in a position to impose restrictions and limitations. When, however, a deep interest and understanding of good building has been acquired, it is probable that this power will cease to be a source of danger. The individual patron, who was often a person of great culture, is rapidly giving place to the State and the smaller governing and public bodies as the architectural employer, and until these realize their responsibility much that it rightly deplored will continue to exist. To bring about the improvement which is to be so devoutly desired, nothing can be of greater assistance than the creation of a school of reasoned and scholarly criticism.

THE AMERICAN ARCHITECT

Founded 1876

PUBLISHED EVERY WEDNESDAY BY

THE ARCHITECTURAL AND BUILDING PRESS, INC.

No. 243 West Thirty-ninth Street, New York

E. J. ROSENCRANS, PRESIDENT AND TREASURER
WILLARD C. HOWE, VICE-PRESIDENT

WILLIAM H. CROCKER, Editor
EDWARD F. HAMMEL, Engineering Editor
ARTHUR T. NORTH, Western Editor

Subscriptions in the United States and Possessions, Mexico and Cuba, TEN DOLLARS. Other Countries, TWELVE DOLLARS.

SINGLE COPIES (Regular Issue) 25 CENTS

CHICAGO OFFICE, Mallers Building
PAGE A. ROBINSON, Western Manager
ST. LOUIS OFFICE, Wright Building
CLEVELAND OFFICE, Guardian Building
SAN FRANCISCO OFFICE, 320 Market Street

Owned by United Publishers Corporation—H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary. Entered as second-class matter January 6, 1909, at the Post Office at New York, New York, under the Act of March 3, 1879.

VOL. CXV MAY 21, 1919 No. 2265

What Could Be Done

WHILE the Post-War Committee on Architectural Practice may for the coming year be seriously engaged in the very important work of formulating what in a sense will be a creed that clearly states the real things which architects, to be successful, should believe, there are other and important matters that will properly engage the serious consideration of that committee.

What the profession has a right to expect as the result of the deliberations of the recent convention is, more than ever before, a measure of accomplishment. It will look forward to some practical fruition of at least a part of the many desirable aims that have been outlined. To accomplish this end it will be necessary to gather into Institute membership that large number of desirable men who up to the present time have held aloof from the organization. This can be more quickly done if every member of the Institute will labor to recruit those men. "A thousand in 1919" should be the slogan.

LOOKING backward to a convention held in Washington some eight years ago, and particularly to a certain reception held in the Hemicycle of the Corcoran Gallery, it is recalled that the meeting was addressed by the late President Roosevelt, Elihu Root, then Secretary of State, and Ambassador Jussurand of France. M. Jussurand referred at some length to the great possibilities for artistic development that existed in that large tract of land lying between Annapolis and Washington. At that time the Institute was lending the weight of its influence to the development of the scheme for a Lincoln Highway and that influence was largely responsible in preventing a certain political faction from securing the abandonment of a scheme that is now rapidly assuming a most dignified and practical completion.

In the report of the Committee on Historic Monuments presented to the Nashville convention, the following interesting paragraph is to be found:

> It is with interest that your Committee records a revival of measures to induce the United States Government to acquire a large area of land adjacent to the national capital for scientific reforestation and improvement as a national park and forests. The project when previously considered had the endorsement of leading associations and the press, and is one of the subjects especially recommended to your Committee for encouragement by the Board of Directors of the Institute. Not only does the territory in question between the District of Columbia and Annapolis offer unusual advantages as a natural arboretum already possessing a great variety of native trees and diversity of soil, but it is proposed to develop the land adjoining the national capital as a park, affording sites also for memorials and monumental structures along the proposed roadways leading toward Baltimore and Annapolis. Within the stretches of country elsewhere and exclusive of the forest areas it is proposed to introduce among other features a village or "insurance city" where the Government would provide homes for disabled soldiers.

In furthering a project so altogether praiseworthy, the Institute would be engaging in a patriotic work exactly within its particular province. It is strongly urged that this matter be seriously considered.

DURING the course of his remarks before a session of the Post-War Committee, H. Van Buren Magonigle, referring to the subject of architectural education, stated:

"Does the public need to be educated? I would propose quite seriously that we do not debate that question at all until we have determined first whether our own education is as perfect as it might be. . . . When it is, then let us take up the public."

This is very good advice, and suggests a further and careful reading of the admirable report submitted by the Committee on Education, from which may be learned just how this important movement may best be organized and conducted. As this report states, architectural education has a two-fold purpose: the creation and the appreciation of architecture. The student must be educated to conform to certain standards that he might now consider as

incompatible with his educated view of his professional work. He must learn that it is his life work to support rational living in a higher sense than it has been heretofore supported. He must do this and at the same time create an impression of good architecture, a respect in the general public for his work.

The problem is one of great intricacy, and its solution has not been found in past educational methods. When it is at last discovered, and that will only result through the efforts of practical men in the profession, the student on graduation will be so well equipped mentally in his art—or profession—and the practical elements that dominate it to a greater extent than any other field of art, as to be thoroughly competent.

It is very apparent that there are things outside of the activities of the Post-War Committee that will afford opportunities for concurrent effort that will be of the most constructive nature. Some of these have been already referred to, and afford an opportunity for constructive work that would place the Institute squarely before the public as an efficient and energetic working body.

THE abandonment of the Committee on Public Information would be an amusing instance of a misunderstood title, if it were not so unfortunate as to deprive the Institute of what could be made a very valuable part of its administration.

It was in these pages that the formation of this committee was urged, and it was at the time when the fate of the Tarsney act was discussed in Congress. The papers teemed with misrepresentations as to the status of architects, and it was proposed to create a committee that would through the daily press, influence a correct point of view on the part of the general public. When this committee was formed there was apparently some misunderstanding as to just what section of the public was to become "informed." It set about informing the architects about matters on which it believed they should become posted. The general public is yet presented with glowing reports of some notable structure in which the owner's name is exploited, the town officials who participated at the opening are fulsomely quoted, while the architect is never even indirectly mentioned. It also reads in its daily paper of the many building activities by national, state and municipal authorities, but the architects' names are conspicuous by their absence. Further, there are constantly recurring examples of statements in the public press, framed in crass ignorance as to the practice of architecture.

It was through a well directed literary propaganda that it was originally proposed to have this Committee on Public Information work. It set sail on an entirely different course, and after floundering along, most of the time conflicting with other committees, it is at last wrecked and scrapped. If a properly constructed committee were formed, acting along the lines above indicated, we would see fewer false statements as to architectural practice, and fewer failures to accord architects their just recognition.

PLATE 162

BUILDING FOR PEOPLE'S NATIONAL BANK, BROOKLYN, N. Y.

KOCH & WAGNER, *ARCHITECTS*

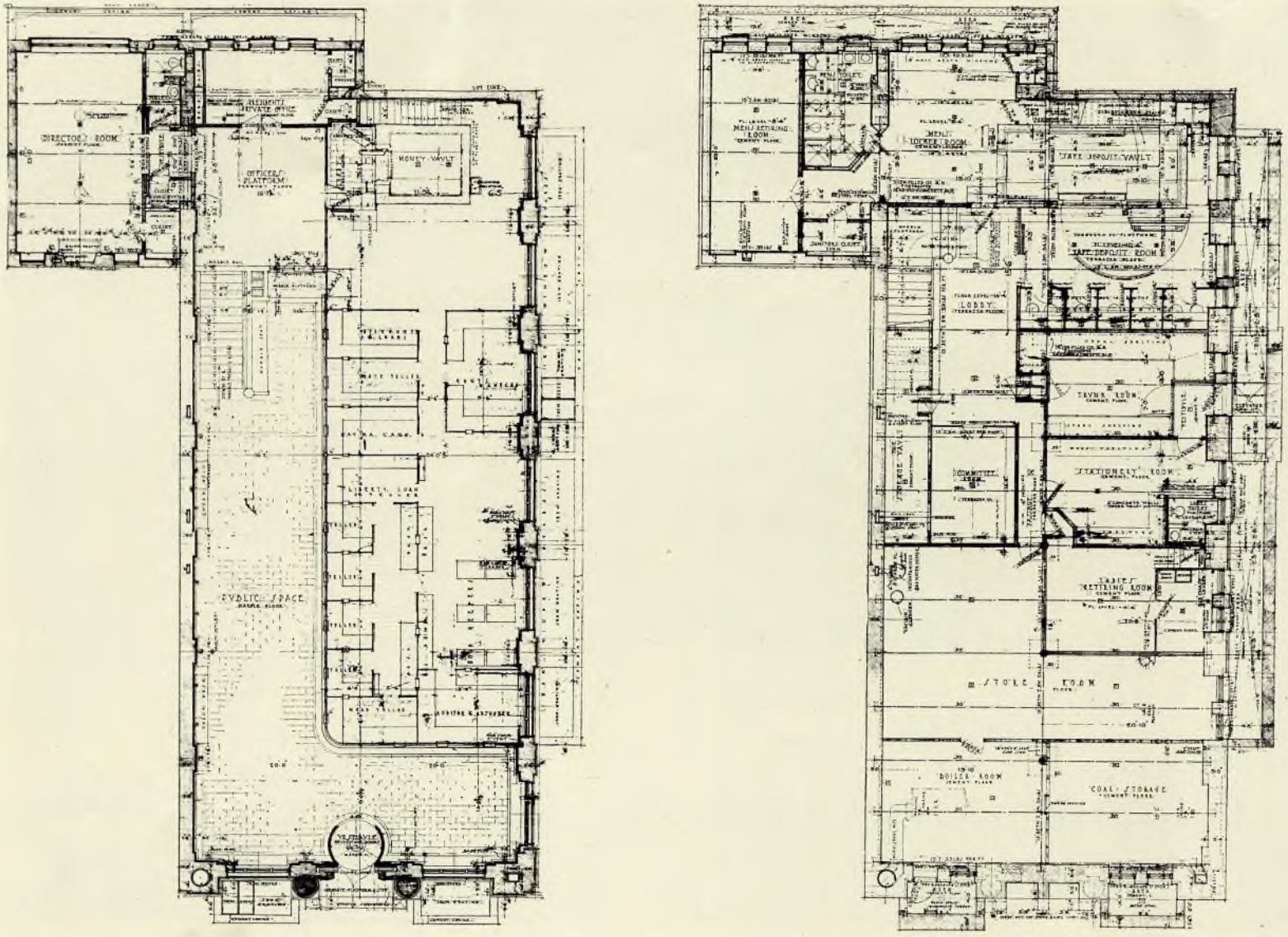


PLATE 163

BUILDING FOR PEOPLE'S NATIONAL BANK, BROOKLYN, N. Y.

KOCH & WAGNER, *ARCHITECTS*

PLATE 164 DETAIL OF MAIN ENTRANCE

BUILDING FOR PEOPLE'S NATIONAL BANK, BROOKLYN, N. Y.

KOCH & WAGNER, *ARCHITECTS*

PLATE 165

INTERIOR DETAILS

BUILDING FOR PEOPLE'S NATIONAL BANK, BROOKLYN, N. Y.

KOCH & WAGNER, *ARCHITECTS*

PLATE 166

APARTMENT HOUSE AT 78TH STREET AND WEST END AVENUE, NEW YORK

ARTHUR LOOMIS HARMON, *ARCHITECT*

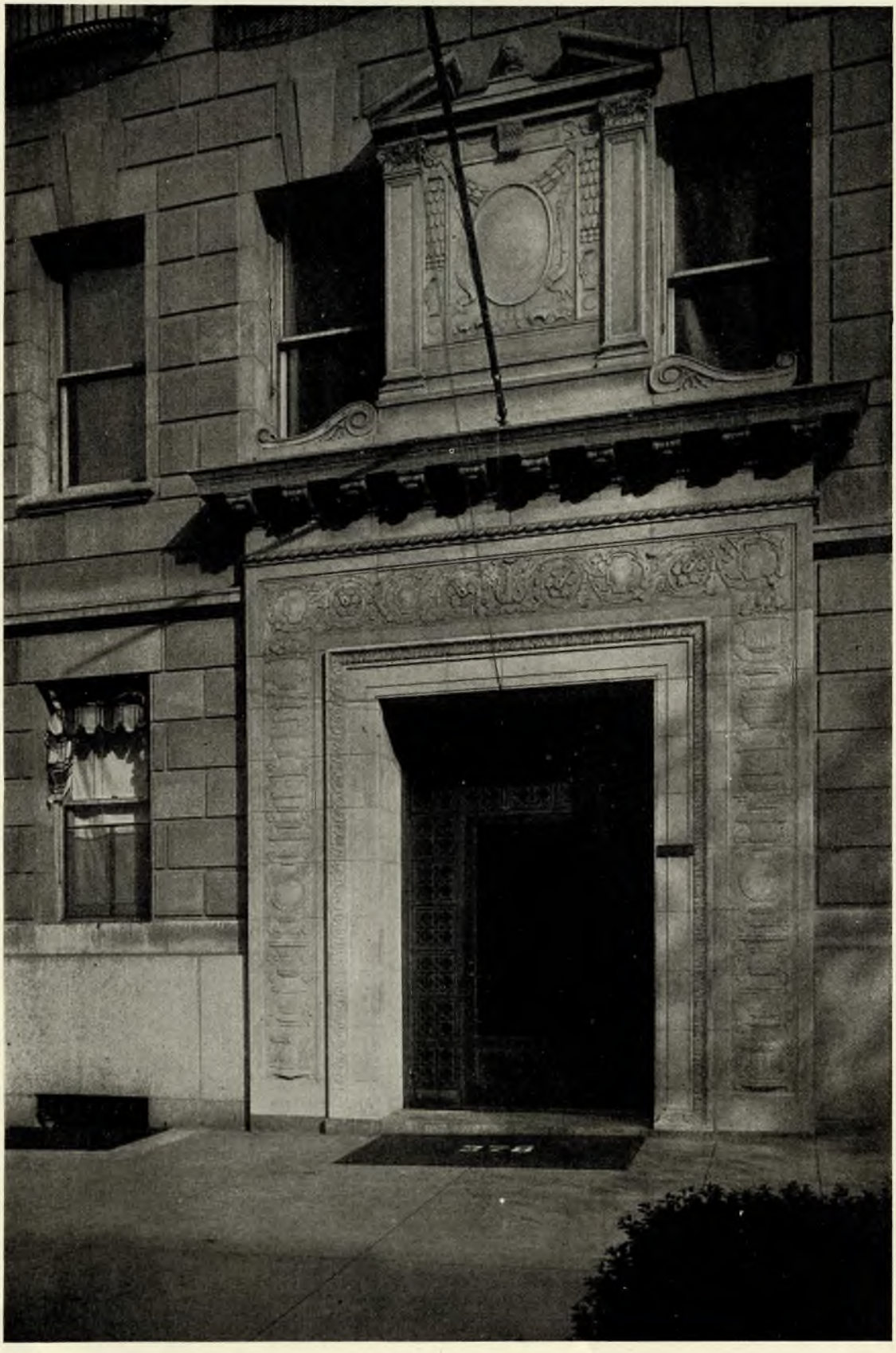


PLATE 167 MAIN ENTRANCE DETAIL

APARTMENT HOUSE AT 78TH STREET AND WEST END AVENUE, NEW YORK

ARTHUR LOOMIS HARMON, *ARCHITECT*

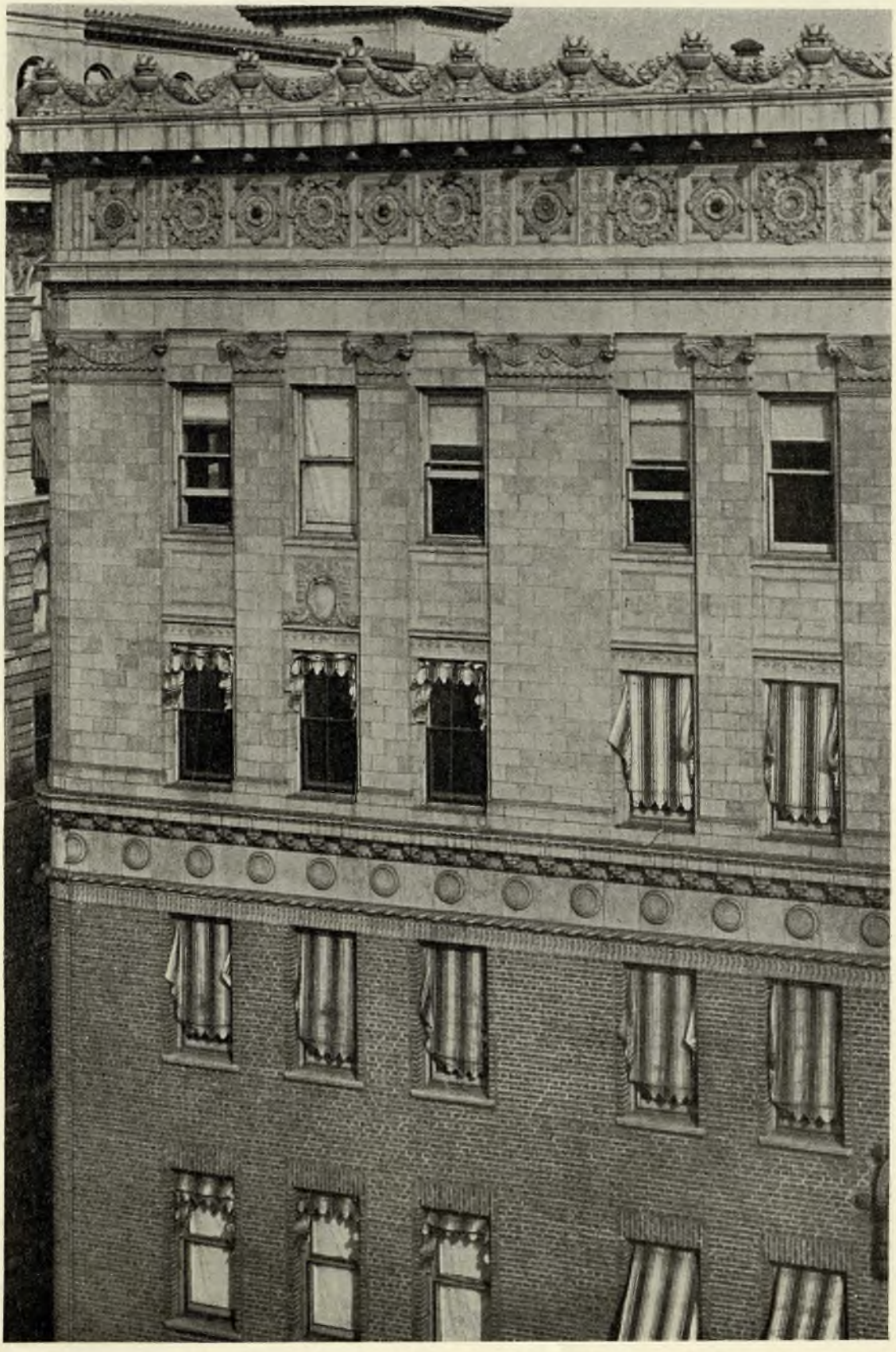


PLATE 168

APARTMENT HOUSE AT 78TH STREET AND WEST END AVENUE, NEW YORK

ARTHUR LOOMIS HARMON, *ARCHITECT*

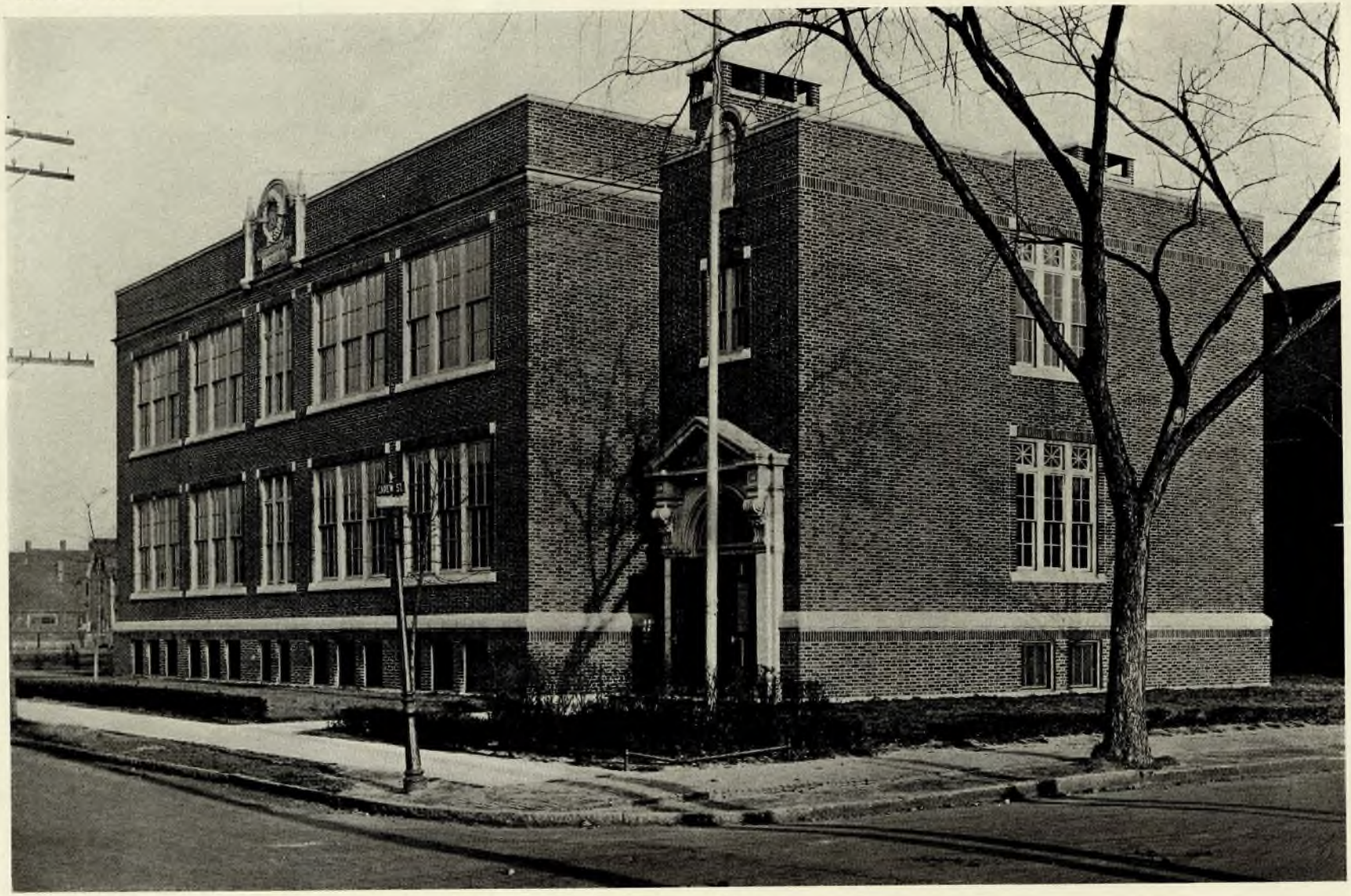


PLATE 169

SCHOOL OF OUR LADY OF HOPE, SPRINGFIELD, MASS.

JOHN WILLIAM DONOHUE, *ARCHITECT*

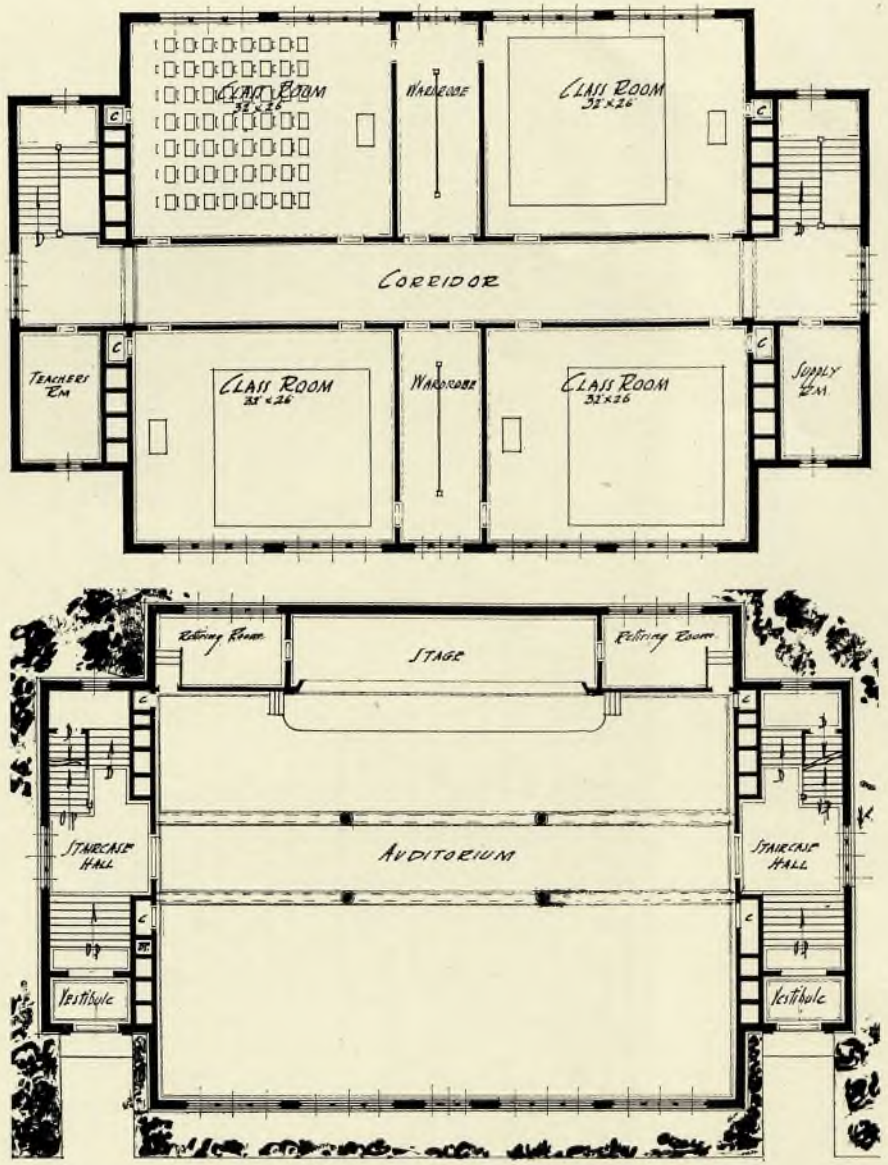


PLATE 170

SCHOOL OF OUR LADY OF HOPE, SPRINGFIELD, MASS.

JOHN WILLIAM DONOHUE, *ARCHITECT*

Current News

The Academy and its Methods of Exhibiting

Considerable dissatisfaction is being manifested in the inner circles of the National Academy of Design with reference to the jury system for the selection of works of art for the annual exhibitions in New York. The insurgents, led by George Bellows, Robert Henri and Jonas Lie, claim that the Academy has ceased to be the representative exponent of the true spirit of American art and that the reputation of the Academy as an official expression of art in this country is at stake.

"The present jury system," says Mr. Bellows in the *Boston Transcript*, "is merely putting a premium upon mediocrity. It simply means that the pictures which nobody dislikes very much, in other words the more or less innocuous pictures, are going to get in. Great paintings, paintings of even noticeable merit, are apt to be paintings which some people prize very ardently and which other people just as ardently detest.

"The old-line artists who are in control of the Academy now are apt to detest the work of the newer men. They set themselves up to say what should be the spirit of American art, and they try to come as near that as they can, without any regard to what actually is the spirit of American art.

"Now, of course, we could meet them in an open fight on this question, but we prefer to let all varieties of opinion and expression have their outlet. That is the spirit of this era and this nation. And so what we propose is to let each man on the jury make an absolute selection, without regard to the opinion of the other jurors, of the pictures he wishes in the Academy show. Each of the jurors will choose in turn, and the selections of each will be hung. Care will be taken to have every shade of school and thought represented on the jury, so that full justice may be done to all styles of painting—academic, post-impressionist, ultra-modern. That is really all there is to it."

British Army Huts for Homes

Reports from London have it that half a million British army huts are to be converted into homes for working men if plans made by the disposal board of the ministry of munitions are carried out. Each little hut will provide six rooms and bath all on one floor, and the cost of moving and fitting each for residence purposes would average $1,000. Besides the huts in England, there are thousands in France that can be used in the same way.

Air Fields Being Established

The government's plan for co-operating with municipalities in the establishment of airplane landing fields and creating a system of aerial highways capable of use for military, postal and commercial purposes has been announced by the Air Service of the United States Army. It is now further learned that the Air Service, in conjunction with the Post Office Department, hopes in the near future to lay out airplane terminals in at least thirty-two cities and towns throughout the length and breadth of this country. Those selected are: Boston, New York City, Richmond, Va.; Raleigh, N. C.; Columbia, S. C.; Augusta, Ga.; Macon, Ga.; Atlanta, Ga.; Kissimmee, Fla.; Mobile, Ala.; New Orleans, Baton Rouge, La.; Beaumont, Texas; Flatonia, Texas; El Paso, Texas; Texarkana, Texas; Columbus, Ohio; Tucson, Ariz.; Phoenix, Ariz.; Yuma, Ariz.; Bakersfield, Cal.; Fresno, Cal.; Buffalo, Albany, Columbus, N. M.; Kansas City, Mo.; Oklahoma City, Okla.; Uniontown, Penn.; Daytona, Fla.; Cleveland and Chicago.

The minimum size of any field should be such as to allow a 600-yard runway in every direction, with no interfering obstacles. The shape should be square or rectangular. The announcement reads in part as follows:

The establishment of landing fields throughout the country through co-operation with the Government agencies and the cities concerned will certainly operate to the advantage of both the Government and the city, because in the rapid development of commercial aviation those cities which have provided the primary facilities for operation of aircraft in their vicinity will have paved the way for local benefits, resulting from the development of aerial intercity transportation, express service, mail service, emergency service and local photographic mapping of aerial protection.

The fields are to be established in accordance with articles of agreement to be entered into between the United States Government and the municipality. Neither the Air Service nor the Post Office Department will deal with any private societies or associations.

Salvaging Old Homes

As a branch of the "Own Your Home" activities the salvaging of old homes is deemed important not only in its bearing on civic conditions but in its power to arouse interest in new enterprises. In every community are old homes that have been permitted to run down until they have become eyesores. An idea of a progressive Kansas town has been to salvage these houses by forming a fund with which to buy properties long neglected by owners and then to remodel the houses, making them modern and attractive in every respect. When fully restored the houses are sold.

Tree Planting in New Bedford, Mass.

New Bedford, Mass., has planted 4000 shade trees in the last seven years, says the Massachusetts Forestry Association, and it is a conservative estimate that in twenty-five years these shade trees will be worth more than $1,000,000 to the city. It has been said to be useless to plant shade trees in thickly settled districts, but New Bedford has disproved this theory. It has shade trees thriving on narrow back streets in the heart of the mill districts with scores of children playing about them.

Says World Faces Lumber Famine

Roger. E. Simmons, who was sent to Russia in 1917 as a member of a United States Government Commission, to study the lumber situation in the war devasted countries, told the Legislative Commission in Chicago recently investigating high prices of building material that the world was facing a lumber famine.

Prices of lumber, he said, were certain to rise in the next few years, because of the unprecedented demand which would come from the reconstruction of the war stricken regions of Europe. The major portion of this lumber, he said, would have to be supplied by the United States and Canada.

Canada already has received an order from the British Government for one billion feet of oak for England and from Italy for twelve shiploads of lumber.

Mr. Simmons said Russia, which before the war exported 52 per cent of the world's lumber supply, would not be in a position to cut lumber until five years after the government had been stabilized and order restored. Austria and other countries which exported lumber before the war are in a similar position, he said, so that the present burden in supplying this commodity would have to be borne by the United States and Canada.

England, Mr. Simmons said, had subsidized a corporation to erect saw mills in Siberia to supply the home needs of that country. Great Britain recently called on its citizens immediately to build 300,000 homes for returning soldiers and sailors, the Government agreeing to refund 75 per cent of any differential cost between to-day and five years from now.

Western Lumber Stock Decreases 5.99 Per Cent

Stock on hand at 72 lumber mills in Western Oregon and Western Washington in March averaged 393,581,222 feet, as compared with 418,638,685 feet on January 1, a decrease of 25,057,462 feet, or 5.99 per cent., according to reports just compiled by the West Coast Lumbermen's Association.

The situation of these 72 mills is believed to be typical throughout the industry in the western part of the two states. Weekly reports show that the mills are shipping more lumber than they are cutting. Production is approximately 25 per cent. below normal.

On account of the prevailing high cost of manufacturing, a number of large plants in the fir producing territory have been closed since early in the year. This accounts for the comparatively small volume of production. Meanwhile orders from retail yards have continued in about normal measure with the result that the stocks at the mills have gradually decreased.

Building Loan Report

An interesting sidelight on the stability of savings and loan associations during the war period is presented in the annual report of the Metropolitan League of Savings and Loan Associations, prepared by its secretary, Archibald W. McEwan. The report says, in part:

"During the year 1918 savings and loan associations in this section increased their assets as follows: In New York County, $418,862; Queens, $37,473; Richmond, $766,-862. Richmond still holds its record of being the banner county in the greater city—population considered—assets having reached $7,000,000, and our associations do more than any other agency in that county in providing homes for the people.

"The memory of the war is still vividly in mind, and 1917-18 will always be remembered as happy years by those mortgagors who are purchasing their homes through our associations. They saw friends and acquaintances who had mortgages become due—or, worse still, had open mortgages—worried immeasurably by notices of call, or to make substantial payments on principal, and often these unfortunates did not know which way to turn.

"In some instances persons got money from our savings and loan associations—fortunately for them—and, as usual, we gave preference to those who were saving members beforehand. The savings and loan mortgagor, however, went serenely on with his day's work, secure in the thought that his mortgage could not be called and that it was being paid off; that in a few years the 'kick' would be taken out of it and that he would own his home free and clear."

Furniture High in Great Britain Due to Lack of Imports

Liverpool is not only becoming a great shipbuilding center, but is also the center of the British lumber trade, in which the shortage has been great during the war because of the enormous demands and curtailment of importations. The American consular service states that there is now a general tendency toward a relaxation in government restrictions with reference to timber. British officials have dispensed with permits for the purchase of home-grown timber, as also for imported hardwood and ply-wood.

Largely owing to the timber shortage, the prices of furniture have risen from 100 to 200 per cent during the war, and inquiries indicate that an excellent market exists for American furniture when it can be imported.

Airplanes for Forest Fire Protection

Army airplanes and captive balloons will cover portions of the national forests of California, Arizona, New Mexico and other states this summer, to aid in detecting and suppressing forest fires, in accordance with orders from the War Department in co-operation with the U. S. Forest Service. Forestry officials believe that there is an important place for aircraft in fire protection of timberlands, but the first step must be the trying out of methods.

Army airdromes and bases will be utilized for the experiments. Some of the bases which are near the National Forests are the flying fields at San Diego, Riverside and Arcadia in Southern California, and one in New Hampshire is also advantageously placed. One of the tests to be made is the bombing of fires to put them out, and another is the transporting of fire fighters by dirigibles from which ladders can be lowered to the ground.

This summer the chief use of the ariplanes will be in detecting fires, aircraft having a great advantage over the present patrol and watch system, and the wireless will be used in reporting fires. This use for fire protection will give fliers an opportunity to train and to develop further the possibilities of aircraft.

German Forests for French Indemnity

The proposal has recently been made by M. Huffel, an official of *l'École Nationale des Eaux et Forêts*, that to prevent further cutting of the forests of France a substantial part of the German indemnity shall be paid in timber taken from the German forests, which have suffered much less than the French forests. This proposal, which is apparently meeting with favor in France, is made not so much as a matter of poetic justice as of sound economics. M. Huffel thinks that about five years would be required to carry out his program, and that it would take about 100,000,000 days' work,—that is, the labor of about 66,000 Germans for five years.

Hostess Plan at Harvard

The Hostess House, opened in connection with Harvard University, furnishes new privileges to the students. One luxury is a candy kitchen, where the undergraduates can make fudge, taffy, or whatever strikes their fancy. Another added privilege gives the students free facilities for pressing clothes. Wives of the professors, who are in charge, also sew on buttons and mend tears without remuneration. If the project is successful the Student Council will take the Hostess House in hand next year. and establish it in the Harvard Union.

Philadelphia Needs 20,000 New Houses

More than 20,000 new homes are required in this city to accommodate the great influx of workers who arrived in Philadelphia during the war and who plan to stay, according to officials of the Philadelphia Operative Builders' Association.

Conservation of Beauty

A recent convention of the Iowa Conservation Association, held at Ames, Ia., was the scene of a discussion in which the conservation of places both of natural beauty and of historic interest, as well as the establishment of state parks and the improvement of Iowa's road system were the chief features. Resolutions were passed advising the leasing of tracts. The association also supported the proposed national park at McGregor. Prof. George L. Kay, state geologist, of Iowa City, was elected president, and G. F. McDonald, professor of forestry, Iowa State College, secretary of the association.

Army Storage Buildings

Anticipating the disastrous results upon labor and industry which an abrupt cancellation of wartime contracts would precipitate, the Government has adopted the policy of accepting a certain percentage of such contracts. This has necessitated the erection of twelve temporary storage buildings, for which a contract has now been placed by the Ordnance Department of the United States Army. The buildings which are one-story structures measuring 96 by 400 feet, are wooden frame with corrugated iron sides and roof, and will be built under the direction of the Construction Division of the United States Army. The cost is estimated at about $450,000, and work will be pushed as rapidly as possible as practically all the existing storage space has already

London's Housing Reforms

One of the housing schemes receiving much favor in London is that being developed in a congested district of Southwark just bought by the Duchess of Marlborough.

Here it is proposed to erect modern tenements, with bathrooms and hot water on every floor, and a playground on the roof. A central laundry with mechanical dryers is to be located in the lower part of the building.

At present there are no tenements in London with these conveniences. Doubt has been expressed as to their popularity because of the liking of London women for detached or semi-detached houses, even though they are not modern.

Club Plans War Memorial

Secretary of War Baker, in a letter to the 17,000 members of his college fraternity, suggests an institutional memorial in honor of the members of the Phi Gamma Delta, who made the supreme sacrifice in the war. As a result of the suggestion, which has been received with enthusiasm by the members of the fraternity, there will be a national memorial building in New York City. At least $200,000 will be raised for the purpose.

Industrial Training and Foreign Trade

"It is up to American industries to learn as much from the war as have the industries of France and England"—that, in substance, is the message contained in a vest pocket bulletin entitled, "Industrial Training and Foreign Trade," recently issued by the U. S. Training Service of the Department of Labor at Washington. During the war, training conducted in the factory or shop to teach the workers the best ways of doing their tasks enabled the Allies as well as America to keep up production despite the drafting of millions of men, the bulletin explains.

In meeting the war emergency by training new workers, industry abroad and to some extent in this country, has learned an invaluable lesson for peace times, namely, that training of a similar character, but adapted to the needs of old employees as well as new, results in an immense benefit to the workers and industry. In these crucial days, when the lines of commerce and trade are being reestablished, the bulletin contends, America cannot afford to be behind foreign nations in applying this lesson.

Charles T. Clayton, Director of the Training Service, emphasizes the need of training broadly, so that the workers become more versatile as well as more highly efficient. The chief task of the Training Service is to advise manufacturers who are interested in establishing training and to provide them with suitable courses in training methods —courses worked out by study and research covering the whole field of industry.

Confer on Federal Home Loan Bank Legislation

The legislative committee of the United States League of Building and Loan Associations has decided that the proposed legislation for a system of Federal Home Loan Banks will not be submitted to the extra session of Congress. The decision is the result of a two-days' conference held in the Department of Labor Building, Washington, D. C.

K. V. Haymaker, expert on building and loan association matters, who has been working with the Department of Labor, announces that the legislative committee believes it prudent to submit the proposed bill for the creation of the Federal Home Loan Bank system to the annual convention of the Building and Loan Associations which is to be held in Detroit, Mich., in July.

E. L. Keesler, president of the United States League of Building and Loan Associations, who presided over the conference, said there was full agreement on the fundamental features of the tentative draft of the proposed bill, but members of the legislative committee hesitated to commit the league to certain details in the bill without submitting them to the national convention for discussion and approval. As this latter action can not be had in time to get action in an extra session of Congress, the building and loan interests have abandoned hope of such early action and will be prepared to make their campaign for this legislation in the next regular session of Congress.

The tentative draft of the bill provides for a Federal Home Loan Board, of five members, of which the Secretary of the Treasury is one, and the other four are to be appointed by the President of the United States with the consent of the Senate. Under the direction of this Board regional banks will be established and the membership in these will be restricted to building and loan associations. No bank may be established with less than a paid-in capital of $100,000. Whenever ten or more building associations, located in a given district, with aggregate assets of not less than $5,000,000 shall associate themselves together and comply with the requirements of the law, they may organize a district federal home loan bank.

The purpose of the Federal Home Loan Bank system is to enable building and loan associations to realize on their real estate mortgages and make more money available for loans to prospective home owners. This will be accomplished through Federal Home Loan Bank bonds, the underlying securities for which will be the real estate mortgages of the building and loan associations which are bank members. Within limitations the new system of banks would do for the home buyer of the city what the Federal Farm Loan Banks do for the farm buyers in the agricultural sections.

Price Levels Following the War

The U. S. Department of Labor, through the Information and Education Service, is issuing the results of a study of prices during the war and readjustment period made by the Division of Public Works and Construction Development. Discussing the world-wide phenomenon of rising prices accompanied by an increase of money, the report says:

"A study of the index figures of commodity prices in the United States and certain foreign countries shows that while prices have risen very considerably in this country through the war period, the rise in other countries has been greater. According to the figures of the Bureau of Labor Statistics, the wholesale prices of all commodities in September, 1918, were 107 per cent over the average for the year 1913. This was the highest figure reached in this country. The price level in Canada, according to the Canadian Labor Department, reached the high point in November, the price level then being 115 per cent over the 1913 figure. According to the figures of the *London Economist,* the price level in the United Kingdom was highest in the month of August, being at that time 133 per cent above the 1913 average. Figures on the increase of prices in France are not available for any time later than June, 1918; however, the index figure as published by the *Statistique Generale* for the month of May showed an increase of 235 per cent over the 1913 price level. Not only do the countries nearer the scene of actual warfare show greater rises in the price level, but it is also true that in these countries the prices began to rise at an earlier date than they did in the United States.

"The general rise in commodity prices was accompanied in all these countries by a considerable increase in the amount of money in circulation and in the amount of bank deposits. In this country, the average amount of money in circulation per capita in the year 1913 was $34.65. This increased to $56.23, the figure for December 1, 1918, an increase of 62 per cent. There has been a slight decrease since that time, the figure for March 1 being $53.76, which is 55 per cent above the 1913 figure. During the same time, bank deposits in the United States have increased almost three-fold. In European countries, during the war period, bank deposits more than doubled.

"Professor Irving Fisher of Yale University recently issued a statement in which the facts concerning the increase of the amount of money and of credits were brought out, and the statement was put forward that this increase was responsible for the general rise in the price level. But Professor Fisher also pointed out that it is extremely unlikely that there will be a decrease of money and credits in either this country or European countries within the next few years, and that the price level will remain permanently high as compared with the pre-war level."

Permanent Lincoln Highway Markers

The Lincoln Highway is permanently marked with enameled steel signs set on steel posts from San Francisco to Omaha, Nebraska, a distance of over 1900 miles. The Association is endeavoring to replace the old marking system of painting the Lincoln Highway insignia on the telegraph poles with these permanent steel markers as rapidly as possible, and hopes to complete the job from Omaha to Pittsburgh next year with the support of the local communities. Those sections of the route which are still marked with the painted markers will require repainting this Spring and many of the communities along the line between Omaha and New York are already taking steps to repaint the markers which have become faded from the weather.

Allen County, Indiana, has already thoroughly remarked the Lincoln Highway within its boundaries, and the other counties of that progressive state are expected to repaint their Lincoln Highway markers before the flood of early Spring touring begins.

Personal Mention

H. S. Cheney, architect, 30 North Michigan Avenue, has moved to 208 La Salle Street, Chicago.

James Walker, architect, announces the removal of his office to 1326 Prudential Building, Buffalo, N. Y.

Frank J. Forster has resumed the practice of architecture in New York City, with offices at 1730-31 Aeolian Hall.

Charles B. Deer has opened an office at Room 506, Crozer Building, Chester, Pa., for the practice of architecture.

Francis A. Ankrom, consulting and supervising engineer, has moved his offices from Douglas, Ariz., to San Antonio, Tex.

Frank Austin Hersh, architect, announces the removal of his offices to the Chamber of Commerce Building, Altoona, Pa.

J. Henry Dewitz, architect and engineer, has opened an office at 232 St. Paul Street, Baltimore, Md., and desires catalogues.

Roy Seldon Price, architect, has opened offices in the University Club Building, St. Louis, Mo., and desires catalogs and samples.

White & Harvey, architects, have opened offices at 418-419 Kampmann Building, San Antonio, Tex., and desire catalogues and samples.

W. F. Gernandt has removed to Suite 634, Keeline Building, Omaha, Neb., and will continue the practice of architecture at this new location.

Davis, McGrath & Kiessling, architects, announce the removal of their offices to 220 Fifth Avenue, at Twenty-sixth Street, New York City, on May 1.

William Platt Sutherland, Jr., has opened offices for the practice of architecture at Rooms 44-45 Exchange Building, 45 Clinton Street, Newark, N. J.

William Francis Diehl has taken over the architectural practice of the late E. N. Alger, with offices in the Robson-Prichard Building, Huntington, W. Va.

A partnership has been formed by Arthur W. Archer and Galen V. R. Lloyd for the practice of architecture in the Reliance Building, Kansas City, Mo.

George H. Carsley has moved his offices from the Power Block to the Power Block Annex, Helena, Mont., where he will continue his architectural practice.

John Hanifen has opened an office for the practice of architecture in the Tribune Building at La Salle, Ill. Strawn Aldrich Gay, who will be in charge of the office, desires manufacturers' catalogs and samples.

Frederick A. Muhlenberg announces his return from the army and the reopening of his office for architectural practice at 901 Flanders Building, Fifteenth and Walnut Streets, Philadelphia. He desires samples and catalogs.

Philander P. Scroggs, architect, having been honorably discharged from the service, has reopened offices in the Lamar Building, Augusta, Ga., for the practice of the profession and desires manufacturers' samples and catalogs.

H. M. Sohn has been mustered out of the service and is now a partner in the firm of Terwilliger & Sohn architects, with offices at 1 West Thirty-fourth Street, New York.

Ernest S. Batterson, after several months with the Government on war work, has resumed the practice of architecture, with new offices at 405 Hanselman Building, Kalamazoo, Mich. Manufacturers' samples and catalogs are desired.

Oscar N. Newstrom, architect, announces that he has completed his work with the McDougall Duluth Co., shipbuilders and engineers, and has located in temporary offices at 734 First National Soo Line Building, Minneapolis, Minn.

Morton Levy is leaving Fort McPherson, Ga., where he has been engaged as supervising engineer in the office of the constructing quartermaster, to resume civilian work in the office of Levy & Clarke, Savannah, Ga. Catalogs are desired.

William Newton Diehl, formerly of the architectural firm of Lee & Diehl, Norfolk, Va., has opened offices for the practice of his profession at 506 Law Building Newport News, Va. Manufacturers' samples and catalogs are desired.

E. R. James has received his discharge from the army as a First Lieutenant Field Artillery and has opened an office for the practice of architecture in the Dudley Building, Danville, Va. He desires manufacturers' samples and catalogs.

Theodore C. Visscher and James L. Burley announce the formation of a partnership for the practice of the profession of architecture, having moved their offices from 299 Madison Avenue to 363 Lexington Avenue, between Fortieth and Forty-first Streets, New York City.

Ernest Alan Van Vleck and Oran Winthrop Rice announce that Ernest Brooks has been admitted into partnership with them in the firm of Starrett and Van Vleck, architects, 8 West Fortieth Street, New York, and that the business will be continued by them under the present firm name.

C. E. Schermerhorn, A. I. A, having completed his work in the United States Army, announces that he has resumed the practice of architecture at 430 Walnut Street, Philadelphia. Mr. Schermerhorn's recent service has been with the Military Intelligence Section, Plant Protection Division, General Staff Corps, U. S. A.

Norman Hatton, Wm. J. Klein and S. E. Holmes announce the formation of a partnership under the name of Hatton, Klein & Holmes. Their practice will be devoted to general engineering, architecture, machinery layouts, heating and ventilating and industrial engineering. Address, Masonic Temple, Cedar Rapids, Iowa.

Rudolph E. Lee, A. I. A., of Clemson College, S. C., T. A. MacEwan of Pittsburgh, and Charlotte and A. R. Turnbull of Charlotte, N C., have opened offices at 1214 Realty Building, Charlotte, N. C., under the firm name of Lee, MacEwan & Turnbull, for the practice of architecture and engineering. A. R. Turnbull is the business manager of the firm. They will be glad to receive manufacturers' samples and catalogs.

Late News from Architectural Fields

Special Correspondence to THE AMERICAN ARCHITECT

Revise Laws to Aid Building Boom

DETROIT, MICH., May 16.—Revision of the building code calculated to expedite the great home building campaign that this city is now entering upon, is now in process of enactment. The amendments will become effective as soon as they have Governor Sleeper's signature. They include nine modifications which, it is believed, will go far to relax rigid restrictions heretofore enforced chiefly as safeguards to public health. They will allow the commissioner of public safety much wider discretion than the law has given him in the past.

Lumber Production in 1918

WASHINGTON, D. C., May 19.—Recent tables compiled by the U. S. Forest Service show that the State of Washington, with a record of more than three and a quarter billion feet of lumber cut in 1918, Oregon with two billion feet cut, and Louisiana with a cut of more than a billion and a half feet, are still the great lumber producing States of the country, with Mississippi, California and Nevada, Wisconsin, Arkansas, Texas and Idaho each cutting more than a half a billion feet.

A total lumber production of 32,760,000,000 feet is the estimated cut for the year 1918 on the basis of partial returns received by the Forest Service from 731 sawmills, each of which cut 5,000,000 or more feet in the years 1917 or 1918.

In 1917, the total production amounted to 36 billion feet. The decrease in 1918 is not confined to any one region but is general. It is largest in the Southern and Eastern States and least in the Western States. Maine shows the greatest per cent of decrease.

Propose Memorial Armory for Washington

WASHINGTON, D. C., May 19.—An item of the public buildings bill now being drafted for the special session of Congress will be an appropriation for a million dollar memorial armory in Washington. A unique style of architecture, an entrance in the form of an arch of triumph, has been proposed by Representative John W. Langley of Kentucky, chairman of the House committee on public buildings and grounds.

Mr. Langley proposes to have architects submit their plans provided the project is approved by Congress, embodying his idea that the memorial should be of utilitarian value in addition to its artistic merit. The nation's capital has no arch of triumph. It is pointed out that European capitals have magnificent structures on the main highways.

The chairmanship of this important Congressional committee gives Mr. Langley great power in securing favorable designs for the proposed memorial armory. The fact that the new chairman has been a staunch advocate of improvements in public buildings and grounds for many years, gives more probability to the proposal. He has suggested making the armory a club for all soldiers visiting the capital. The armory would be a monument to the valor of District of Columbia soldiers. Civic organizations have expressed approval of the plan and it is confidently expected that Chairman Langley's influence will push the measure through the extra session.

Receive Appeal for Draughtsmen

WASHINGTON, D. C., May 19.—The Washington Chapter, American Institute of Architects, has received several appeals from architects in neighboring states for draughtsmen. Salary advances have not proved sufficient inducement to these men.

It is generally reported that increased building work this spring has exhausted the supply. Shortage of architectural draughtsmen in the Middle West has proved a serious factor in construction as many contracts were forfeited by architects who could not meet the demand owing to the lack of draughtsmen. Statistics given out by the Department of Labor recently show that the present salary of competent draughtsmen is from $45 to $75 a week.

Housing Problem Gets More Serious

MEDIA, PA., May 19.—So serious is the housing problem becoming in Delaware County that steps must be taken at once local authorities say, either by some strong civic organization or by the Government to alleviate the conditions which make it utterly impossible for many persons in many sections of the county to get homes.

Five-Day Week Is Plan of Builders

SEATTLE, WASH., May 17.—A five-day week now prevails in the building industry in this city, the action of the Building Trades Council, representing about 6,000 workers, having been put into effect. Similar action is expected soon in Tacoma.

According to Mr. Cotterill, the Council's secretary, the step is taken to insure employment for returned soldiers and sailors. By the five-day instead of the five-and-a-half-day week he said the Council expects to carry the building industry through normal conditions in 1919 and 1920 without any cases of unemployment.

"The change is not expected to disturb the building industry," said Mr. Cotterill. "To the contrary, we are certain that in many cases builders will find it more desirable to do away with the four hours' work on Saturday."

Trades affected by the order include building laborers, building and structural ironworkers and piledrivers, asbestos workers inside and outside electrical workers, plumbers and steamfitters, elevator constructors, lathers, plasterers, painters, bricklayers, hoisting engineers and roofers. Plasterers, lathers and painters already have the five-day week.

Next Congress to Take Up World's Exposition Plan

WASHINGTON, D. C., May 19.—The plan for a permanent world's exposition in Washington, a subject much discussed by architects, will be submitted to the extra session of Congress for approval and aid. Original plans called for the development of the national capital through the erection and maintenance of forty-eight individual State buildings containing expositions of the natural, educational and industrial resources.

Widening the scope to include all nations blots out, in many respects, the nationalism of the plan as proposed. Supporters of the movement point to the remarkable success of the Pacific Exposition as an example of the manifold benefits and the feasibility of the proposed exposition. The main objective of the proponents is to make Washington, from an architectural standpoint, the most beautiful city in the world and a real world capital.

It is proposed to have every representative government erect and maintain buildings in Washington. The world's leading architects will be requested to submit plans to their respective governments for approval. These tentative designs will be passed upon by the Fine Arts Commission, which reviews all proposed plans for Washington buildings and by similar commissions from other countries or a joint commission. Each country will be asked to send commissions here to study the situation and report to various architectural and governmental organizations.

Such a prodigious undertaking as proposed would require several years to complete and the expenditure of millions of dollars. As an inducement to other nations, the States' exhibit committee has announced its intention to take up the plan for forty-eight separate buildings before extending the movement across seas. Col. Robert N. Harper, of Washington, D. C., chairman, has issued a call for a committee meeting next week. The plan has the official endorsement of several governors who have promised to secure legislative action in their respective states.

In each state, a campaign will be waged for an appropriation which will permit the construction and maintenance of a building here. It is proposed to have these buildings designed by architects in each state, constructed from material produced in the locality and built by representative labor. Each building will be pre-eminently an architectural triumph reflecting the spirit of the individual states.

The legislators and people will be told that such a building will afford extensive advertising for the state's products. It will be one of the chief arguments of the advocates in their appeals to the business interests of the country.

The initial costs of the nation-wide campaign are estimated at $500,000, the greater share of which is to be donated by Washington business organizations and civic associations for the purpose of inaugurating the national plan. The custom following world fairs, that is, completely dismantling magnificent structures at a cost of millions, would be abolished through the proposed scheme of continual national or international expositions.

The Washington Chapter, American Institute of Architects has endorsed the proposal. The States' exhibit committee, hopes to secure the approval of all architectural associations and list the members in a co-operative effort for adequate legislation.

Real estate men here have evinced the liveliest interest in the proceedings. Careful analysis of the proposal shows that the largest industries of the world would establish offices here; many new hotels would be required to house the constantly increasing throngs of visitors, convention hall would become a necessity and a general increase in all forms of construction could be expected.

Congressional action is necessary to obtain land in the District of Columbia. To this end, a campaign will be conducted in the Senate and House at the coming session.

Start Building Plans to Last Ten Years

ST. PAUL, MINN., May 17.—Ground has been broken on the University of Minnesota campus for a new administration building, a store house and shops, which marked the opening of a great building program. For the next ten years it is expected that there will be only a few days which will not echo with the sound of hammering and riveting.

By 1930 the building plan of Cass Gilbert will be well in evidence on the new campus. Many of the buildings now on the campus will be torn down, or moved, as they mar the possibilities of the mall. The plan advocated by President Burton is for a series of quadrangular dormitories, each to take up an entire block, with an inner rectangular court. These would be located on a strip five blocks long.

Roof Landing for Planes

Ground for Brooklyn's new building, with an airplane roof landing has been broken. It will cover a plot 175x175, and the platform landing will extend as a spur several feet beyond the edge of the roof.

New Orleans Builders Foresee Skyscraper Age

NEW ORLEANS, LA., May 16.—Skyscrapers in abundance, many modern residences in one of the greatest building periods of the city, the construction of homes in the old segregated district, and a great sea wall along the lake front were predictions for New Orleans by speakers at a meeting of the Allied Building Council and the General Contractors' Association just held at the Grunewald Hotel.

Brooklyn Industrial Exhibit

In accordance with the plans outlined in THE AMERICAN ARCHITECT on April 30, the Brooklyn Chapter of the American Institute of Architects joined with the Engineers' Club in an industrial exhibit extending over two weeks. The exhibit was well attended, and those passing up and down the long aisles, in addition to being shown the best methods of lighting, heating, painting and roofing a building, also saw artistic designs and models of buildings proposed or already constructed.

In this way, the progressive men in the Brooklyn Chapter are endeavoring to stimulate the demand for architectural service by such effective means as are at their disposal, and are laboring to create a greater appreciation of the value of well-planned buildings. Let us hope that this foreshadows a closer co-operation between art and commerce, to the end that the great structures which house industry shall become more aesthetic in appearance, and add to the artistic dignity of the communities in which they are located.

Return of "Open" Market Aids Construction

DECLARING that inasmuch as the Industries Board has failed in its attempt to stabilize the price of steel and that in all probability there will be no further effort by the Government to fix the price on other building materials, architects and builders this week expressed the opinion that with a return to an "open" market and the revival of the law of supply and demand, construction is now ready to be speeded up with an impetus the like of which has not been seen in years. They feel that this indicates manufacturers must get what they may for their commodities. Whether purchasers will have to pay higher prices than they would if the Government's effort in fixing a temporary schedule of values had been successful, remains to be seen.

It is generally believed in architectural and building circles that in a large percentage of materials, prices cannot recede without a reduction in wages. It is not probable that leaders in industry will consent to a wage cut at the present time. In the steel market, where factories are working at approximately 60 per cent of capacity, the Railroad Administration's call for bids on 200,000 tons of rails to supply approximately 10 per cent of an estimated demand, is the first indication of large orders that are to follow. The building industry is closely watching developments in this phase of the situation, and what an "open" market, with the removal of Federal restraint, will accomplish. It is expected it will make a very active construction market.

A noteworthy feature of the week's activity in New York building material markets was the entry into trade of leading brick interests, purchasing heavily for future needs at $15 per thousand wholesale on common brick, with higher prices for better grades. Sharp advances were noted by architects in Italian marbles, a quotation of $8 a foot for seconds being obtained. No black and gold Italian marble could be had, but a liberal supply of domestic marble at nominal figures was to be had. Lack of labor in the quarry districts of Italy was given as the reason for the shortage of this imported commodity.

In making a nation-wide survey of building conditions, the U. S. Department of Labor recently sent out questionnaires to several thousand building and loan associations. These questionnaires covered inquiries concerning assets, the average amount of loans made each year, applications for 1919, the possibility of increasing demands for loans and opinions concerning the proposed system of Federal Home Loan Banks.

Returns disclosed that more than forty per cent of the building associations have not sufficient available funds to meet the desirable applications for loans that are coming in as a result of the shortage of houses and the general revival of construction activities. While the building associations of the country are reported on a sound financial basis their present difficulties are due to the facts that they have enormous investments and that the long time mortgages representing large amounts are not negotiable at commercial banks.

The movement to establish Federal Home Loan Banks is approved by a majority of the Associations that returned answers to the questionnaire. Out of 1200 thus far received less than 10 per cent of the Associations represented are opposed to the plan. An answer that is typical of the attitude of Associations that are financially independent came from the West. "Our organization does not need a Federal Home Loan Bank system at this time," writes the secretary, "but it will be helpful to those who do and the time may come when we shall be glad to take advantage of it."

According to recent estimates made by the Division of Public Works and Construction Development, of the Department's Information and Education Service, there are now in the United States 7269 building and loan associations with paid-in capital stock amounting to $1,503,770,848, the investment in building association stock having increased last year $145,000,000. Available statistics show that the normal requirements of the building and loan associations before the war called for loanable funds amounting to approximately $500,000,000 per annum, which could be supplied by the savings departments of these organizations. The solution of the problem of how to supplement the ordinary income of the building and loan associations in places where the demand for small mortgage loans might be greatly in excess of the supply of money is now sought in the Federal Home Loan Banks. In view of the shortage of houses estimated at something like 1,000,000, the demands on building and loan associations are likely to be heavier than ever before. Increase in building operations for April were so marked that the business of the associations in certain parts of the country was reported to be of unusual volume.

CHICAGO, ILL., May 19.—Building material dealers are cutting prices, each trying to undersell the other fellow to get the business. Architects are employing draughtsmen and other additional office help. Few, if any, bricklayers or carpenters are walking the streets in search of work. Commissioner of Public Works Charles R. Francis announces that 3000 additional men will be put to work on the new Pennsylvania terminal within thirty days. Joseph E. Otis, vice-president of the Central Trust Company, says there has been a complete reversal of the feeling over the business and financial outlook, and that optimism is now generally prevalent.

Those are but few evidences of increased activities in building and construction projects in this city. It is the actual starting of post-war building, first the remodeling of old structures and the construction of bungalows and cottage homes, and now the issuance of permits and the breaking of ground for apartments and factory plants, that is stimulating many lines of business and making readjustment from war to a peace basis possible.

Statistics compiled by the Chicago Masons' & Builders' Association show permits issued during April for buildings to cost $7,447,800, as compared with costs totaling $2,757,900 for the same month last year. The permits issued in April were for 140 frame and 565 brick structures. Included in these is an eight-story hotel to cost $300,000; a three-story apartment to cost $110,000; another to cost $125,000; two churches at costs aggregating $35,000; also a $200,000 flat building, and several factory structures, one a three-story concrete manufacturing plant for the Hydrox Company at a cost of $175,000. In all the outlying sections there is activity in small home building at costs averaging $7,000 and less.

Steel and other metal products are moving into this construction at prices based on the break following the signing of the armistice. Common brick still holds at $12 per M, while competition based largely on supply and demand is a factor in the selling prices for cement, lumber and some of the other basic materials. In the aggregate, however, there is but little change during the week in price levels.

Late Quotations in Building Material Markets

(Price quotations now current on building materials and supplies as quoted by dealers and jobbers for delivery in New York and Chicago follow. The quotations set forth are placed before readers of THE AMERICAN ARCHITECT to afford an accurate review of market conditions rather than for use as a basis for actual purchase. They will not only provide knowledge of the exact state of the market as to items quoted, but will also present a basis to judge conditions as affecting co-relating materials. Items marked (*) indicate an advance over last week, while those marked (†) record a decline. Other prices did not fluctuate during the week.)

BRICK

	New York	Chicago
Common (Delivered at job in Borough of Manhattan only), per thousand	$17.85	$13.00

CEMENT

Per bbl. in 15 cent bags (Rebate 60c. per bbl. for bags)	$3.25	$2.80

COPPER SHEETS

At the mill, hot rolled, 16 oz. base-price, per lb. (From jobber's warehouse add 2 to 3 cents. Cold rolled add 1c. per lb. to hot rolled.)	22½c.	22½c.

GALVANIZED SHEETS

Nos. 18 and 20 gauge, per lb	$6.12	$6.12
No. 26	6.42	6.42
No. 27	6.57	6.57

GLASS

(Discounts from manufacturer's price lists)

Single strength, A quality, first three brackets	77%†	77%
Single strength, B quality	77%†	77%
Double strength, A quality	79%†	79%
Double strength, B quality	81%†	81%
Plate—up to 5 sq. ft.	82%	....
Plate—over 5 sq. ft.	84%	....
Plate—up to 10 sq. ft.	...	83%
Plate—over 10 sq. ft.	...	82%

GRAVEL

1¼ in. (Borough of Manhattan only), per cu. yd.	$2.75	$2.35†
¾ in. (Borough of Manhattan only), per cu. yd.	2.75	2.35†

GYPSUM

Plaster Board: Delivered at job, Boroughs of Manhattan and Bronx.		
27 x 28 x 1	35c.	....
27 x 48 x ½	30c.	....
32 x 36 x ¼	21c.	25c.
32 x 36 x ⅜	21c.	26c.
32 x 36 x ½	23½c.	....
Plaster Blocks: Delivered at job, Boroughs of Manhattan and Bronx.		
2 in. solid, per sq. ft.	7½c.	....
3 in. solid, 12 x 30, per sq. ft.	10½c.	....
3 in. hollow	10½c.	10c.
4 in. hollow	12½c.	11c.
6 in. hollow	17½c.	....

HOLLOW TILE

(Delivered at job, in New York below 72nd St.)

2 x 8 x 12 partitions, per 1,000 sq. ft.	$70.15	....
3 x 12 x 12 partitions, per 1,000 sq. ft.	102.00	$67.90
4 x 12 x 12 partitions, per 1,000 sq. ft.	114.75	72.50
6 x 12 x 12 partitions, per 1,000 sq. ft.	153.00	99.60
8 x 12 x 12 partitions, per 1,000 sq. ft.	....	135.80
10 x 12 x 12 partitions, per 1,000 sq. ft.	....	167.50
12 x 12 x 12 partitions, per 1,000 sq. ft.	....	194.60
2 x 12 x 12 split furring, per 1,000 sq. ft.	63.75	....

LATH

Eastern spruce, per thousand	$6.50	....
No. 1 white pine, per thousand	....	$6.50
No. 1 hemlock, per thousand	....	6.00
No. 1 yellow pine, per thousand	6.20*	5.25

LIME

Common, 300 lb. bbls., per bbl.	$2.50†	$1.40
Finishing, 300 lb. bbls., per bbl.	3.70	....
Hydrated, in paper bags, per ton	17.25	17.00!

LUMBER

(Retail prices per M, F.O.B.)

Yellow pine, 2 x 4	$51.50*	$47.00
Yellow pine, 2 x 6	48.00*	45.00
Yellow pine, 4 x 4	58.50*	52.00
Yellow pine, 8 x 8	67.50*	52.00
Yellow pine, 12 x 12	55.00*	57.00
Yellow pine, No. 1 boards, 1 x 6	58.25*	53.00
Yellow pine, No. 1 boards, 1 x 12	60.50*	56.00
Yellow pine, B and better flooring (plain)	60.50*	57.00
Yellow pine, B and better flooring (quartered)	72.50*	70.00
Douglas fir, 6 x 6 to 12 x 12	62.50	63.00
Douglas fir, 12 x 14 to 14 x 14	....	64.00
Norway pine, 2 x 4	60.00	50.00
Norway pine, 2 x 12	65.00	57.00
Hemlock, 2 x 4	47.50	46.00
Hemlock, 2 x 12	51.00	48.00
Oak flooring, 13/16 quartered white	139.50*	122.00
Oak flooring, 13/16 quartered red	132.00*	115.00
Oak flooring, 13/16 plain white	89.50*	82.00
Oak flooring, 13/16 plain red	89.50*	82.00
Maple flooring, 13/16 clear	82.00*	72.00
Maple flooring, 13/16 select	77.00*	69.00
Maple flooring, 13/16 No. 1 fancy	69.50*	58.00
Mahogany, 1" F. A. S.	300.00	300.00
Quartered oak, 1" F. A. S.	180.00	135.00
Plain oak, 1" F. A. S.	120.00	100.00
Red gum, 1" F. A. S.	87.00	70.00
Sap gum, 1" F. A. S.	56.00	60.00
Chestnut, 1" F. A. S.	87.50	75.00
Poplar, 1" F. A. S.	130.00	100.00
Birch, 1" F. A. S.	70.00	65.00
Spruce, random 2"	52.00	50.00
Spruce, wide	62.50	60.00

LEAD

American pig, per lb.	5½ to 6	5½ to 6
Bar, per lb.	7½ to 8	6 to 6½

METAL LATH

Under 100 sq. yd., per sq. yd.	40c.	40c.

PAINTS, OILS, ETC.

	New York	Chicago
Leads:		
American white, in oil, kegs; lots over 100 lbs.	14c.	14c.
White, in oil, 25-lb. tin pails; add to keg price.	¼c.	¼c.
Red, bbl., ½ bbl. and kegs; lots over 100 lbs.	14½c.	14½c.
Dry Colors:		
Red Venetian, American, per 100 lbs.	$2.75 to $5.00	$2.00 to $5.00
Metallic Paints:		
Brown, per ton	24.00 to 32.00	24.00 to 32.00
Red, per ton	24.00 to 30.00	24.00 to 32.00

PIPE

Cast iron:		
6 in. and heavier	$57.70	$56.80
4 in.	60.70	59.80
3 in.	67.70	66.80

(and $1 additional for Class A and gas pipe.)

(Discounts to jobbers for carload lots on the Pittsburgh basing card; freight rates from Pittsburgh to New York, and also from Pittsburgh to Chicago, in carloads, per 100 lbs., are 27c.)

Wrought:		
Butt Weld		
Steel:		
Black, ⅛ to 3 in.	50½%	57½%
Galv., ⅛ to 3 in.	24 %	41 %
Iron:		
Black, ⅛ to 1½ in.	29½ to 39 %	39½%
Galv., ⅛ to 1½ in.	2½ to 23½%	23½%
Lap Weld		
Steel:		
Black, 2½ to 6 in.	53½%	53½%
Galv., ⅛ to 3 in.	41 %	41 %
Iron:		
Black, 2½ to 6 in.	34½%	34½%
Galv., 2½ to 6 in.	21½%	21 %

PLASTER

Neat wall cement in 15 cent bags, per ton	$20.30	$18.50
Finishing plaster	24.00	21.00

RADIATION

(A further discount, effective April 4, of 15% on direct radiators, 12½% on wall radiators, and 10% on steam and hot water boilers is announced. This approximates a drop of 36% on radiators and 33% on boilers from prices in effect before the 1st of January, 1919.)

Chicago reports a 57% discount on standard heights.

SLATE ROOFING

Pennsylvania:	F.O.B. cars, Quarry Station	F.O.B. Chicago
Best Bangor	$7.75 to $9.00	$10.20 to $11.45
No. 1 Bangor Ribbon	6.75 to 7.25	9.20 to 9.70
Pen Argyl	7.25 to 8.00	9.70 to 10.45
Peach Bottom	10.00 to 12.50	12.45 to 14.45
No. 1 Chapman	7.25 to 8.25	8.70 to 9.95
Vermont:		
No. 1 Sea Green	3.50 to 6.75	5.95 to 9.20
Unfading Green	5.50 to 9.25	8.30 to 11.05
Red	12.00 to 20.00	14.80 to 22.80
Maine:		
Brownsville, U'f'g Black, No. 1	11.00 to 12.00	14.10 to 15.10
Slaters felt, 30 lb. roll	1.75	.....
Slaters felt, 40 lb. roll	2.25	.....

ROOFING MATERIAL

Tarred Paper:		
1-Ply, per ton, per roll, 108 sq. ft.	$63.00 to $65.00	$65.00
2-Ply	95c.	95c.
3-Ply	1.23 to 1.30	1.30
Rosin sized sheathing	per ton 60.00	60.00

Corrugated roofing, galvanized, 2½ in. corrugation, over flat sheets, 30c. per 100 lbs.

SHINGLES

Red cedar, 5 to 2, clear, per thousand	$8.25*	$6.50
White cedar, extra star, A star, per thousand	7.20*	5.50

STRUCTURAL STEEL

Beams and channel, 3 to 15 in., per lb.	2.45c.	3.47c.
Beams and channel, over 15 in., per lb.	2.45c.	3.57c.
Angles, 3 to 6 in.	2.45c.	3.47c.
Zees and tees	2.45c.	3.47c.
Steel bars, half extras, from mill	2.35c.	3.47c.

REINFORCING BARS

High carbon steel from mill	$48.50	$49.50
Medium steel from mill	48.50	49.50

SAND

Mason, per cu. yd.	$1.80	$2.25
Torpedo, per cu. yd.	1.80	2.35

Financial and Commercial Digest

As Affecting the Practice of Architecture

Prices, Yesterday, Today, and Tomorrow*

The chief causes of the world advance in prices appear to be the inflation of world currency, coupled with the "scarcity demand" and the consequent advance in labor costs. The prospect of material reductions in the near future depends upon the removal or modification of the chief causes of the advance.

When prices began to advance in the opening of the war, we could readily see that the upward movement was due to the urgent demand for the food and raw material required by the enormous armies put into the field, and this cause has been designated the "scarcity demand," but when we found the advance extending to many articles in which there was no scarcity and which were not used by the armies or utilized in the manufacture of their requirements, we began to realize that a part of the advance must be due to some cause other than mere war or scarcity demands.

Much of the material used in preparing the supplies for the battlefield was "switched" from the usual lines of industry, for there was an immediate cessation of railway construction, building operation, and a thousand industries which formerly required manufacturing material and as a result of this cessation of activities the material formerly used by them became available for war purposes.

The chief causes of the advance seem to have been first the "scarcity demand" for war materials, food, clothing, manufactures, manufacturing materials and the labor required for their prompt production but this was quickly followed by an enormous world inflation, in which paper money with a face value of $36,000,000,000 was emitted by the printing presses of the countries at war, and the legal tender circulating medium of the world was thus advanced from $15,000,000,000 in 1913 to over $45,000,000,000 in 1918, most of the gold formerly in circulation passing into the vaults of the governments and their great banks as a partial basis for this greatly enlarged paper currency.

Other principal causes of the advance in prices during the war besides "scarcity demand" were the advance in wages, presumably due to increased cost of living, and demand for labor and also the large increase in world circulating media, or to put it in a single word "inflation." Professor A. C. Miller, member of the Federal Reserve Board, an authority whose views are entitled to high consideration, in a recent address before the American Academy of Political and Social Science named as the two chief causes of the advance in prices, "scarcity demand" and "inflation," adding that "there is so much evidence of an artificial abundance of money in comparison with the things that are purchasable by it that the abundance of money must be credited with at least an equal influence in explaining the high prices which have prevailed."

The "scarcity demand" still continues in everything except war supplies and even in that line is not entirely ended, since there are about 15,000,000 men still under arms. The demand for food is as insistent as ever, owing to the disordered state of the population of Central Europe and the impoverished condition of the neglected soils of all that continent, while the factories and empty shelves of all the world are clamoring for new supplies which ran low, during the war period.

The face value of the paper currency issued in the four years of the war was greater than the value of all the gold and all the silver mined in all the world since the discovery of America. We had been inclined to charge up the advance in prices occurring *prior* to the war to the fact that 8 billion dollars worth of gold was turned out by the mines of the world in the twenty years following our famous gold and silver campaign of 1896. But here are 36 billion dollars worth of paper promises to pay turned out as legal tender money by 15 responsible governments in a short four-year period.

If we are right in assuming that a considerable proportion of the world advance in prices is due to the enormous increase in world currency can we expect a marked reduction in prices until the cause, "inflation," is removed? Or, to put it in another form, that part of the advance caused by inflation can only be cured by deflation, by a reduction in the enormous stocks of currency which, as I have shown you, has trebled during the war, while that other form of slowly moving currency, governmental obligations, has quintupled.

As to a material reduction of the inflated currency, the prospects for the near future do not seem encouraging in view of the fact that the 1919-20 "budgets" of the principal countries of the world now being made up, call for fully four times as much money as those of the year preceding the war, suggesting that the governmental demands in the first peace year after the war, will be about $50,000,000,000 as against about $12,000,000,000 in 1913, and that the governments which must quadruple their demands upon their tax payers and prepare for a reduction of their debts will hesitate about reducing the amount of money in circulation.

If the governments which have been the chief participants in the world increase of currency should fail to materially reduce that excessive supply, and if the world's demand for food, manufacturing material and manufactures is to continue at the present rate, are we justified in expecting a general reduction in prices in the near future? The question answers itself. There will, of course, be instances in which there will be material reductions, but in general terms the outlook for marked or rapid decline, at least in the near future, does not seem encouraging.

*Excerpts from an address delivered by O. P. Austin, statistician of the National City Bank of New York before the Editorial Conference of the New York Business Publishers Association.

Department of Architectural Engineering

Correct Proportioning of Concrete Mixes

THE importance of concrete as a building material may be judged from the fact that during the year 1900 a total of 10,000,000 barrels of Portland cement were used in this country; during 1910 a total of 75,000,000 barrels, and it is estimated that, in the first year following resumption of building activity a total of approximately 100,000,000 barrels will be used.

Reinforced concrete floor arches in skeleton steel structures are the rule rather than the exception to-day, and one does not travel far by rail before the growth of the reinforced concrete industrial building impresses itself upon the mind. While concrete is one of the most ancient of building materials, having been used by the Romans in early times, it is also one of the most modern. This may seem a paradox, but it is nevertheless true.

Concrete, as used in modern construction, is composed of three materials. First and generally considered of prime importance is the cement. Great care is taken in specifying its qualities, characteristics, etc., and this is as it should be. Next in order comes the aggregate, usually divided into fine and coarse, the fine taking the form of sand or stone screenings, and the coarse consisting of gravel, crushed stone or slag, and sometimes anthracite cinders. Finally and most neglected of all, so far as any definite specification of its quality or quantity is concerned, is the water.

Each of these component parts has a certain importance, and the final concrete will have characteristics reflecting the care with which all were chosen, proportioned, mixed and placed. It is the purpose of this article to focus attention on the importance of designing a proper mixture. Such design is, or should be, a subject of vital interest to all architects, engineers and constructors who have to do with concrete work, and all such are indebted to Professor Duff A. Abrams, in charge of the Structural Materials Research Laboratory, Lewis Institute, Chicago, for the contribution he has just made on this subject.* This is not the first contribution by Professor Abrams, throwing light on this subject, nor, we hope, will it be the last, but might be considered in the nature of a progress report, embodying data too important to withhold, and giving promise of further interesting information in the near future. The problem involved in the design of a concrete mix is catechised as follows:

1. What mix is necessary to produce concrete of proper strength for a given work?
2. With given materials what proportions will give the best concrete at minimum cost?
3. With different lots of materials of different characteristics which is best suited for the purpose?
4. What is the effect on strength of concrete from changes in mix, consistency or size and grading of aggregate?

This is a problem daily confronting the architect, and in justice to his client he should be able to solve it intelligently.

At the present time, the most generally advocated methods of proportioning a concrete mix are:

1. Arbitrary selection—such as a 1:2:4 mix, ignoring all other factors. Many building codes erroneously make this the basis in determining the permissible stresses in concrete.
2. Density of aggregates, the assumption being that in securing an aggregate of maximum density the resultant concrete has a greater strength.
3. Density of concrete, many believing that the strength of concrete increases with the density.
4. Sieve analysis, the aggregate being carefully graded to conform to some standard, considered as giving the best results.
5. Surface area of aggregates.

Professor Abrams goes on to say of these methods:

"It is a matter of common experience that the method of arbitrary selection in which fixed quan-

*Published in Bulletin 1. Structural Materials Research Laboratory, Lewis Institute, Chicago, April, 1919. The data in this article is taken from this bulletin.

tities of fine and coarse aggregates are mixed without regard to the size and grading of the individual materials, is far from satisfactory. Our experiments have shown that the other methods mentioned above are also subject to serious limitations. We have found that the maximum strength of concrete does not depend on either an aggregate of maximum density or a concrete of maximum density, and that the methods which have been suggested for proportioning concrete by sieve analysis of aggregates are based on an erroneous theory. All of the methods of proportioning concrete which have been proposed in the past have failed to give proper attention to the water content of the mix. Our experimental work has emphasized the importance of the water in concrete mixtures, and shown that the water is, in fact, *the most important ingredient,* since very small variations in water content produce more important variations in the strength and other properties of concrete than similar changes in the other ingredients.

NEW STUDIES OF CONCRETE MIXTURES

During the past three years a large number of investigations have been under way at the Structural Materials Research Laboratory, Lewis Institute, Chicago, which throw considerable new light on the subject of proportioning concrete. These investigations are being carried out through the co-operation of the Institute and the Portland Cement Association. These studies have covered an investigation of the inter-relation of the following factors:

1. The consistency (quantity of mixing water).
2. The size and grading of aggregates.
3. The mix (proportion of cement).

Any comprehensive study of proportioning concrete must take into account all of these factors.

During this period about 50,000 tests have been carried out which have a bearing on this subject. These tests have been largely confined to compression tests of concrete and mortars. These investigations have given us a new insight into the factors which underlie the correct proportioning of concrete mixtures and show the limitations of older methods. Certain phases of these investigations are still under way.

RELATION OF WATER CONTENT TO STRENGTH OF CONCRETE

Probably the most salient feature of these tests is the importance which the quantity of mixing water has on the ultimate strength of the concrete.

In the "Concrete Engineers' Handbook" by Hool and Johnson (recently reviewed in these columns) the following appears on page 72:

"Unfortunately, little is definitely known at the present time as to the proper proportions of water. It is known, however, that the quantity depends both upon the demands of the cement and also upon the character of aggregate employed, upon the surfaces to be covered, and the voids to be filled. Research has been recently directed to these lines with highly important results."

The following diagram (Fig. 1) shows with startling clearness what effect a variation of the water content has on the strength of concrete, and this smooth curve obtained from platting the results of many tests made with variations of mix, ranging from neat cement to one volume of cement to 15 volumes of aggregate, gives us an entirely new conception of the function of the constituent materials entering into a concrete mix. It will be noted that neither the size and grading of the aggregate nor the quantity of cement are of importance in increasing the strength of the concrete except as they produce in the mix qualities influencing the quantity of water required to produce a "workable" or plastic mix.

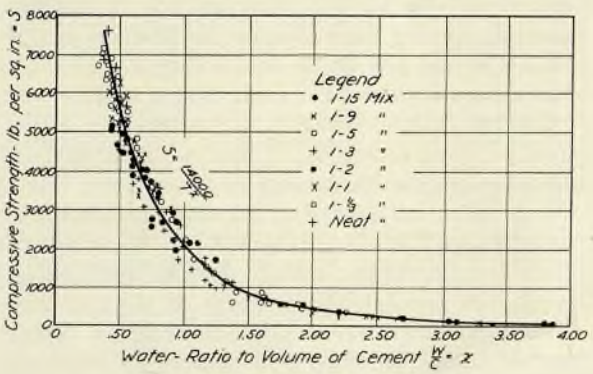


Fig. 1. Relation between strength of concrete and water content.

While the exceptionally high strengths obtained with low water ratios are enviable, they are not possible of duplication under present construction methods, as a mix having a volume of water less than from 75 per cent to 100 per cent the volume of cement (that is a water ratio less than from .75 to 1.00) would be too dry to be *workable.*

It is interesting to note the following statement:

"Other tests made in this laboratory have shown that the character of the aggregate makes little difference so long as it is clean and not structurally deficient."

In connection with the water content, it must be constantly borne in mind that in the richer mixes a *workable mix* can always be produced with a lower water-ratio than in the leaner mixes. Take, for instance, a rich mix as 1:2:3, sometimes used

in reinforced concrete construction, and assume a water-ratio of one (relative consistency approximately 1.30).

This is graphically illustrated by Fig. 2, page 724.

Now compare with this a lean mix as 1:4:8 and having the same water content (consistency approximately 0.70), graphically illustrated by Fig. 3.

A glance will show that 7½ gallons of water mixed with this latter quantity of material will *not* produce a *workable mix;* in other words, while the water-ratio is the same in both cases, namely, one volume of water to an equal volume of cement, the consistency of the resultant concrete differs widely. Table 1 is of interest with respect to the variations of water ratio, consistency and strength.

TABLE 1

EXAMPLE OF INFLUENCE OF QUANTITY OF MIXING WATER ON THE STRENGTH OF CONCRETE

Values calculated from equation

$$S = \frac{A}{B^x} = \frac{14{,}000}{8.2^x}$$

Where S = Compressive strength of concrete (lb per sq. in.)

x = Water-ratio (an exponent).

A and B are constants whose values depend on quantity of cement and other conditions of the test. The values gives for A and B are based on 28-day tests of 1:4 mix, pebble aggregate graded 0-1¼-in., fineness modulus 5.75.

The water-ratio is equivalent to the cubic feet of water to 1 sack (1 cu. ft.) of cement.

The strength values are *solely for comparative purposes* in showing the influence of changing the water content.

Water in a 1-Bag Batch		Relative Consistency, per Cent	Compressive Strength of Concrete at 28 Days	
Gallons	Water-Ratio (x)		Lb. per Sq. In. (S)	Relative Strength per Cent
5.75	.77	100	2770	100
6.0	.80	104	2600	94
6.25	.84	109	2400	87
6.5	.87	113	2250	81
7.0	.94	122	1950	70
7.5	1.01	131	1670	60
8.0	1.07	139	1470	53
9.0	1.21	157	1100	40
10.0	1.34	174	830	30
12.0	1.60	208	480	17
15.0	2.00	260	200	7

In order to obtain definitely the quantity of water required in a given mix under specified conditions, Table 5 is given on page 730. This table is of interest when we consider that it has been found that a given water-ratio corresponds to constant concrete strength regardless of the combination of mix, consistency or grading of aggregate which may be used, so long as we have a workable concrete.

RELATION OF GRADING OF AGGREGATES TO STRENGTH OF CONCRETE

The next question of importance discussed by Professor Abrams relates to the grading of the aggregate. The terms "fine aggregate" and "coarse aggregate" are not used, the term aggregate covering both and the outer limits of gradation specified for each test sample. As the tests and investigations brought to light new matter it became necessary to extend the nomenclature used in connection with concrete construction, and the term "Fineness Modulus of Aggregates" has been coined, to supply a need in this respect. Before an intelligent understanding can be had of the results of these tests, it is necessary to comprehend clearly just what is meant by this new term.

Practically all aggregate for concrete used in building construction work is included within the limits of a 100 mesh screen (clear opening of mesh approximately 6/1000 of an inch square) and a 1½ inch screen (clear opening of mesh 1.5 inch square), although under certain conditions coarser material is sometimes used. For the purpose of grading aggregate, the Tyler standard sieves (embracing 9 sizes) were used, each sieve having a *clear opening* just double that of the preceding one. The *fineness modulus* of an aggregate is defined as "the sum of the percentages given by the sieve analysis, divided by 100." This may be a little difficult to grasp immediately, as it is an abstract number, and a graphical representation of the sieve analysis of two grades of aggregate is given by Figs. 4 and 4A, page 724, in order to illustrate this value. Let us suppose that a certain quantity of aggregate, represented as 100 per cent is placed on the finest sieve of the set. A certain percentage may pass through, and the balance is retained on the sieve. Now let the same quantity (the entire 100 per cent) be placed on the next larger size sieve. A greater quantity will pass through and a smaller quantity will be retained. Let this process be repeated over the entire set of 9 sieves and the percentages *retained* tabulated. Now if these percentages be added together and divided by 100 the quotient will be the "fineness modulus."

Table 2, page 725, gives the sieve analysis and *fineness modulus* of aggregate ranging from fine sand to coarse gravel, and also shows the method of determining the fineness modulus of a "mixed" aggregate, and Fig. 5 shows the method of platting.

A well-graded torpedo sand up to No. 4 sieve will give a fineness modulus of about 3.00; a coarse aggregate graded 4-1½ in. will give a fineness modulus of about 7.00; a mixture of the above materials in proper proportions for a 1:4 mix will have a fineness modulus of about 5.80. A fine sand such as drift-sand may have a fineness modulus as low as 1.50.

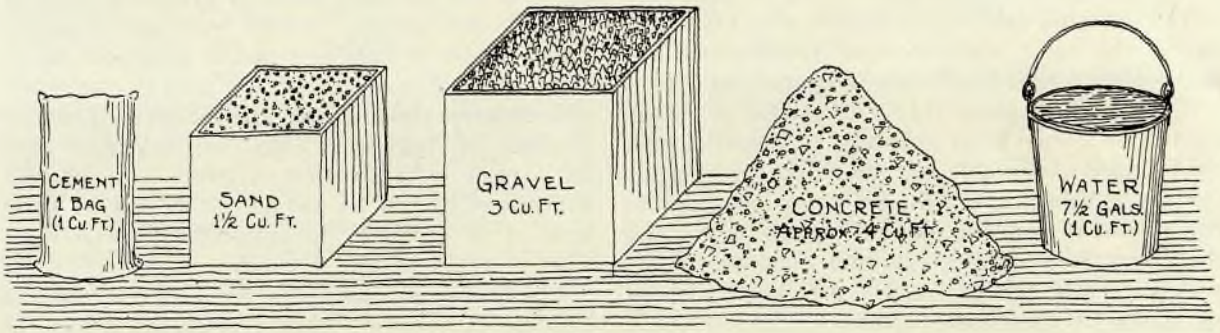


Fig. 2. Workable concrete mix—1 : 1½ : 3 with water-ratio of one, and 1.30 consistency.

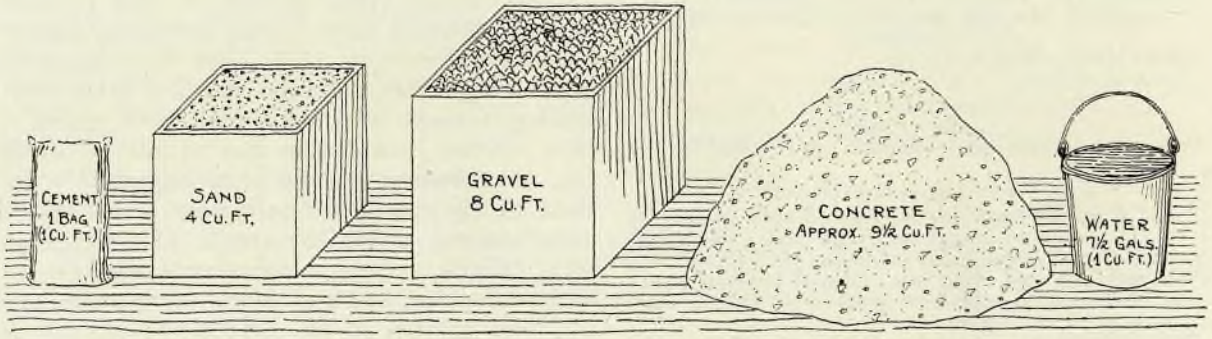


Fig. 3—Unworkable concrete mix—1 : 4 : 8 with water-ratio of one and 0.70 consistency.

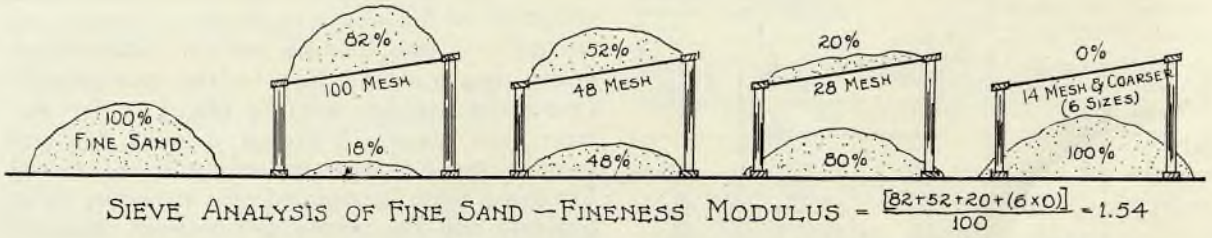


Fig. 4 (Sand "A")

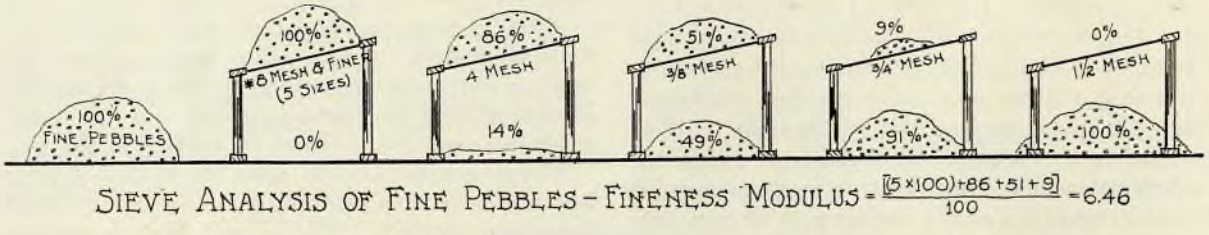


Fig. 4A (Pebbles "D")

*It is to be noted that the amount of aggregate coarser than each sieve size must be tabulated to obtain the fineness modulus; thus when the entire aggregate is coarser than the first five sieve sizes, a value of 500 must be added (or 100 for each of these sieve sizes) to the summation of the percentages retained on the remaining sieves of the set, before dividing by 100.

SIEVE ANALYSIS OF AGGREGATE

There is an intimate relation between the sieve analysis curve for the aggregate and the fineness modulus; in fact, the fineness modulus enables us for the first time to properly interpret the sieve analysis of an aggregate. If the sieve analysis of an aggregate is platted in the manner indicated in Fig. 5; that is, using the per cent coarser than a given sieve as ordinate, and the sieve size (platted to logarithmic scale) as abscissa, the fineness modulus of the aggregate is measured by the area below the sieve analysis curve. The dotted rectangles for aggregate "G" show how this result is secured. Each elemental rectangle is the fineness modulus of the material of that particular size. The fineness modulus of the graded aggregate is then the summation of these elemental areas. Any other sieve analysis curve which will give the same total area corresponds to the same fineness modulus and will require the same quantity of water to produce a mix of the same plasticity and gives concrete of the same strength, so long as it is not too coarse for the quantity of cement used.

The fineness modulus may be considered as an abstract number; it is in fact a summation of volumes of material. There are several different methods of computing it, all of which will give the same result. The method given in Table 2 is probably the simplest and most direct.

TABLE 2

METHOD OF CALCULATING FINENESS MODULUS OF AGGREGATES

The *sieves* used are commonly known as the Tyler standard sieves. Each sieve has a *clear opening* just double that of the preceding one.

The *sieve analysis* may be expressed in terms of volume or weight.

The *fineness modulus* of an aggregate is the sum of the percentages given by the sieve analysis, divided by 100.

Sieve Size	Size of Square Opening		Sieve Analysis of Aggregates Per Cent of Sample Coarser than a Given Sieve						
			Sand			Pebbles			Concrete Aggregate
	In.	Mm.	Fine (A)	Medium (B)	Coarse (C)	Fine (D)	Medium (E)	Coarse (F)	(G)*
100-mesh	.0058	.147	82	91	97	100	100	100	98
48-mesh	.0116	.295	52	70	81	100	100	100	92
28-mesh	.0232	.59	20	46	63	100	100	100	86
14-mesh	.046	1.17	0	24	44	100	100	100	81
8-mesh	.093	2.36	0	10	25	100	100	100	78
4-mesh	.185	4.70	0	0	0	86	95	100	71
⅜-in.	.37	9.4	0	0	0	51	66	86	49
¾-in.	.75	18.8	0	0	0	9	25	50	19
1½-in.	1.5	38.1	0	0	0	0	0	0	0
Fineness	modulus.	.....	1.54	2.41	3.10	6.46	6.86	7.36	5.74

*Concrete aggregate "G" is made up of 25% of sand "B" mixed with 75% of pebbles "E." Equivalent gradings would be secured by mixing 33% sand "B" with 67% coarse pebbles "F"; 28% "A" with 72% "F," etc. The proportion coarser than a given sieve is made up by the addition of these percentages of the corresponding size of the constituent materials.

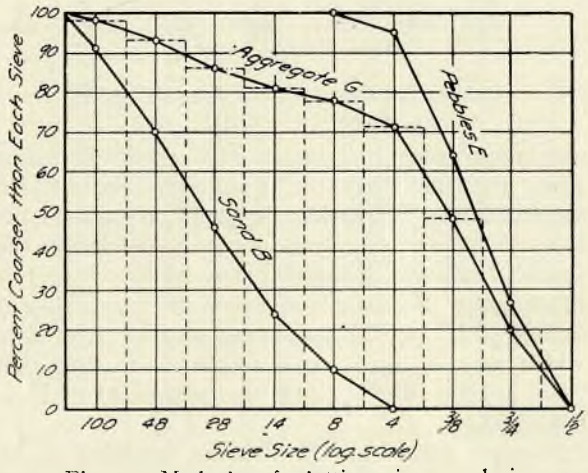


Fig. 5. Method of plotting sieve analysis.

Exactly what effect the fineness modulus has on the strength of concrete is demonstrated by the

results of many different series of tests. These show definitely that for a given plastic condition (consistency), and using the same proportions of cement and aggregate for the different samples, that the strength of the concrete varies with the fineness modulus. The results of these tests are shown graphically by the curves in Figs. 6 and 6A.

It will be noted that in each case there is a steady increase in the compressive strength of the concrete as the *fineness modulus* increases until a certain value is reached which corresponds to a maximum point. It will be noted also that this maximum point corresponds to greater and greater values of fineness modulus as the quantity of cement in the mix is increased. In other words, the maximum strength comes at a fineness modulus of about 5.80 for the 1:9 mix and about 6.40 for the 1:4 mix. In these tests the different values of the fineness modulus were secured by using a preponderance of the coarser sizes, but in all cases maintaining the same limiting size, that is, 1¼ in.

In Fig. 6A is found a similar relation between the strength and the fineness modulus, except that no

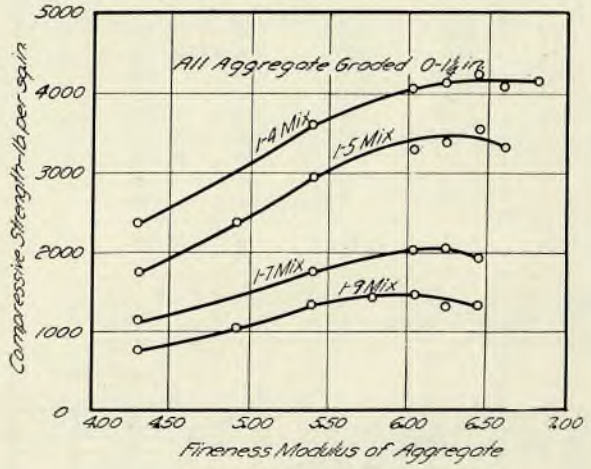


Fig. 6. Relation between finess modulus of aggregate and strength of concrete.

maximum point is found. This condition arises from the fact that the maximum size of the aggregate is increasing without changing the type of the sieve analysis curve, consequently the fineness modulus strength curve continues to rise indefinitely. The height to which the curve rises is limited only by the maximum size of aggregate which may be used. It is important to note that there is no conflict between the indications of Figs. 6 and 6A.

A given value for the fineness modulus of an aggregate can be secured with any combination of percentages in the sieve analysis which gives the same total, consequently, an infinite variety of gradings may be found which give aggregate of the same concrete strength. Table 3, page 727, gives the results of groups of tests which bring out the wide variation which may be made in the grading of aggregate without producing any essential variation in the concrete strength. Twenty-seven different gradings of the same aggregate were made up. These gradings covered the widest possible range, but they had one property in common; that

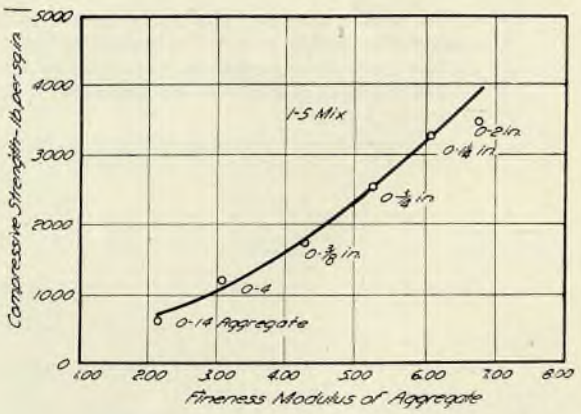


Fig. 6A. Relation between fineness modulus of aggregate and strength of concrete.

is, a fineness modulus of 6.04. All specimens were mixed with the same quantity of cement and water. Separate sets of specimens were made of two different consistencies. The mean variation from the average strength is about 3 per cent.

Since a maximum practicable value of fineness modulus is found for each size of aggregate and mix, it is necessary to place certain limits on the value which may be used for proportioning materials for concrete mixes. Table 4, page 728, gives limits which will be found practicable. Subsequent experience may dictate certain modifications in the details.

The purpose of Table 4 is to avoid the attempt to secure an aggregate grading which is too coarse for its maximum size and for the amount of cement used. It is also useful in prohibiting attempts to use sands which are too coarse for best results in concrete mixtures. For instance, it would be found from this table that the use of a sand of the nature of standard Ottawa sand is not permitted except in mixes 1:2 or richer.

The curves in Figuse 7, page 729, are platted directly from the values given for the standard sieves in Table 4.

From a careful consideration of the foregoing factors, it will be seen that the problem of designing the proper concrete mix under certain given conditions resolves itself into that of finding the combination which, with a given water-ratio will give a concrete of suitable workability, with a minimum quantity of cement.

The following outline will make clear the steps to be followed in the design of concrete mixes on the bases of these studies of concrete:

STEPS IN THE DESIGN OF CONCRETE MIXTURES

1. Having fixed the compressive strength required of the concrete, determine by the use of Fig. 1 the *maximum* water-ratio which may be used. Remember that a water-ratio lower than 1.00 will hardly produce a *workable* concrete except for a fairly rich mix. Obviously the driest workable consistency possible should be used.

2. Make sieve analysis of fine and coarse aggregates to be used, using Tyler's standard sieves of the following sizes: 100, 48, 28, 14, 8, 4, ⅜, ¾ and 1½ in. Express sieve analysis in terms of percentages of material by weight (or separate volumes) *coarser than* each of the standard sieves.

TABLE 3

EFFECT OF GRADING OF AGGREGATES ON THE STRENGTH OF CONCRETE

Compression tests of 6 by 12-in. concrete cylinders.

Mix 1:5 by volume; age at test, 28 days; stored in damp sand; tested damp.

Aggregates—sand and pebbles from Elgin, Ill. Aggregates were screened to different sizes and recombined to conform to predetermined sieve analyses.

The aggregates were made up in such a manner as to give the widest variations in the grading of the particles. All gradings had one common property, in that the *fineness modulus* was exactly the same—m=6.04.

The same quantity of water was used in all specimens of a given consistency. The 110 per cent consistency contains 10 per cent more water than the 100 per cent.

Each specimen was made from a separate batch.

Each value in the strength tests is the average from 5 tests made on different days.

Sieve Analysis of Aggregate — Per Cent Coarser than Each Sieve										Fineness Modulus of Aggregate	Surface Area of Aggregate, Sq. In.		Compressive Strength of Concrete at 28 Days (Lb. per Sq. In.)	
100	48	28	14	8	4	⅜	¾	1¼	1½	2		Per Lb. of Aggregate	Per G. of Cement	100% Consistency	110% Consistency
99	98	95	90	81	68	49	24	0	..	..	6.04	602	8.8	3300	2890
99	98	96	92	84	67	46	22	0	..	..	6.04	569	8.2	2950	2650
98	97	93	88	80	67	52	29	0	..	..	6.04	764	11.4	3120	2760
97	94	91	85	77	67	58	35	0	..	..	6.04	999	15.2	3140	2790
95	92	87	82	75	67	67	39	0	..	..	6.04	1292	20.1	3100	2800
95	90	84	78	73	67	62	55	0	..	..	6.04	1451	23.0	2830	2740
95	89	82	75	67	67	67	62	0	..	..	6.04	1565	25.2	2680	2580
100	97	91	79	72	67	58	40	0	..	..	6.04	761	11.9	3070	2690
100	97	93	88	83	67	50	27	7	0	..	6.04	616	9.0	3080	2790
99	97	94	86	77	67	47	27	16	..	0	6.04	709	10.5	3150	2710
98	95	90	83	83	83	50	22	0	..	..	6.04	834	12.6	3080	2500
98	94	90	86	83	80	55	18	0	..	..	6.04	898	13.3	3050	2550
96	90	80	80	80	80	60	39	0	..	..	6.04	1391	21.5	2970	2550
100	96	92	87	81	75	50	23	0	..	..	6.04	672	10.0	2930	2710
95	91	87	82	77	73	59	40	0	..	..	6.04	1315	20.2	3000	2580
99	95	88	80	76	73	61	32	0	..	..	6.04	911	13.9	2950	2740
90	85	81	78	75	73	66	56	0	..	..	6.04	1992	31.3	2680	2440
100	93	82	73	73	73	63	47	0	..	..	6.04	1076	16.7	2820	2620
100	100	100	92	81	60	45	26	0	..	..	6.04	390	5.6	3040	2780
100	98	95	90	80	60	50	31	0	..	..	6.04	557	8.3	2900	2770
100	99	96	92	84	55	50	28	0	..	..	6.04	483	7.0	2940	2750
100	99	96	91	80	50	50	38	0	..	..	6.04	514	7.6	3080	2750
98	84	84	84	84	57	57	57	0	..	..	6.04	1276	19.7	3000	2780
99	98	91	86	80	76	38	38	0	..	..	6.04	701	10.4	2940	2700
99	98	91	86	80	76	46	30	0	..	..	6.04	697	10.2	3020	2660
99	98	91	86	80	76	61	15	0	..	..	6.04	689	10.1	2930	2670
99	98	91	85	80	76	67	8	0	..	..	6.04	685	9.9	2970	2630
Average											6.04	904	13.8	2990	2690
Minimum value											.....	390	5.6	2680	2440
Maximum value											.....	1992	31.3	3300	2890
Mean variation from average—per cent											.....	34.4	37.2	3.41	3.04

3. Compute fineness modulus of each aggregate from the date obtained from (2).

4. Determine the maximum size of aggregate by applying the following rules:

(*a*) If more than 20 per cent of aggregate is coarser than any sieve, the MAXIMUM SIZE shall be taken as the next *larger* sieve in the standard set

(*b*) If between 11 per cent and 20 per cent is coarser than any sieve, the MAXIMUM SIZE shall be taken as the next *larger* "half-sieve."

(*c*) If less than 10 per cent is coarser than certain sieves, the MAXIMUM SIZE shall be taken as the *smallest* of these sieve sizes.

5 Determine by the use of Table 4 (or Fig. 7) the *maximum* value of fineness modulus which may be used for the mix, kind and size of aggregate, and the work under consideration.

TABLE 4

MAXIMUM PERMISSIBLE VALUES OF FINENESS MODULUS OF AGGREGATES

For *mixes* other than those given in the table, use the values for the next leaner mix.

For *maximum sizes* of aggregate other than those given in the table, use the values for the next smaller size.

Fine aggregate includes all material finer than No. 4 sieve; *coarse aggregate* includes all material coarser than the No. 4 sieve. *Mortar* is a mixture of cement, water and fine aggregate.

This table is based on the requirements for *sand-and-pebble* or *gravel* aggregate composed of approximately spherical particles, in ordinary uses of concrete in reinforced concrete structures. For other materials and in other classes of work the maximum permissible values of fineness modulus for an aggregate of a given size is subject to the following corrections:

(1) If *crushed stone* or *slag* is used as coarse aggregate, *reduce* values in table by 0.25. For crushed material consisting of unusually flat or elongated particles, *reduce* values by 0.40.

(2) For *pebbles* consisting of *flat particles, reduce* values by 0.25.

(3) If *stone screenings* are used as fine aggregate, *reduce* values by 0.25.

(4) For the top course in *concrete roads, reduce* the values by 0.25. If finishing is done by *mechanical means,* this reduction need not be made.

(5) In work of *massive proportions,* such that the smallest dimension is larger than 10 times the maximum size of the coarse aggregate, *additions may be made* to the values in the table as follows: for ¾-in. aggregate 0.10; for 1½-in. 0.20; for 3-in. 0.30; for 6-in. 0.40.

Sand with fineness modulus lower than 1.50 is undesirable as a fine aggregate in ordinary concrete mixes. Natural sands of such fineness are seldom found.

Sand or screenings used for fine aggregate in concrete must not have a higher fineness modulus than that permitted for mortars of the same mix. Mortar mixes are covered by the table and by (3) above.

Crushed stone mixed with both finer sand and coarser pebbles requires no reduction in fineness modulus provided the quantity of crushed stone is less than 30% of the total volume of the aggregate.

MAXIMUM PERMISSIBLE VALUE OF FINENESS MODULUS

MIX		SIZE OF AGGREGATE (LIMITS OF GRADATION)													
Cement	Aggregate	0-28	0-14	0-8	0-4	0-3*	0-⅜	0-½*	0-¾	0-1 in.	0-1½	0-2.1 *	0-3 in.	0-4½ *	0-6 in.
1	12	1.20	1.80	2.40	2.95	3.35	3.80	4.20	4.60	5.00	5.35	5.75	6.20	6.60	7.00
1	9	1.30	1.85	2.45	3.05	3.45	3.85	4.25	4.65	5.00	5.40	5.80	6.25	6.65	7.05
1	7	1.40	1.95	2.55	3.20	3.55	3.95	4.35	4.75	5.15	5.55	5.95	6.40	6.80	7.20
1	6	1.50	2.05	2.65	3.30	3.65	4.05	4.45	4.85	5.25	5.65	6.05	6.50	6.90	7.30
1	5	1.60	2.15	2.75	3.45	3.80	4.20	4.60	5.00	5.40	5.80	6.20	6.60	7.00	7.45
1	4	1.70	2.30	2.90	3.60	4.00	4.40	4.80	5.20	5.60	6.00	6.40	6.85	7.25	7 65
1	3	1.85	2.50	3.10	3.90	4.30	4.70	5.10	5.50	5.90	6.30	6.70	7.15	7.55	8.00
1	2	2.00	2.70	3.40	4.20	4.60	5.05	5.45	5.90	6.30	6.70	7.10	7.55	7.95	8.40
1	1	2.25	3.00	3.80	4.75	5.25	5.60	6.05	6.50	6.90	7.35	7.75	8.20	8.65	9.10

*Considered as "half-size" sieves; not used in computing fineness modulus.

6. Compute the percentages of fine and coarse aggregates required to produce the fineness modulus desired for the final aggregate mixture by the use of Fig. 8 or the following formula:

$$P = 100\,\frac{A-B}{A-C} \text{ in which}$$

P = percentage of fine aggregate in total mixture.
A = fineness modulus of coarse aggregate.
B = fineness modulus of final aggregate mixture.
C = fineness modulus of fine aggregate.

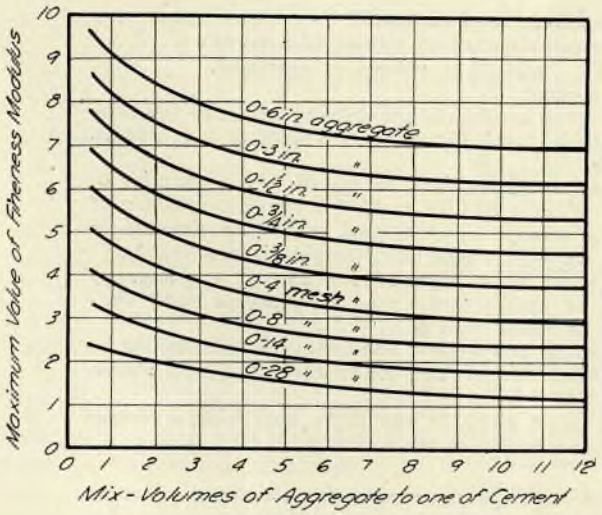


Fig. 7.—Maximum permissible values of fineness modulus of aggregate.

(NOTE.—Fig. 8 may also be used for making comparisons of the effect of certain changes in proportions of fine and coarse aggregates. The distinction between fine and coarse aggregate is solely for convenience in securing a uniform grading; the division may be made at any desired point.)

7. With the estimated mix, fineness modulus and consistency enter Fig. 9, page 731, and determine the strength of concrete produced by the combination. If the strength shown by the diagram is not that required, the necessary readjustment may be made by changing the mix, consistency or size and grading of the aggregate.

The quantity of water required can be determined approximately from Table 5 or more exactly from the formula given below.

FORMULA FOR DETERMINING WATER REQUIRED FOR CONCRETE

$$x = R\left\{\frac{3}{2}p + \left(0.22 - \frac{m}{42} + a - c\right)n,\right\} \text{ in which}$$

x = water required given as the ratio to the volume of cement in batch (water-ratio).

R = Relative consistency of concrete, or "workability factor." Normal consistency (relative consistency — 1.00) requires the use of such a quantity of mixing water as will cause a slump of ½ to 1 in. in a freshly molded 6 by 12-in. cylinder of about 1:4 mix upon withdrawing the form by a steady, upward pull. A relative consistency of 1.10 requires the use of 10 per cent more water, and under the above conditions will give a slump of about 5 to 6 in.

p = Normal consistency of cement ratio by weight.

m = Fineness modulus of aggregate (an exponent).

n = Volumes of mixed aggregate to one of cement.

a = Absorption of aggregate, ratio of water absorbed to volume of aggregate. (Determined after immersion in water for 3 hours. Average values for crushed limestone and pebbles may be assumed as 0.02; porous sandstones may reach 0.08; very light and porous aggregate may reach 0.25.)

c = Moisture contained in aggregate, ratio of water contained to volume of aggregate. (Assume as zero for room-dry aggregate.)

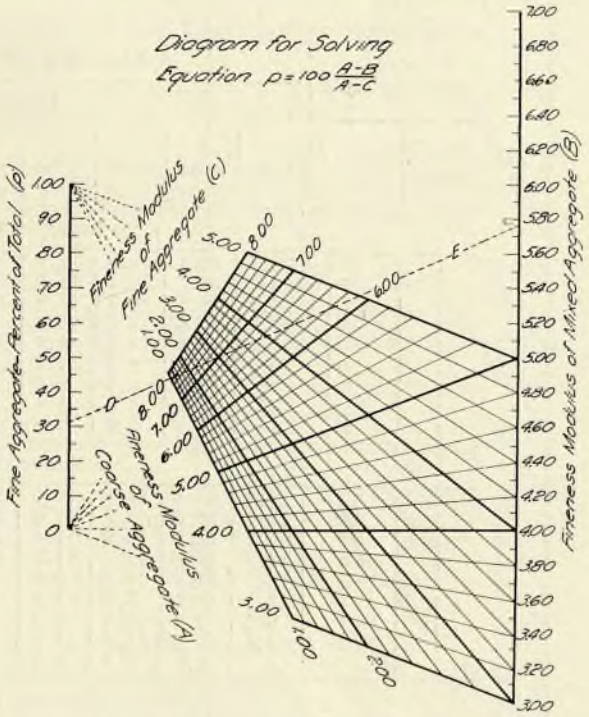


Fig. 8.

This formula takes account of all the factors which affect the quantity of water required in a concrete mixture. These factors may be classified as follows:

TABLE 5

QUANTITY OF MIXING WATER REQUIRED FOR CONCRETE

*Calculated by formula: $x = R\left[\frac{3}{2}p + \left(\frac{.30}{1.26m} + a - c\right)n\right]$

Where x = Water required—ratio to volume of cement in batch (water-ratio).
R = Relative consistency, or "workability factor." Where R = 1.00 the concrete is said to be of "normal consistency."
p = Normal consistency of cement by weight (assume p = 0.23).
m = Fineness modulus of aggregate.
n = Volume of mixed aggregate to one volume of cement.
a = Absorption of aggregate, ratio of water absorbed to volume of aggregate.
c = Moisture in aggregate, ratio of water contained to volume of aggregate.
(a — c) = Net absorption of aggregate by volume.

In this table (a — c) is assumed as 0.02. In other words, the net quantity of water taken by the aggregate is 2% by volume. This value may be used for ordinary limestone and pebbles. For crushed trap and granite it is somewhat high.

A relative consistency of 1.00 (normal consistency) requires the use of such a quantity of mixing water as will cause a slump of ½ to 1 in. in a freshly molded 6 by 12in. cylinder of about 1:4 mix upon withdrawing the form by a steady, upward pull. This consistency **is somewhat dry for most concrete work,** but can be used where light tamping is practicable.

A relative consistency of 1.10 (10% more water than required for normal consistency) represents about the driest concrete which can be satisfactorily used **in concrete road construction.** This consistency will give a slump of about 5 to 6 in.

A relative consistency of 1.25 represents about the wettest consistency which should be used **in reinforced concrete building construction.** Under the conditions mentioned above, this consistency will give a slump of about 8 to 9 in.

For mixes and fineness moduli, other than those given in the table, approximate values may be determined by interpolation. For specific cases use the formula.

Mix by Volume		GALLONS OF WATER PER SACK OF CEMENT											
		Fineness Moduli of Aggregates†											
Cement	Aggregate	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00
Relative Consistency — (R) = 1.00													
1	12	23.5	21.4	19.5	17.8	16.4	15.2	13.9	12.9	12.0	11.1	10.4	9.8
1	9	18.1	16.7	15.2	14.0	12.9	12.0	11.0	10.2	9.6	9.0	8.4	7.9
1	7	14.7	13.5	12.3	11.4	10.6	9.9	9.1	8.6	8.0	7.6	7.2	6.7
1	6	13.0	12.0	11.0	10.2	9.5	8.9	8.3	7.7	7.3	6.8	6.5	6.2
1	5	11.2	10.4	9.5	8.9	8.3	7.8	7.3	6.9	6.4	6.1	5.8	5.5
1	4	9.5	8.9	8.2	7.7	7.2	6.8	6.3	6.0	5.7	5.4	5.2	5.0
1	3	7.8	7.2	6.7	6.3	6.0	5.7	5.4	5.1	4.9	4.6	4.5	4.3
1	2	6.0	5.7	5.4	5.1	4.9	4.7	4.5	4.3	4.1	4.0	3.9	3.8
1	1	4.3	4.1	3.9	3.8	3.7	3.6	3.5	3.4	3.3	3.2	3.2	3.1
Relative Consistency — (R) = 1.10													
1	12	25.8	23.6	21.4	19.6	18.1	16.7	15.3	14.2	13.2	12.2	11.4	10.8
1	9	19.9	18.4	16.7	15.4	14.2	13.2	12.1	11.2	10.6	9.9	9.2	8.7
1	7	16.2	14.9	13.5	12.5	11.7	10.9	10.0	9.5	8.8	8.4	7.9	7.4
1	6	14.3	13.2	12.1	11.2	10.5	9.8	9.1	8.5	8.0	7.5	7.2	6.8
1	5	12.3	11.4	10.5	9.8	9.1	8.6	8.0	7.6	7.0	6.7	6.4	6.1
1	4	10.5	9.8	9.0	8.5	7.9	7.5	6.9	6.6	6.3	5.9	5.7	5.5
1	3	8.6	7.9	7.4	6.9	6.6	6.3	5.9	5.6	5.4	5.1	5.0	4.7
1	2	6.6	6.3	5.9	5.6	5.4	5.2	5.0	4.7	4.5	4.4	4.3	4.2
1	1	4.7	4.5	4.3	4.2	4.1	4.0	3.9	3.7	3.6	3.5	3.5	3.4
Relative Consistency — (R) = 1.25													
1	12	29.4	26.8	24.4	22.2	20.5	19.0	17.4	16.1	15.0	13.9	13.0	12.3
1	9	22.6	20.9	19.0	17.5	16.1	15.0	13.8	12.7	12.0	11.2	10.5	9.9
1	7	18.4	16.9	15.4	14.3	13.2	12.4	11.4	10.7	10.0	9.5	9.0	8.4
1	6	16.3	15.0	13.8	12.8	11.9	11.1	10.4	9.6	9.1	8.5	8.1	7.7
1	5	14.0	13.0	11.9	11.1	10.4	9.8	9.1	8.6	8.0	7.6	7.2	6.9
1	4	11.9	11.1	10.2	9.6	9.0	8.5	7.9	7.5	7.1	6.8	6.5	6.2
1	3	9.8	9.0	8.4	7.9	7.5	7.1	6.8	6.4	6.1	5.8	5.6	5.4
1	2	7.5	7.1	6.8	6.4	6.1	5.9	5.6	5.4	5.1	5.0	4.9	4.8
1	1	5.4	5.1	4.9	4.8	4.6	4.5	4.4	4.3	4.1	4.0	4.0	3.9

*This formula given on page 729 in simpler form.

1. "Workability" factor, or the relative consistency on the concrete. This is dictated by the kind of work being done; concrete must be more plastic (which generally means a wetter consistency) in reinforced concrete building construction than is necessary in mass work. The term (R) in the equation takes care of this factor. (R) may vary from, say, 0.90 for a dry concrete to 2.00 or higher for very wet mixes.
2. Cement factor, which is made of two parts; the quality of cement so far as normal consistency is concerned (p); the quantity of cement in the mix (n).
3. The aggregate factor. This includes the three terms within the parenthesis in the equation. The first term, involving (m), takes account of the size and grading; the second (a) the absorption, and the third (c) the water contained in the aggregate.

In case admixtures of any kind are used, another term must be inserted in the equation. This relation has been fully worked out, but is not included in this report.

CHART FOR DESIGN OF CONCRETE MIXES

Fig. 9 is a nomographic chart for the design of concrete mixes. This chart takes account of the following four factors:

1. The mix (cement content).
2. The relative consistency.
3. The grading of aggregate (fineness modulus).
4. The compressive strength of concrete.

Given any three of these factors the chart enables us to solve for the fourth. This chart is, of course, based on the results of certain tests. For practical application these values must generally be reduced by certain factors, which will depend on the judgment of the designer. In order to furnish some basis for comparison, compression tests of 1:3 standard sand mortars from the cement used in these tests are given.

Suppose we consider the case of concrete for road construction. This is generally specified as a 1:1½:3 or a 1:2:3 mix, with aggregate graded up to 1½ in. These mixes are about the same as what have been termed a 1:4 mix, the exact equivalent depending on the particular size and grading of the fine and coarse aggregate. Assume that gravel aggregate will be used, graded to 1½ in. Table 4 shows that we may use a fineness modulus as high as 6.00-.25 = 5.75. Knowing the sieve analysis and fineness modulus of both sizes of aggregate, apply the formula or Fig. 8 to determine the proportion of each aggregate which must be mixed to secure this value. Assume that the concrete will be mixed to a relative consistency of 1.10, which is of such plasticity as will give a slump of 5 to 6 in. in the test described

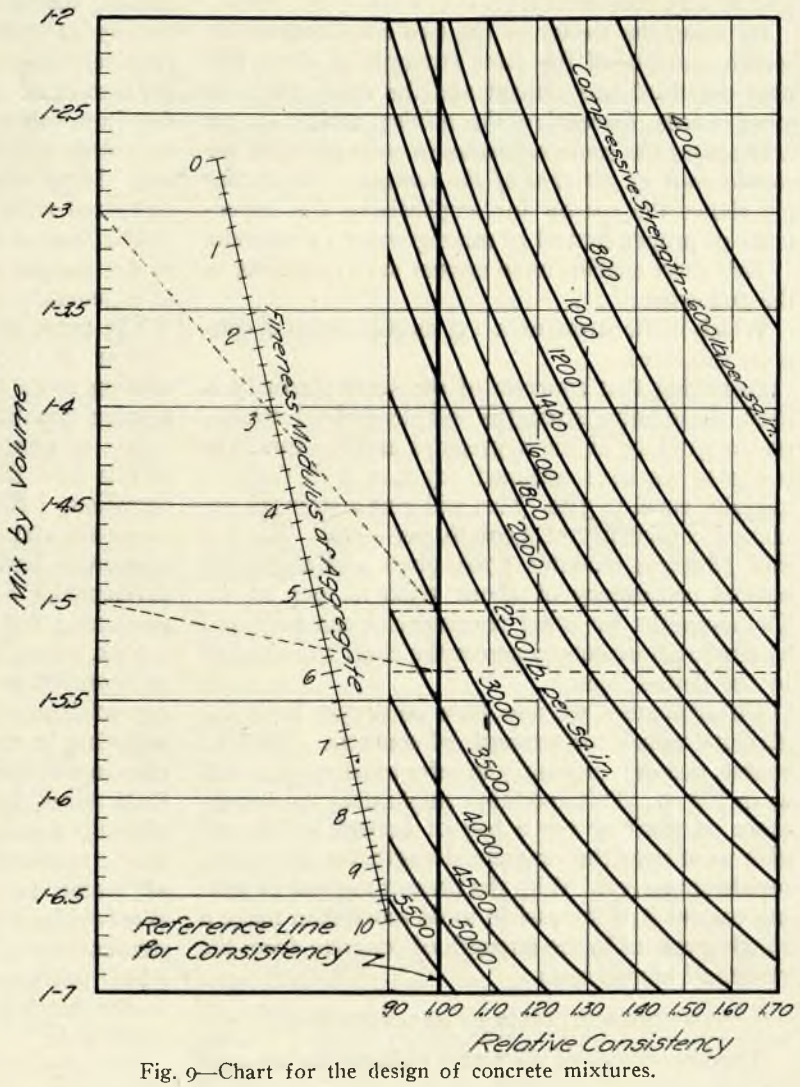


Fig. 9—Chart for the design of concrete mixtures.

above. Place a straightedge in Fig. 9 on mix 1:4, and fineness modulus 5.75, and mark the point where it crosses the reference line for consistency; from this point project the line horizontally (as indicated in other examples) to relative consistency 1.10. It will be seen that this gives a compressive strength of 3,400 lb. per sq. in. at 28 days.

The effect of using other mixes, gradings or consistencies on the strength can be seen at once from the diagram. For instance, if the water were increased to a relative consistency of 1.25 (not nearly so wet as is frequently seen in road work) the strength will be reduced to 2,700 lb. per sq. in.—a reduction of over 20 per cent. If the mix were changed to 1:4½ and other factors the same as in the first example, the strength would be 3,200 lb. per sq. in. We should have to change the mix to as lean as 1:5¼ in order to secure the same reduction in strength as was found above for a change from 1.10 to 1.25 consistency.

By using the wetter of the two consistencies we secure concrete of the same strength as if we had used one-third less cement and the drier mix. In other words, *increasing the mixing water 13 per cent causes the same reduction in strength as if we should omit 33 per cent of the cement.* This example shows the reason for emphasizing the importance of proper control of mixing water in concrete.

This chart enables us to answer such questions as the following:

Which is the stronger, a 1:3 mortar or a 1:5 concrete mixture?

Assuming that concrete of the same plasticity is used, the relative strengths will depend, of course, on the grading of the aggregates and the mix. In one case we have assumed 1:3 mix with fineness modulus equal to 3.00. This will give a strength for normal consistency of 3,000 lb. per sq. in. The 1:5 mix (fineness modulus 5.70) gives a strength for normal consistency of about 3,300 lb. per sq. in. The strengths for other consistencies can be found by reading horizontally across the chart as indicated by the dotted lines.

Unfortunately, we now have no proper basis for absolute values for strength of concrete. This, of course, makes it necessary to refer to particular tests as in Fig. 9. This condition emphasizes the importance of working out a test of cement which will give us at once the concrete strength for given materials, mixes, etc. With the present method of testing cement it is impossible to do more than make a rough guess as to the strength of concrete from the results of briquet tests.

FURTHER DISCUSSION OF CONCRETE MIXES

The importance of the water ratio on the strength of concrete will be shown in the following considerations:

One pint more water than necessary to produce a plastic concrete reduces the strength to the same extent as if we should omit 2 to 3 lb. of cement from a 1-bag batch.

Our studies give us an entirely new conception of the function performed by the various constituent materials. The use of a coarse, well-graded aggregate results in no gain in strength unless we take advantage of the fact that the amount of water necessary to produce a plastic mix can thus be reduced. In a similar way we may say that the use of more cement in a batch does not produce any beneficial effect except from the fact that a plastic, workable mix can be produced with a lower water-ratio.

The reason a rich mixture gives a higher strength than a lean one is not that more cement is used, but because the concrete can be mixed (and usually is mixed) with a water-ratio which is relatively lower for the richer mixtures than for the lean ones. If advantage is not taken of the fact that in a rich mix relatively less water can be used, no benefit will be gained as compared with a leaner mix. In all this discussion the quantity of water is compared with the quantity of cement in the batch (cubic feet of water to 1 sack of cement) and not to the weight of dry materials or of the concrete as is generally done.

The mere use of richer mixes has encouraged a feeling of security, whereas in many instances nothing more has been accomplished than wasting a large quantity of cement, due to the use of an excess of mixing water. The universal acceptance of this false theory of concrete has exerted a most pernicious influence on the proper use of concrete materials and has proven to be an almost insurmountable barrier in the way of progress in the development of sound principles of concrete proportioning and construction.

Rich mixes and well-graded aggregates are just as essential as ever, but we now have a proper appreciation of the true function of the constituent materials in concrete and a more thorough understanding of the injurious effect of too much water. Rich mixes and well-graded aggregates are, after all, only a means to an end; that is, to produce a plastic workable concrete with a minimum quantity of water as compared with the cement used. *Workability* of concrete mixes is of fundamental significance. This factor is the only limitation which prevents the reduction of cement and water in the batch to much lower limits than are now practicable.

The above considerations show that the water

content is the most important element of a concrete mix, in that small variations in the water cause a much wider change in the strength than similar variations in the cement content or the size or grading of the aggregate. This shows the absurdity of our present practice in specifying definite gradings for aggregates and carefully proportioning the cement, then guessing at the water. It would be more correct to carefully measure the water and guess at the cement in the batch.

The grading of the aggregate may vary over a wide range without producing any effect on concrete strength, so long as the cement and water remain unchanged. The consistency of the concrete will be changed, but this will not affect the concrete strength if all mixes are plastic. The possibility of improving the strength of concrete by better grading of aggregates is small as compared with the advantages which may be reaped from using as dry a mix as can be properly placed. Table 1 shows the effect of water on the strength of concrete.

It is impracticable to lay down a general rule for the quantity of water which should be used in a concrete mix, since it was seen in the water formulas given above that the total water is governed by a large number of different factors. However, it is only the water which goes to the cement (that is, exclusive of absorbed water) which affects the concrete strength. The failure to recognize this fact has led to many erroneous conclusions from tests made to determine the relative merits of different aggregates.

Table 5 gives the quantity of water required for plastic mixes for certain assumed conditions of normal consistency of cement, absorption of aggregate, and relative consistency. Water is expressed in terms of gallons per sack of cement. In using this table the dependence of the value of fineness modulus which may be used on the size of aggregate and the mix, referred to in Table 3, should not be overlooked.

Without regard to the actual quantity of mixing water, the following rule is a safe one to follow:

Use the smallest quantity of mixing water that will produce a plastic or workable concrete.

The importance of any method of mixing, handling, placing and finishing concrete which will enable the builder to reduce the water content of the concrete to a minimum is at once apparent.

Reinforced Concrete Tests

As the results of tests on reinforced concrete conducted by the University of Illinois are of vital importance to the architect as well as the engineer, the following should be of interest.

URBANA, ILL., April 15, 1919.

Rigidly connected frames are frequently used in reinforced concrete construction. Since about 1905 they have been extensively used in continental Europe, and there is a tendency in America to use them for buildings and bridges. The field of the application of rigid frames is almost unlimited, for most reinforced concrete structures are composed of elements of rigid frames. Every building construction of reinforced concrete may be considered as a rigidly connected frame, for columns, girders, beams and slabs are all rigidly connected with each other, although the effect of this condition is not fully considered in the design. Bridges, trestles and viaducts are also in the field of the rigid frame. Likewise parts of culverts, sewers, subway constructions, reservoirs and water tanks are examples of the rigidly connected frame.

The reinforced concrete frame is advantageous in that it is economical and permits effective designs. Notwithstanding the importance of the frame in construction, practical formulas to determine exactly the stresses as they occur in a rigidly connected reinforced concrete frame are not generally available.

A series of tests has been conducted by the engineering experiment station of the University of Illinois to obtain experimental information concerning the stresses in the reinforcement and in the concrete, the continuity of the composing members of a frame, the location of sections of critical stress, the reliability of a reinforced concrete frame and the applicability of the theoretical formulas in the design of frames. Formulas for moments and other indeterminate quantities for several types of indeterminate structures have been derived. To test practically the reliability of these formulas for reinforced concrete structures, eight test frames were designed according to the formulas found by the analyses, and the deformations produced in the various parts of the members by the test loads were

measured. The specimens were made in November and December, 1913, and January, 1914, and were tested in January, February and March, 1914. The following cases have been analyzed for vertical load: (1) single story, single span; (2) single story, three spans; (3) trestle bent with tie, single span; (4) building frame with several stories and several spans; and (5) bridge trestle. For horizontal load the following cases have been analyzed: (1) single story, single span; (2) octagonal reservoir or atnk; and (3) rectangular reservoir.

The formulas found from the analyses and graphs showing the main stresses that were observed at the principal loads are published in Bulletin 107 entitled "Analysis and Tests of Rigidly Connected Reinforced Concrete Frames" by Mikishi Abe under the direct charge of Professor Arthur N. Talbot, Department of Theoretical and Applied Mechanics, University of Illinois. Copies of this bulletin may be had without charge by addressing the Engineering Experiment Station, Urbana, Ill.

Importance of Electricity in World's Largest Hotel

THE Hotel Pennsylvania, New York City, illustrated in our issue of February 26, was planned to be one of the most convenient and comfortable of hotels. Electricity therefore plays a large part in the service of the guests.

In fact, so important is this mysterious force to the life of the hotel that special precautions have been taken to prevent the failure of the supply. It would, for example, be extremely disagreeable if the lights should all go out and the elevators stop running. To prevent such a contingency arrangements have been made to supply current from three independent sources—from two stations outside of the building and from a generator inside. The cables come in through a tunnel deep under ground, and the power cannot be cut off even, it is believed, by an earthquake or an air raid (fire need not be seriously considered as the hotel is absolutely fireproof).

To provide further safety, the lights are operated from three separate circuits. Some of the lights in each corridor, and at other emergency points, are lit from each of these circuits, so that even if trouble developed on two circuits at the same time no important part of the hotel would be plunged into darkness.

The guest is constantly meeting novel applications of electricity. When he enters his attractive bathroom, the first thing he notices is a faucet labeled "ice water," which is supplied by an electric pump in the basement. Should he order breakfast served in his room he receives it in a surprisingly short time, and the secret of this rapid service is the electric breakfast kitchen located on every one of the guest floors. These kitchens are equipped with electric coffee percolators, stoves, toasters, egg-boilers and other cooking utensils. Each one also has a "cold box," or refrigerator, set in the wall and kept cold by refrigerated brine circulated by an electric pump.

He may, perhaps, notice that the air in the restaurants and other concourse rooms is fresh and pure in spite of the many people and the smoke from hundreds of cigarettes and cigars. This is due to the fact that air for these rooms is drawn in from the outside by electric ventilating fans, forced through cheesecloth filters, washed in running water, and heated in winter and cooled in summer, while the foul air is drawn out by exhaust fans. Each of the 2200 bathrooms is also ventilated by exhaust. Twenty-seven motors, specially selected because of their silent operation, operate these fans, and 800 tons of sheet metal were required for the ventilating ducts.

Everything is neat and clean, because two 20-horsepower motors drive vacuum cleaners that draw dust and dirt from 487 openings and carry it through a total of three miles of pipe to dust receptacles in the cellar.

The laundry, which is one of the largest private laundries in the country, is electrically operated throughout.

Perhaps the most unique electrical machine is the one that reproduces writing and is used to convey instructions throughout the hotel. These machines can be seen in operation at various points, and to watch the pen of one of them busily spelling out a message in the handwriting of some one perhaps twenty floors below is fascinating and almost uncanny.

One of the inconspicuous but valuable features of the electrical equipment is the switch panels for controlling the lighting circuits on the various floors. These panels differ from the ordinary type in that it is impossible for anyone operating the switches to come in contact with live parts. Hence they are absolutely safe and cannot cause injury to the operator. The fuses and connections are locked in a separate compartment and are accessible only to authorized electricians.

BUILDING NEWS

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Persons in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

ALABAMA

CORDOVA, ALA.—Indianhead Mills plans to build three story reinforced concrete cotton mill. Lockwood, Greene & Co., Healy Building, Atlanta, Ga., engineers. $1,500,000.

CALIFORNIA

BAKERSFIELD, CAL.—J. M. Jameson proposes building two story, 50 x 122 ft., brick garage on Twenty-second and Chester Avenues. T. B. Wiseman, Brower Building, Architect. Kitchen & Amell, agents for Overland automobile, Bakersfield, lessees.

CALEXICO, CAL.—City is having plans prepared by Olmstead & Gillelen, engineers, 1112 Hollingsworth Building, Los Angeles, for gas and electric light plant here. P. B. Steintorff, clerk. $325,000.

FAIRFIELD, CAL.—Contract for construction of the County Hospital has been awarded to the E. E. Elterton Co. of San Francisco on its bid of $103,200.

FRESNO CAL.—Sperry Flour Co., Hamilton and J Streets, plans to build flour mill. J. L. Eischelberger, manager. $400,000.

LOS ANGELES, CAL.—Los Angeles *Times*, First Street and Broadway, is having plans prepared by Krempel & Erkes, Architects, 415 Henne Building, for building four story, 25 x 100 ft., reinforced concrete and brick newspaper plant.

SAN FRANCISCO, CAL.—Sherman Estate care of J. L. Stewart, Architect, C. Spreckles Building, is having plans prepared for five story, 100 x 160 ft., reinforced concrete warehouse on Second and Brannan Streets.

SANTA PAULA, CAL.—Limoneira Co. is having plans prepared by Allison & Allison, Architects 1405 Hibernian Building, Los Angeles, for building one and two story hollow tile and concrete packing plant. $150,000.

SANTA CRUZ, CAL.—F. D. Hihn, Insurance Merchants Exchange Building San Francisco, is having plans prepared by Reid Bros., Architects, 105 Montgomery Street, San Francisco, for building brick or concrete theater. $155,000.

WASCO, CAL.—Trustees School District let contract for building two story, 146 x 182 ft., school to H. Eisler, Bakersfield. $59,900.

CONNECTICUT

BRIDGEPORT, CONN.—St. Michael's Polish congregation, 310 Sterling Street, let contract for building three and one-half story, 90 x 150 ft., brick, steel and concrete school on Sterling and Kossuth Streets to Johnson Bros. 166 Devonshire Street, Boston. $160,000.

BRIDGEPORT, CONN.—Post Publishing Co., 49 Cannon Street, let contract for building two story, 47 x 68 ft., brick and concrete printing plant on Middle Street to M. Tredennick Co., 188 Main Street. $60,000.

HARTFORD, CONN.—H. G. Bond, 320 Asylum Street, plans to build two story brick, steel and concrete addition to Hotel Sherman on Allyn and High Streets, costing $60,000; also seven story building on Allyn Street to be known as Hotel Bondmore. Whiton & McMahon, 36 Pearl Street, Architects.

HARTFORD, CONN.—City proposes building one story public market on Connecticut Boulevard. Whiton & McMahon, 36 Pearl Street, Architects. $100,000.

MIDDLETOWN, CONN.—Rockfall Woolen Co., Maplewood Street, plans to build brick addition to plant. $50,000.

NEW BRITAIN CONN.—Erwin Home, Bassett and Ellis Streets, plans to build home. Late D. Miller donated $50,000 for project.

NEW BRITAIN, CONN.—New Britain Institute, High and West Main Streets, plans to build institute. Late D. Miller donated $50,000 for project.

NEW HAVEN, CONN.—Jewish Home for Aged, 169 Davenport Avenue, plans to build hospital. $200,000.

NEW HAVEN CONN.—J. Weinstein, Architect, 6 Church Street, has plans for two story, 80 x 100 ft., brick and concrete bakery on Broad and Commerce Streets. $50,000.

NEW HAVEN, CONN.—Besse, Ritchey & Co., 784 Chapel Street, plans to construct new front to present building and five story addition in rear. Brown & Von Beren, 185 Church Street, Architects. $50,000.

NEW HAVEN, CONN.—Plans are out for figures for two story, 70 x 100 ft., brick business building on Broadway and Howe Street for Beecher & Bennett Co., 280 Elm Street. C. S. Palmer, 191 Church Street, Architect. $60,000.

NORWICH, CONN.—Norwich Hospital for Insane is having plans prepared by Cudworth & Thompson, Architects, Thayer Building, for psychopathic and tuberculosis buildings on hospital grounds. $200,000.

SOUTH MANCHESTER, CONN.—Cheney Bros. let contract for two story, 60 x 90 ft., reinforced concrete factory to Aberthaw Construction Co., School Street, Boston.

TORRINGTON, CONN.—Charlotte Hungerford Memorial Hospital, Litchfield Road, is having plans prepared by E. Greene, Architect, 5 Beekman Street, New York City, for dormitory on hospital grounds. $50,000.

WATERBURY, CONN.—Board of Education plans to build brick, concrete and steel addition to Croft Street school. L. A. Walsh, 51 Leavenworth Street, Architect. $125,000.

WATERBURY, CONN.—F. A. Webster, Architect, 193 Homer Street, proposes building two story, 100 x 120 ft., brick garage on North Main and North Willow Streets for M. A. Doolittle, Watertown Avenue. $60,000.

DISTRICT OF COLUMBIA

WASHINGTON, D. C.—George Washington Memorial Association, Scott Circle, is having plans prepared by Tracy & Swartout, Architects, 18 West Thirty-fourth Street, New York City, for building four story, 200 x 220 ft., steel and brick memorial. $4,000,000.

FLORIDA

GREEN GROVE SPRINGS, FLA.—Board of Education, Clay County, plans election soon to vote on $50,000 bonds to build school here.

JACKSONVILLE, FLA.—Atlantic National Bank soon lets contract for one story, 50 x 100 ft., brick and steel bank. Mowbray & Uffinger, 56 Liberty Street, New York City, engineers. $100,000.

IDAHO

BLACKFOOT, IDAHO.—Building Committee, Mormon Church, will build two story brick church. Pope & Burton, New House Building, Salt Lake City, engineers. $150,000.

IDAHO FALLS IDAHO.—City voted $85,000 bonds to build high school.

POCATELLO, IDAHO.—Northwestern Auto Supply Co., Billings, plans to build three story plant here. $32,000.

ILLINOIS

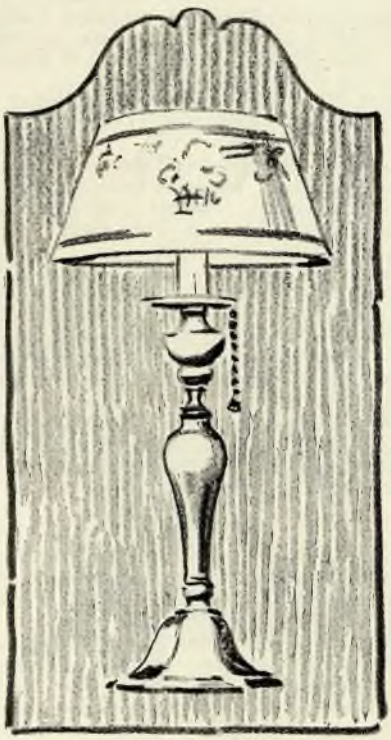
BROOKLYN, ILL.—Terminal Railroad Association, Union Station, St. Louis, Mo., plans to build 50 x 150 ft. brick and concrete boiler shop here to replace one recently destroyed by fire. W. Bawden, 411 Union Station, St. Louis Mo., superintendent and engineer. $35,000.

BELLEVILLE, ILL.—Western Brewing Co. will build addition to plant. $50,000.

CHICAGO, ILL.—J. A. Armstrong, Architect, 11 South La Salle Street, has plans for building seven story, 167 x 287 ft., mill construction warehouse on Ogden Avenue and Rockwell Street for A. I. Jordan, care of Architect. $300 000.

CHICAGO, ILL.—Foley & Co., 2835 Sheffield Avenue, proposes building two story, 40 x 125 ft., addition to present plant; new five story, 40 x 125 ft., building, and one and two story, 125 x x125 ft., warehouse, all mill construction. E. R. Krause, Majestic Theater Building, Architect. $200,000.

Pull Chain Sockets

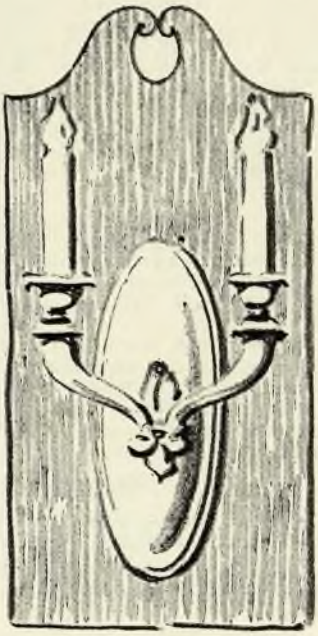


PULL chain sockets have two uses.

For wall bracket fixtures the convenience of using a pull-chain, rather than fumbling for a key makes pull-sockets highly desirable.

For ceiling fixtures the distance of the lamps from the floor makes pull sockets practically necessary if control of individual lamps is desired.

G-E Pull Chain Sockets are sturdy, dependable and the standard of electrical convenience.



G-E RELIABLE WIRING DEVICES
can be furnished by any reputable electrical contractor

G. E. metal shell pull chain socket.

G. E. metal shell pull chain socket (locking type)

The name General Electric Company on an electrical device is a guarantee of quality backed by over a quarter-century's experience in the generation, transmission, distribution and application of electricity.

G. E. porcelain pull chain socket (with insulated chain)

General Electric Company
General Office Schenectady, N.Y.

41-A

CHICAGO, ILL.—The R. F. Wilson Co. of Chicago has been awarded contract for construction of three story building at southwest corner Lake Park Avenue and Twenty-fourth Street for the Q. R. S. Co., a subsidiary of Melville Clark Piano Co. $100,000.

CHICAGO, ILL.—Fourteenth Church of Christ, Scientist, care of N. M. Dunning, Architect, 310 South Wabash Avenue, soon lets contract for one story, 105 x 140 ft., stone and terra cotta church on Paulina and Sunnyside Avenues. $175,000.

CHICAGO, ILL.—Sixteenth Church of Christ, Scientist, 1700 Lunt Avenue, had plans prepared by H. L. Cheney, Architect, 208 South La Salle Street, for building one story, 100 x 160 ft., brick and timber church on Ashland and Kenilworth Avenues. $200,000.

CHICAGO, ILL.—Hydrox Co., 3543 Normal Avenue soon lets contract for building three story reinforced concrete and brick ice factory on 4000 sq. ft. site on Lake Park Avenue and Twenty-fourth Street. Schmidt, Garden & Martin, 104 South Michigan Avenue, Architects.

IOWA

COUNCIL BLUFFS, IOWA.—Board of Education is having plans prepared by Proudfoot, Bird & Rawson, Architects, Hubbell Building, Des Moines, for school here. $240,000.

FORT DODGE, IOWA.—C. E. Atkinson has contract for constructing the addition of three stories to the Wahkonsa annex. $130,000.

WATERLOO, IOWA.—John G. Miller has general contract for Waterloo laundry building. H. O. Bernbrock, president. $110,000.

MASSACHUSETTS

ATHOL, MASS.—Town plans to build hall. D. P. Kimball, clerk. $150,000.

BOSTON, MASS.—City had plans prepared for three story brick hospital on Charles Street. H. G. Desmond, 15 Beacon Street, Architect. $150,000.

BOSTON, MASS.—W. D. Young Co., 10 Washington Street, plans to build five story reinforced concrete factory and sales house on Babcock and Commonwealth Avenues. $225,000.

DORCHESTER (BOSTON P. O.), MASS.—Adams & Pond plan to build two story, 60 x 120 ft., reinforced concrete factory on Commonwealth Avenue. $50,000.

SPRINGFIELD, MASS.—A. Goodside, Fidelity Building. Portland, Me., is having plans prepared by G. H. Desmond, Architect, 15 Beacon Street, Boston, for building five story, 60 x 154 ft., theater on Main and Pynchon Streets. $200,000.

MICHIGAN

DETROIT, MICH.—C. B. Bohn Foundry Co., Hart Avenue, is having plans prepared by C. W. Brandt, Architect, Kresge Building, for building one story, 80 x 100 ft., reinforced concrete, brick and steel power plant on Hart Avenue. $25,000.

DETROIT, MICH.—Directors Detroit Symphony Orchestra care of C. H. Crane, Architect, 2325 Dime Bank Building, are having plans prepared for building two story, 100 x 174 ft., brick, steel and reinforced concrete music hall and stores on Woodward Avenue and Parsons Street. W. H. Murphy, chairman. $300,000.

DETROIT, MICH.—St. Ambrose congregation, Wayburn Avenue, proposes building two story, 75 x 100 ft. brick and reinforced concrete school on Wayburn Avenue and Alter Road. Donaldson & Meier, 1314 Penobscot Building, Architects. $100,000.

DETROIT, MICH.—Detroit Savings Bank Penobscot Building, is having plans prepared by A. Kahn, Architect, Marquette Building, for two story steel and granite bank and office on Griswold and State Streets. $300,000.

FLINT, MICH.—D. L. Seymour & Co., Penobscot Building, Detroit, are having plans prepared for seven story, 70 x 200 ft., reinforced concrete and brick warehouse in Second and Ann Arbor Streets here. $225,000.

PONTIAC, MICH.—Hess-Pontiac Spring Co. plans to build two story brick and reinforced concrete forge shop. B. A. Litchfield, general manager. $200 000.

MINNESOTA

ALTURA, MINN.—Company is being formed to build electric light and power plant. Address Power Engneering Co., 510 Corn Exchange, Minneapolis, engineers. $300.000.

BALATON, MINN.—City plans election soon to vote on $60 000 bonds to build school. E. H. Feff, clerk, Board of Education.

DULUTH, MINN.—Banett & Record Co. received contract for building a fireproof annex to the Consolidated Elevator Co.'s Elevator H, on the Garfield Avenue water front, having a capacity of approximately 1,250,000 bushels of grain and costing $250,000.

DULUTH, MINN.—C. A. Bronson, secretary Board of Education, Glencoe Building, proposes building three story, 54 x 64 ft., reinforced concrete and brick grade school on East Third Street. Croft & Boerner, Lonsdale Building, Architects. $70,000.

GRASSTON, MINN.—City proposes building two story, 36 x 76 ft., school. Foss & Foss, St. Cloud, engineers. $50,000.

MINNEAPOLIS MINN.—Northwestern Catalogue Co., 800 Phoenix Building, proposes building four story, 100 x 100 ft., reinforced concrete and brick warehouse. Long, Lamereaux, Long & Phorshang, 1028 Andrus Building, Architects. $100 000.

RED LAKE FALLS, MINN.—Red Lake Falls Hotel Co. proposes building three story hotel. B. D. Lecl, First National Bank Building, Grand Forks, N. D., Architect.

ST. PAUL, MINN.—W. H. Schmelzel Co., Inc., 117 University Avenue, W., proposes building one story, 130 x 390 ft., reinforced concrete and brick tractor plant on Rice and Atwater Streets. L. W. Baumeister, 1204 Pioneer Building, contractor. $75,000.

ST. PAUL, MINN.—J. H. Allen & Co., Sixth Street and Broadway, is having plans prepared for wholesale grocery building. $1,000,000.

MISSOURI

JOPLIN, MO.—Hulburt Undertaking Co., West Fourth and Virginia Streets, let contract for two story, 60 x 110 ft., garage and 30 x 60 ft. chapel, brick, to R. L. Hoffman, Royal Heights. $35,000.

ST. LOUIS, MO.—Portorico Realty Co., 4549 Lindell Block, will build seven story reinforced concrete, steel and brick hotel at 5370 Pershing Avenue. $275,000.

ST. LOUIS, MO.—Northwestern Consolidated Milling Co., 438 Theresa Street, let contract for building three story, 50 x 130 ft., concrete, steel and brick warehouse at 438 Theresa Street to T. H. Ratz, 4333 Taft Avenue. $60,000.

MONTANA

GREAT FALLS, MONT.—Paris Dry Goods Co., 306 Central Avenue, will build ten story, 100 x 150 ft., store on Central Avenue. G. H. Shanley, 511 First National Bank Building, Architect. $500,000.

NEW JERSEY

ASBURY PARK, N. J.—Victory Tire & Rubber Co., 385 East 149th Street, New York City, plans to build two story, 75 x 165 ft., concrete and steel factory on Railroad Avenue here. E. A. Arend, Kinmoth Building, Architect. $125,000.

JERSEY CITY, N. J.—City will build addition to City Hospital. Plans include constructing new wing containing four wards, garage, morgue, fumigation building, laboratory, laundry building and tunnels; also vacuum cleaning plant. Total cost, $1,381,000.

RIVERSIDE, N. J.—Riverside Trust Co. plans to build one story bank, 60 x 67 ft. limestone, here. W. A. Klemann, First National Bank Building, Trenton, Architect. $75,000.

WEST NEW YORK, N. J.—Town Council proposes building reinforced concrete and brick school. $300,000.

NEW YORK

ALBANY, N. Y.—M. Spiegel, Strand Theater Building, New York City, soon lets contract for building two story, 75 x 175 ft., brick and steel theater on Monroe Street here. T. Lamb, 644 Eighth Avenue, New York City, Architect. $150,000.

BROOKLYN, N. Y.—Cushman Sons, Inc., 49 Manhattan Street, New York City, are having plans prepared by L. S. Beardsley, Architect, 40 West Thirty-second Street, New York City, for three story, 140 x 200 ft., brick and steel bakery on Atlantic and Troy Avenues here. $100,000.

BROOKLYN, N. Y.—Shampan & Shampan, Architects, 50 Court Street, propose building three story, 60 x 100 ft., brick and steel garage on Vanderbilt and DeKalb Avenues for W. Bauer, care of Architects. $50,000.

BROOKLYN, N. Y.—Levy Bros., 189 Montague Street, will build two story, 130 x 180 ft., brick and steel theater on Bedford Avenue and Lincoln Road. $500,000.

BROOKLYN, N. Y.—Mollers & Schuman, Marcy Avenue, propose building two story brick and steel factory on Gerry and Wallabout Streets. H. Holder, 242 Franklin Avenue, Architect. $80,000.

BROOKLYN, N. Y.—Pathe Freres, Grand Avenue is having plans prepared by R. G. Corey, Architect and Engineer, 39 Cortlandt Street, New York City, for seven story, 90 x 100 ft., brick, steel and reinforced concrete addition to factory.

BROOKLYN, N. Y.—J. Bene & Sons, 541 Dean Street, let contract for building two story, 100 x 100 ft., brick and steel factory on Clinton Avenue and Fulton Street to W. Kennedy Construction Co., 215 Montague Street.

BROOKLYN, N. Y.—Cairns Holding Co., Inc., let contract for nine story, 75 x 119 ft., brick and reinforced concrete factory on Atlantic and Classon Avenues to Gillies-Campbell, 101 Park Avenue, New York City.

BROOKLYN, N. Y.—Lasky Motor Car Corp., 17 Graham Avenue, will build two story, 100 x 100 ft., brick and steel garage on Montrose Avenue and Leonard Street. Shampan & Shampan, Architects, 50 Court Street. $75,000.

BROOKLYN, N. Y.—Washington Amusement Co., care of Zipkes, Wolff & Kudroff, Architects, 25 West Forty-second Street, New York City, is having plans prepared for one and one-half story, 100 x 137 ft., brick and steel theater on Washington Avenue and Prospect Place. $100,000.

BUFFALO, N. Y.—Peoples Bank, 224 Main Street, is having plans prepared for bank on Main and Seneca Streets, extending to Pearl Street. $1,000,000.

BUFFALO, N. Y.—Mentholatum Co., 146 Seneca Street, let contract for four story, 80 x 100 ft. reinforced concrete factory on Seneca Street to J. W. Cowper Co., Fidelity Building. $225,000.

CENTRAL ISLIP, N. Y.—State Hospital Commission Capitol, Albany, will build three story, 30 x 300 ft., addition to building for acute patients, with two wings 30 x 60 ft. and one 40 x 60 ft., brick and reinforced concrete. $150 000.

COHOES, N. Y.—Tooker & Marsh, Architects, 101 Park Avenue, New York City, have plans for building three story brick and steel high school for Board of Education. $210,000.

FREDONIA, N. Y.—Red Wing Grape Juice Co. contemplates building four story, 48 x 80 ft., reinforced concrete and brick warehouse and factory. W. H. Powers, care of owner, Architect. $40,000.

GLENS FALLS, N. Y.—Arrow Grip Mfg. Co. plans to build two story brick factory adjoining Delaware & Hudson R. R. $150,000.

GREENBURG, N. Y.—Board of Education is having plans prepared by Tooker & Marsh, Architects, 101 Park Avenue, New York City, for two story brick and steel school. $90,000.

LONG ISLAND CITY, N. Y.—Board of Education, 500 Fifth Avenue, New York City, will build three story, 100 x 100 ft., brick and steel addition to Bryant High School on Wilbur Avenue. C. B. J. Snyder, Municipal Building, New York City, Architect. $500,000.

LONG ISLAND CITY, N. Y.—L. Gold, 44 Court Street, Brooklyn, will build two story, 90 x 130 ft. reinforced concrete and steel factory on Sixth Street and Washington Avenue. $75,000.

LONG ISLAND CITY, N. Y.—Sawyer Biscuit Co., 404 East Thirty-second Street, New York City, plans to build eight story brick and steel factory on Degnon tract here. Ballinger & Perrott, 1328 Broadway, New York City, Architects.

NEW YORK, N. Y.—C. H. Allen, 138 William Street, proposes building seven-story brick and steel storage house at 119 Fulton Street and 56 Ann Street. Montgomery & Riggs, 105 West Fortieth Street Architects. $75,000.

NEW YORK, N. Y.—Industrial School, 418 West Forty-first Street, is having plans revised by G. M. McCabe, Architect, 96 Fifth Avenue, for three story, 50 x 99 ft., brick and steel garage at 418-420 West Forty-first Street. $55,000.

NEW YORK, N. Y.—Terminal Warehouse Co., 17 South William Street, is having plans prepared by J. W. O'Connor, Architect, 3 West Twenty-ninth Street, for two nine story brick and steel warehouses at 29-31 South William Street. J. H. Lynch, president. $100,000.

NEW YORK, N. Y.—Clinton & Russell, Architects, 32 Liberty Street, plan to build thirty story, 100 x 100 ft., brick and steel office at 93 Maiden Lane.

NEW YORK, N. Y.—Wendell Estate, 175 Broadway, is having plans prepared by C. E. Birge, Architect, 29 West Thirty-fourth Street, for altering six story brick and steel store and office building at 181 broadway. F. G. Shattuck, 62 West Twenty-third Street, lessee.

NEW YORK, N. Y.—Commonwealth Ice Co., 7 East Forty-second Street, let contract for two and three story, 101 x 169 ft., brick and steel ice plant on Sixty-seventh Street and West End Avenue to J. H. Taylor Construction Co. 110 West Fortieth Street. $70,000.

NEW YORK, N. Y.—R. Higgins, Architect, 126 East Thirty-eighth Street, is designing five story loft and office, 25 x 100 ft., brick and steel, at 45 Maiden Lane, for Lawyers Realty Co., 160 Broadway.

NEW YORK, N. Y.—60 Wall Street Corp. soon lets contract for building five story brick and steel addition. Clinton & Russell, 32 Liberty Street, Architects. $100,000.

OSSINING, N. Y.—State Hospital Commission, Capitol, Albany, soon receives bids for building four story, 50 x 200 ft., clinic building No. 8; four story, 40 x 260 ft., detention building and outside cells No. 5; one story, 50 x 200 ft., mess hall and kitchen No. 4, with two wings 50 x 80 ft.; one story, 30 x 30 ft., pumphouse and 30 x 90 ft. reservoir, and three story, 50 x 90 ft., outside cell No. 7; all reinforced concrete and brick construction.

ROCHESTER, N. Y.—Episcopal Church of the Ascension is having plans prepared for church. W. C. Compton, rector. $100,000.

ROCHESTER, N. Y.—Whit-Field Map Co., Inc., plans to build factory. Address I. A. Whitman, Rochester. $60,000.

ROCHESTER N. Y.—Keenan & Keenan, Powers Building, received contract for building four story, 100 x 120 ft., reinforced concrete and brick garage at 39 South Union Street. $100,000.

SYRACUSE, N. Y.—H. H. Franklin Mfg. Co. 302 South Geddes Street, proposes building two story, 70 x 150 ft., reinforced concrete addition to plant. R. J. Reidpath & Son, Builders Exchange Building, Buffalo, Architects.

SYRACUSE, N. Y.—Board of Education and City Engineering Department are having plans prepared by M. L. King, Architect, Snow Building, for three story brick academy to be known as Onondago Academy. $250 000.

SYRACUSE, N. Y.—Ward Bros. Co., Inc., purchased site on Taylor, Burt, South, State and Grape Streets and plan to build baking plant. Address E. J. Moore, local manager. $250,000.

WESTFIELD, N. Y.—Armour & Co., 208 South La Salle Street, Chicago, let contract for three story, 130 x 200 ft., brick and stone factory and 54 x 54 ft. power house to Black Construction Co., 20 West Jackson Boulevard, Chicago. $210,000.

OHIO

AKRON, OHIO.—State Savings & Trust Building Co., Main and Market Streets, is having plans prepared by Harpster & Bliss, Architects, Hamilton Building, for sixteen story, 52 x 72 ft., steel and brick bank and office on Main and Market Streets.

AKRON, OHIO.—Walker & Weeks, Architects, 1900 Euclid Building, Cleveland, have plans for building four story concrete, steel and brick welfare building on East Market Street for Goodyear Tire & Rubber Co., Market Street. $100,000.

BELLAIRE, OHIO.—United Mine Workers of Sub. Dist. No. 5, Bridgeport, Ohio, let contract for building three story temple, 82 x 120 ft., brick, on Thirty-fourth and Belmont Streets, to R. R. Kitchen Co., Wheeling, W. Va. $125,000.

CINCINNATI, OHIO.—Dolly Varden Chocolate Co., 411 Laurel Street, let contract for six story, 53 x 100 ft., reinforced concrete addition to factory to Ferro Concrete Construction Co., Richmond and Harriet Streets. $80,000.

CLEVELAND, OHIO.—Christain, Schwarzenberg & Gaede, engineers, 1900 Euclid Building, will build four story, 90 x 100 ft., concrete, steel and brick factory for Grabler Mfg. Co. 6565 Broadway Avenue. $100,000.

CLEVELAND, OHIO.—Cleveland Automobile Co., East 131st Street and St. Clair Avenue, plans to build four story reinforced concrete, steel and brick boiler house on London Road. E. McGeorge, 1900 Euclid Avenue, Architect. $100,000.

Carey ASFALTSLATE SHINGLES

For All Kinds of Houses

Examples of the kind of buildings on which Asfaltslate Shingles are used.

Robert First, Contractor, Cincinnati, $10,000 bungalow.

Methodist Episcopal Church, Downs, Kans., $50,000 structure—Roman style of architecture.

Eugene Martin, Italy, Texas, $5,000 brick bungalow.

Judge Schwan, Benton, Ills., $12,000—2½ story residence.

Japanese Tea Garden, Seattle, Wash. A $3,000 dream of artistic architecture.

H. S. Atho, Orlando, Fla., Sub-tropical home of great beauty.

R. C. Ware, Plainview, Texas, $7,000 single story, stucco bungalow.

Panama Park School Bldg., Jacksonville, Fla., $100,000 brick structure.

RESIDENCES listed in the panel range in cost from $2,000 to $15,000. This is typical.

Asfaltslate Shingles are suitable for any pitched roof. They are not merely beautiful; not merely fire-resisting; not merely enduring—they are *all* of these things *put together*.

They require no painting. They do not rot. They do not dry out and split nor curl. Wind cannot loosen them, heat or cold does not affect them; rust cannot reach the nail heads and, finally, they are spark-proof.

The base is a special wool felt produced in our own mills. This is thoroughly waterproofed with asphalt from our own refineries and the surface finished with crushed slate in natural red and green colors.

Asfaltslate Shingles save painting, repairs and replacements and reduce insurance premiums. To be sure of getting the maximum beauty, safety, economy and satisfaction, specify Carey Asfaltslate Shingles.

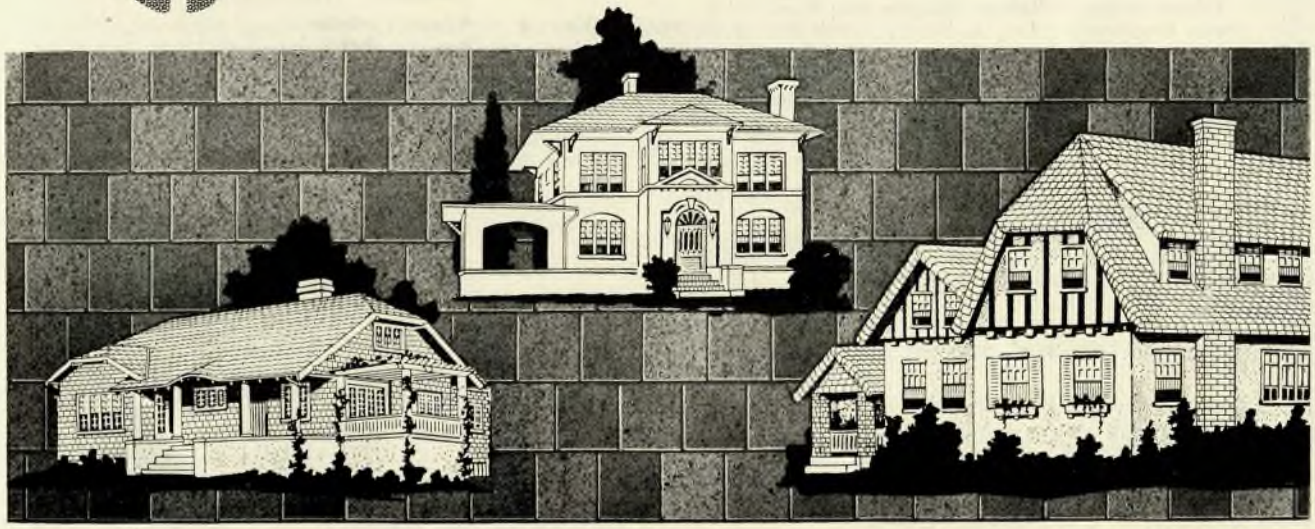
For particulars address nearest branch or

THE PHILIP CAREY COMPANY

General Offices: 505-525 Wayne Ave., Lockland, Cincinnati, O.

50 Branches and Distributors

Atlanta	Chattanooga	Detroit	Memphis	Omaha	Spokane
Baltimore	Chicago	Jacksonville	Minneapolis	Philadelphia	St. Louis
Birmingham	Cincinnati	Kansas City	Montreal	Pittsburgh	Tacoma
Boston	Cleveland	Knoxville	Nashville	Portland	Toronto
Buffalo	Dallas	Little Rock	New Orleans	San Francisco	Wheeling
Charlotte	Denver	Los Angeles	New York	Seattle	Washington, D. C.



CLEVELAND, OHIO.—E. A. Curtiss, Architect, 416 Guardian Building, has plans for two story, 60 x 125 ft., reinforced concrete, steel and brick factory at 9006-14 Woodland Avenue for J. H. Fisher, 2167 East Seventy-first Street. $50,000.

CLEVELAND, OHIO.—Land & Home Co. Williamson Building, plans to build five story concrete, steel and brick factory on East Thirtieth Street and Perkins Avenue.

CLEVELAND, OHIO.—National Lamp Association, Nela Park, plans to build six story reinforced concrete, steel and brick plant. $250,000.

CLEVELAND, OHIO.—W. J. Carter, Architect, 723 Illuminating Building, is receiving bids for four story, 50 x 100 ft., reinforced concrete, steel and brick factory at 2978 Woodhill Road for Van Dorn Electric Co., 2978 Woodhill Road. $75,000.

CLEVELAND, OHIO.—City proposes building two story 70 x 76 ft., concrete, steel and brick bathhouse at 2526 Central Avenue. F. H. Betz, 604 City Hall, Architect. $50,000.

CLEVELAND, OHIO.—Knights of Columbus (Forest City Council) 1770 West Twenty-fifth Street, plans to build five story concrete, steel and brick clubhouse on West Sixty-fifth Street and Detroit Avenue. $150 000.

CLEVELAND, OHIO.—Schoeder & Glickman, 416 Guardian Building, are having plans prepared by E. A. Curtiss, Architect, 416 Guardian Building, for three and four story concrete, steel and brick commercial building on East 149th Street and Lake Shore Boulevard. $90,000.

CLEVELAND, OHIO.—Paul Bros. Citizens Building, are having plans prepared by G. A. Grieble, Architect, Sloane Building, for eleven story reinforced concrete, steel and brick office on East Sixth Street and Vincent Avenue. $750,000.

CLEVELAND, OHIO.—E. Huberty, Architect, 8017 Whitehorn Avenue, soon receives bids for two story concrete, steel and brick theater and store on Fulton Road and Bush Avenue for American Amusement Co., 4108 Broadway Avenue. $80,000.

CLEVELAND, OHIO.—Lockwood, Greene & Co., Architects, 38 South Dearborn Street, Chicago, will build two story brick and timber factory for Beckman Co., Fulton Road. $175,000.

CLEVELAND, OHIO.—Van Aken & Strock, 6523 Euclid Avenue, let contract for building four story, 80 x 270 ft., reinforced concrete, steel and brick sales building on East Sixty-sixth Street and Euclid Avenue to A. W. Kilbourne Co., 6523 Euclid Avenue. $250,000.

COLUMBUS, OHIO.—F. L. Packard, Architect, Hayden Building, is preparing plans for building six story, 26 x 95 ft., reinforced concrete and brick bank and office on High and Main Streets for Franklin Loan & Savings Co., Main and High Streets. $110,000.

COLUMBUS, OHIO.—Carroll-Thompson Co., East Long Street, plans to build four story, 75 x 100 ft.,, sales building on East Long Street. E. C. Matthews, 79 Brighton Street, Architect. $150,000.

DAYTON, OHIO.—West Dayton Commercial & Savings Bank, West Third Street, plans to build three story, 85 x 120 ft., reinforced concrete and brick bank on Third Street and Western Avenue.

DOVER OHIO.—Tuscora Rubber Co., care of W. C. Owen Engineering Co., Architects, 1900 Euclid Building, Cleveland, is having plans prepared for three story concrete, steel and brick factory here. $100,000.

GALLIPOLIS, OHIO.—Board of Administration, Oak Street, will build two story, 48 x 68 ft., reinforced concrete and brick addition to West Hall. $72,000.

KENT, OHIO.—Mason Cotton Fabrics Co. will build three story mill. Lockwood, Greene & Co., 60 Federal Street, Boston, Mass., Architects. $700,000.

STEUBENVILLE, OHIO.—W. R. Johnson and associates plan to build nine story steel brick, limestone and granite hotel on Fourth and Washington Streets. J. S. Hershey, Altoona, Pa., Architect. $900,000.

WARREN, OHIO.—J. Warner Hotel Co. plans to build eight story reinforced concrete, steel and brick hotel. $300,000.

PENNSYLVANIA

NANTICOKE, PA.—Duplan Silk Co., 135 Madison Avenue, New York City, proposes building one and two story, 100 x 550 ft., brick and steel mill construction silk mill here. Ballenger & Perrott, Seventeenth and Arch Streets, Philadelphia, Architects.

PHILADELPHIA, PA.—Edward Fay & Son were awarded contract for one and two story brick boathouse, superintendent's office and stables, bandstand and two overlook comfort buildings, costing approximately $270 000.

PHILADELPHIA, PA.—George F. Pawling & Co. have contract for constructing one story brick, concrete and steel structure, 154 x 288 ft., for State Armory Board, at $215,000.

PHILADELPHIA PA.—Melody & Keating, 1322 Race Street, this city, received contract for addition to store building for L. W. Hirsch Co., 925-27 Market Street, at $250,000.

PHILADELPHIA, PA.—W. Freihofer, Twentieth Street and Indiana Avenue, plans to build two story, 72 x 190 ft., concrete and steel theater on Frankford Avenue, near Oxford Lane. H. C. Hogens, 1312 Walnut Street, Architect. $125,000.

PHILADELPHIA, PA.—H. C. Hogens, Architect 1312 Walnut Street, is preparing plans for two story theater, 100 x 200 ft., steel and concrete, on Germantown and Lehigh Avenues. $200,000.

SOUTH CAROLINA

CHARLESTON, S. C.—Sottile Cadillac Co., 261 Meeting Street, proposes building two story, 100 x 120 ft., reinforced concrete garage on Meeting Street. $53,000.

CHARLESTON, S. C.—A. B. Rhett, superintendent city schools, will build two story 100 x 170 ft., brick and concrete school on King Street. Cost between $90,000 and $100,000. Benson & Barbot, 26 Broad Street, have prepared plans.

TENNESSEE

JACKSON, TENN.—Bemis Bag Co., 601 South Fourth Street, St. Louis, Mo., plans to build two four story, 35 x 40 ft., reinforced concrete locker towers at plant here. Stephen & Pearson, 820 Central National Bank Building, St. Louis, Mo., Architects.

MEMPHIS, TENN.—A. S. Barboro & Co., 99 South Main Street let contract for tearing down old building and constructing two story, 100 x 150 ft., brick and concrete storehouse on Wagner and Pontotoc Streets to J. A. Alexander Construction Co., 388 North Front Street. $135,000.

TEXAS

AUSTIN, TEX.—Jake Wattinger of Austin has contract for constructing the new Sull Ross Normal College at Alpine.

AUSTIN, TEX.—Hogg-Wroe Syndicate had plans prepared for twelve story, 60 x 160 ft., hotel on Congress Avenue, between Tenth and Eleventh Streets. L. J. Schneider, care of American National Bank Littlefield Building, secretary-treasurer. $360,000.

EL PASO, TEX.—Central Baptist congregation plans to build one story brick and steel church on Virginia and Montana Streets. O. H. Thorman, 725 First National Bank Building, Architect. $100,000.

WASHINGTON

HOQUIAM, WASH.—J. Johnson and associates, Puget Sound, plan to build steel rolling mills at harbor here. First unit to cost $250,000.

WEST VIRGINIA

ATHENS, W. VA.—A. F. Wysong, Architect, Princeton, has plans for building three story brick dormitory at Normal School here. $60,000.

HUNTINGTON, W. VA.—Voegele & Dinny Co., 603-5 Fourth Avenue is having plans prepared by R. T. Day, Architect, First National Bank Building, for reinforced concrete warehouse. $80,000.

MONTGOMERY, W. VA.—A. F. Wysong, Architect, Princeton, prepared plans for building two story brick high school for Board of Education. $80,000.

WISCONSIN

ASHLAND, WIS.—The general contract for building the tri-county tuberculosis sanatorium was awarded to Tomlinson & Egan of Ashland at $80,000.

MILWAUKEE, WIS.—Jaeger Baking Co., Central Avenue, proposes building three story, 100 x 100 ft., brick and steel bakery. L. S. Beardsley, 40 West Thirty-second Street, New York City, engineer. $100 000.

SHEBOYGAN, WIS.—Raab-Thieman Co., 816 Niagara Avenue, is having plans prepared by W. C. Weeks, Architect, Ontario Avenue for building two story, 60 x 150 ft., brick garage. $55,000.

At the Architect's Service

The Value of Good Will

Architects appreciate the value of good will for it is largely through satisfied clients that their business is enlarged. In fact, they are dependent upon good will to an extent equalled only by members of other learned professions.

Manufacturers sometimes fail to appreciate the value of the good will of architects until some incident arises where the lack of it affects their business.

An incident in point arose in connection with the selection of the plumbing equipment for one of the most prominent office buildings erected in New York. The architect specified the product of a manufacturer who had become well and favorably known to him through consistent advertising in architectural journals and uniformly satisfactory business dealings.

A manufacturer of closet seats, whose product was part of the regular equipment selected, endeavored to have his seats specified independently and even offered a lower price.

The architect refused to specify them because this company was unknown to him and he preferred to deal with an organization that had established its reputation by publicly standing behind all goods it furnished—one which had won the good will of the profession.

Ads. marked E.O.W. appear every other week Ads. marked E.F.W. appear every fourth week
Ads. marked O.A.M. appear once a month

DIGEST
Of Manufacturers' Data

ARCHITECTS' OFFICE EQUIPMENT

PENCILS:

Dixon Crucible Co., Jos., Jersey City, N. J.

BLACKBOARDS, SLATE

Natural Slate Blackboard Co., Pen Argyl, Pa.

CASEMENT WINDOWS

METAL:

Pomeroy Co., Inc., S. H., 30 E. 42d St., N. Y.

CEMENT AND PLASTER

CEMENT:

Atlas Portland Cement Co., The, New York.

CORNER BEADS:

Milwaukee Corrugating Co., Milwaukee, Wis.

PLASTER:

National Kellastone Co., The, Chicago, Ill.

SPECIALTIES:

Truscon Steel Co., Dept. 68, Youngstown, Ohio. Representatives in principal cities. Corner beads, "Kahn" curb bars, "Trus-Con" slotted inserts; "Kahn" adjustable inserts; "Trus-Con" National socket inserts; "Kahn" elastic filler and armor plates for expansion joints.

STUCCO:

National Kellastone Co., The, Chicago, Ill.

CONCRETE REINFORCEMENT

REINFORCEMENT:

American Steel & Wire Co., Chicago-New York.

Berger, The, Mfg. Co., Canton, Ohio.

Bostwick Steel Lath Co., The, Niles, O.; 135 N. 22nd St., Phila., Pa. Bostwick "Truss-V-Rib" for all light concrete work without forms or stiffening channels.

Truscon Steel Co., Dept. 68, Youngstown, Ohio. Representatives in principal cities. "Kahn" System reinforced concrete; "Kahn" bars; "Rib" bars; "Rib" lath; "Floretyles," "Floredome," etc.; flat and beamed ceilings of all types.

DAMPPROOFING

(See Water and Dampproofing)

DAYLIGHTING

Berger, The, Mfg. Co., Canton, Ohio.

DOORS AND TRIM

HOLLOW STEEL DOORS:

Interior Metal Mfg. Co., Jamestown, N. Y.; Bankers Trust Bldg., 501 Fifth Ave., New York. Hollow steel doors in all standard sizes.

SHEET METAL DOORS:

Merchant & Evans Co., Philadelphia, Pa. "Almetl" fire doors and shutters.

SLIDING DOOR EQUIPMENT:

Richards-Wilcox Mfg. Co., Aurora, Ill.

STEEL ROLLING EQUIPMENT:

Edwards Mfg. Co., The, 319-349 Eggleston Ave., Cincinnati, O. Send specifications for estimate.

THIS department is intended to assist our subscribers in readily determining the names and addresses of manufacturers of products in which they may be interested, together with brief data about their material.

The headings and sub-headings are arranged alphabetically and have been selected in accordance with the intent of meeting the architect's thought in preparing his specifications.

If the information desired is not found here, it will gladly be supplied by the Service Department of THE AMERICAN ARCHITECT.

DUMB-WAITERS

Sedgwick Machine Wks., 159 W. 15th St., N.Y.

ELECTRICAL EQUIPMENT AND SUPPLIES

CONDUITS AND FITTINGS:

National Metal Molding Co., 1111 Fulton Bldg., Pittsburgh, Pa. "NATIONAL" metal molding for surface wiring; "SHERADUCT" and "ECONOMY" conduits, "FLEXSTEEL" armored cable and a complete line of fittings.

Youngstown (O.) Sheet & Tube Co. "Buckeye" rigid conduit. "Realflex" armored conductor.

COOKING APPLIANCES:

General Electric Co., Schenectady, N. Y.

DOOR OPENERS:

Richards-Wilcox Mfg. Co., Aurora, Ill.

LIGHTING SYSTEMS:

General Electric Co., Schenectady, N. Y.

OUTLET BOXES:

General Electric Co., Schenectady, N. Y.

Hart & Hegeman Mfg. Co., Hartford, Conn.

PANEL BOARDS:

Structural Slate Co., The, Pen Argyl, Pa.

RECEPTACLES:

Hart & Hegeman Mfg. Co., Hartford, Conn.

SOCKETS:

Hart & Hegeman Mfg. Co., Hartford, Conn.

SWITCHES:

General Electric Co., Schenectady, N. Y.

Hart & Hegeman Mfg. Co., Hartford, Conn.

WIRES AND CABLES (Insulated):

General Electric Co., Schenectady, N. Y.

ELEVATORS AND HOISTS

CONVEYORS:

Otis Elevator Co., 11th Ave. and 26th St., N. Y. C. Gravity spirals.

DOOR EQUIPMENT:

Richards-Wilcox Mfg. Co., Aurora, Ill.

ELEVATORS:

American Elevator & Machine Co., Louisville, Ky.

Kaestner & Hecht Co., 500 South Throop St., Chicago, Ill.

Otis Elevator Co., 11th Ave. and 26th St., N. Y. C. Offices in principal cities of the world. Electric, hydraulic, belt and hand power, inclined freight elevators and escalators.

ELEVATORS (Hand Power):

Sedgwick Machine Wks., 159 W. 15th St., N.Y.

ELEVATOR CABLE:

American Steel & Wire Co., Chicago-New York.

HOISTS (Ash):

Otis Elevator Co., 11th Ave. and 26th St., N. Y. C. Automatic coal and ash hoists. blast furnace and ship hoists.

FIREPROOFING MATERIALS

CAGING OR FORMING:

Mitchell-Tappen Co., 15 John St., N. Y. C.

METAL LATH:

Berger, The, Mfg. Co., Canton, Ohio.

Bostwick Steel Lath Co., The, Niles, O.; 135 N. 22nd St., Phila., Pa. Bostwick "Truss-Loop" and expanded metal in three types; "Diamond A" and "Lock."

Milwaukee Corrugating Co., Milwaukee, Wis.

Truscon Steel Co., Dept. 68, Youngstown, Ohio. Representatives in principal cities. "Hy Rib," "Rib" lath; "Diamond Mesh" lath.

FIRE PROTECTION

AUTOMATIC FIRE DOOR HARDWARE:

Richards-Wilcox Mfg. Co., Aurora, Ill.

FLOORS

COMPOSITION:

Franklyn R. Muller & Co., Waukegan, Ill.

National Kellastone Co., The, Chicago, Ill.

TILE AND CERAMIC MOSAIC:

Structural Slate Co., The, Pen Argyl, Pa.

FOUNDATIONS

PILES:

Raymond Concrete Pile Co., 140 Cedar St., N. Y. C. "Raymond" concrete piles are made by driving a reinforced steel shell which is left permanently in the ground. This shell is then filled with concrete.

ALPHABETICAL INDEX OF ADVERTISERS ON PAGE 20

FURNITURE AND DECORATIONS

DRAPERIES, UPHOLSTERIES, WALL COVERINGS:

Standard Textile Products Co., The, 320 Broadway, New York. "Sanitas" Tinted, Decorative and Glazed. Fast colors, sanitary. For private homes, hotels, auditoriums, institutions, etc.

ECCLESIASTICAL FURNITURE:

Thomas & Co., Inc., 110 Exchange St., Worcester, Mass.

METAL:

Canton Art Metal Co., Canton, Ohio.

HARDWARE

"AIR-WAY" HARDWARE:

Richards-Wilcox Mfg. Co., Aurora, Ill.

BOLTS:

Corbin, P. & F., New Britain, Conn.

BUILDERS' HARDWARE:

Corbin, P. & F., New Britain, Conn.
Richards-Wilcox Mfg. Co., Aurora, Ill.
Sargent & Co., New Haven, Conn.
Stanley Works, The, New Britain, Conn.

BUTTS AND HINGES:

Corbin, P. & F., New Britain, Conn.
Lawson Mfg. Co., Superior and Franklin Sts., Chicago, Ill. "Nu" Jamb Hinge.
McKinney Mfg. Co., Pittsburgh, Pa.
Stanley Works, The, New Britain, Conn. (Ball-Bearing)—steel, brass, bronze.

DOOR CHECKS:

Corbin, P. & F., New Britain, Conn.
Richards-Wilcox Mfg. Co., Aurora, Ill.

GARAGE HARDWARE:

Richards-Wilcox Mfg. Co., Aurora, Ill.
Stanley Works, The, New Britain, Conn. Garage door holders and garage door hinges.

HEATING, VENTILATION, PLUMBING

BLOWERS AND EXHAUSTERS:

Buffalo Forge Co., Buffalo, N. Y.

CLOSETS:

Clow, James B., & Sons, Chicago, Ill.

DRINKING FOUNTAINS:

Cahill Iron Works, The, Chattanooga, Tenn.
Clow, James B., & Sons, Chicago, Ill.

FLOOR DRAINS:

Crampton-Farley Brass Co., Kansas City, Mo.

HEAT REGULATING SYSTEMS:

Gold Car Heating & Lighting Co., 17 Battery Place, New York. Gold's thermostatic heat regulating system.

LAUNDRY TUBS:

Cahill Iron Works, The, Chattanooga, Tenn.
Structural Slate Co., The, Pen Argyl, Pa.

LAVATORIES:

Cahill Iron Works, The, Chattanooga, Tenn.
Clow, James B., & Sons, Chicago, Ill.

PIPE (Steel):

Youngstown Sheet & Tube Co., Youngstown, O.

PLUMBERS' HARDWARE:

Structural Slate Co., The, Pen Argyl, Pa.

RADIATORS:

Clow, James B., & Sons, Chicago, Ill.

SHOWERS:

Structural Slate Co., The, Pen Argyl, Pa.

HEATING, VENTILATION, PLUMBING—Continued

SINKS:

Cahill Iron Works, The, Chattanooga, Tenn.

SINKS (Slop):

Cahill Iron Works, The, Chattanooga, Tenn.

TANKS (Closet):

Cahill Iron Works, The, Chattanooga, Tenn.

TEMPERATURE INSTRUMENTS:

Taylor Instrument Co., Rochester, N. Y.

TOILET PAPER HOLDERS:

A. P. W. Paper Co., Albany, N. Y.

TRAPS (Steam):

Jenkins Bros., 80 White St., N. Y. C.

TUBS (Bath):

Cahill Iron Works, The, Chattanooga, Tenn.

TUBS (Laundry):

Cahill Iron Works, The, Chattanooga, Tenn.

URINALS:

Cahill Iron Works, The, Chattanooga, Tenn.
Clow, James B., & Sons, Chicago, Ill.
Structural Slate Co., The, Pen Argyl, Pa.

VALVES (Air):

Jenkins Bros., 80 White St., N. Y. C.

VALVES (Radiator):

Jenkins Bros., 80 White St., N. Y. C.

VALVES (Steam):

Jenkins Bros., 80 White St., N. Y. C.

VALVES (Water Line):

Jenkins Bros., 80 White St., N. Y. C.

VAPOR HEATING SYSTEMS:

American Dist. Steam Co., N. Tonawanda, N.Y.

VENTILATORS:

Burt Mfg. Co., The, 77 Main St., Akron, O. Manufacturers of all types of ventilators, both stationary and revolving.
Merchant & Evans Co., Philadelphia, Pa.
Milwaukee Corrugating Co., Milwaukee, Wis.

WATER SYSTEMS:

Deming Co., Salem, O.

HOISTS

(See Elevators and Hoists)

INSULATION (Sound and Heat)

BUILDING:

Cabot, Samuel, Inc., Boston. "Cabot Quilt."
Hydrex Felt & Eng. Co., 120 Liberty St., N.Y.

LIGHTING FIXTURES

GLASSWARE:

Mitchell-Vance Co., 503 W. 24th St., New York City.

METAL:

Mitchell-Vance Co., 503 W. 24th St., New York City.

MARBLE

Appalachian Marble Co., Knoxville, Tenn.

MUSICAL INSTRUMENTS

ORGANS:

Kimball, W. W., Co., Chicago, Ill.

ORNAMENTAL BRONZE AND IRON

Polachek, John, Bronze & Iron Co., 480 Hancock St., Long Island City, N. Y.

PAINTS, VARNISHES, STAINS

LEAD (Red):

Carter White Lead Co., Chicago, Ill.

LEAD (White):

Carter White Lead Co., Chicago, Ill.

LITHARGE:

Carter White Lead Co., Chicago, Ill.

PAINT (Steel Protective):

Dixon, Joseph, Crucible Co., Jersey City, N. J.

STAINS:

Cabot, Samuel, Inc., Boston. "Cabot's" Creosote Stains, Stucco Stains, Brick Stains, Old Virginia White and Old Virginia Tints.

PARTITIONS

METAL:

Berger, The, Mfg. Co., Canton, Ohio.
Interior Metal Mfg. Co., Jamestown, N. Y.; Bankers Trust Bldg., 501 Fifth Ave., N. Y. Interchangeable Hollow Metal Partitions.
Pomeroy, S. H., Co., Inc., 30 E. 42d St., N. Y.

SLIDING PARTITION EQUIPMENT:

Richards-Wilcox Mfg. Co., Aurora, Ill.

PLASTER

(See Cement and Plaster)

PLUMBING

(See Heating, Ventilation, Plumbing)

REFRIGERATION

REFRIGERATORS:

McCray Refrigerator Co., 607 W. Lake St., Kendallville, Ind.

ROOFING

ASPHALT:

Carey, Philip, Co., The, Lockland, Cincinnati, Ohio. Carey Flexible Cement Roofing. A roofing for all classes of buildings, flat or steep surfaces; concrete, tile or wood sheathing construction. Made of a flexible asphalt cement in sheets 26 in. wide by 36 ft. long.

CANVAS:

Hydrex Felt & Eng. Co., 120 Liberty St., N.Y.

SHEET METAL:

American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Merchant & Evans Co., Philadelphia, Pa.

SHINGLES, METAL:

Milwaukee Corrugating Co., Milwaukee, Wis.

SLATE:

General Slate Co., 148 State St., Boston, Mass.
Rising & Nelson Slate Co., West Pawlet, Vt.; 101 Park Ave., N. Y. C. Special slate to architect's design.

TILE, METAL:

Merchant & Evans Co., Philadelphia, Pa. Spanish metal tiles, metal Gothic shingles.

TILE (Reinforced-Cement):

American Cement Tile Mfg. Co., Pittsburgh and New York. "Bonanza" roofing tile.

SAFETY TREADS

Am. Mason Safety Tread Co., Lowell, Mass.
Structural Slate Co., The, Pen Argyl, Pa.

ALPHABETICAL INDEX OF ADVERTISERS ON PAGE 20

SASH
(See Windows)

SASH CORD
Samson Cordage Works, 88 Broad St., Boston.

SHEET METAL
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Merchant & Evans Co., Philadelphia, Pa.

FORMED PRODUCTS:
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Berger, The, Mfg. Co., Canton, Ohio.
Kawneer Mfg. Co., 1201 No. Front St., Niles, Mich.

METAL CEILINGS:
Berger, The, Mfg. Co., Canton, Ohio.
Canton Art Metal Co., Canton, Ohio.
Milwaukee Corrugating Co., Milwaukee, Wis.

SKYLIGHTS, ROLLED STEEL
Milwaukee Corrugating Co., Milwaukee, Wis.

STAINS
(See Paints, Varnishes and Stains)

STORE FRONTS
Kawneer Mfg. Co., 1201 No. Front St., Niles, Mich.

STRUCTURAL STEEL
PRESSED STEEL CONSTRUCTION:
Berger, The, Mfg. Co., Canton, Ohio. "Metal Lumber." Pressed Steel Joists and structural members.
Truscon Steel Co., Dept. 68, Youngstown, Ohio. Representatives in principal cities. "Kahn" pressed steel beams, joists, studs, plates, etc.

STUCCO AND WALL BOARD
PLASTER BOARD:
Bishopric Mfg. Co., The, 744 Este Ave., Cincinnati, Ohio. Bishopric Stucco or Plastic Board. The dove-tailed key locks the plaster. Made of creosoted lath, asphalt-mastic and heavy fibre board.

STUCCO:
National Kellastone Co., The, Chicago, Ill.

TERRA COTTA
TERRA COTTA (Architectural):
Midland Terra Cotta Co., 1515 Lumber Exchange, Chicago, Ill.
N. Y. Arch. Terra Cotta Co., Tel. Astoria 700.

TILE
(See Flooring and Roofing)

VARNISHES
(See Paints, Varnishes and Stains)

VENTILATION
(See Heating, Ventilation, Plumbing)

WALL BOARD
(See Stucco and Wall Board)

WATER AND DAMPPROOFING
Cabot, Samuel, Inc., 141 Milk St., Boston.
Hydrex Felt & Eng. Co., 120 Liberty St., N. Y.

WATER SUPPLY SYSTEMS
Carter, R. B., Co., 152 Chambers St., N. Y. C.

WINDOWS METAL
Detroit Steel Products Company, Department No. 9, Detroit, Mich. Fenestra Solid Steel Windows are made from Solid Rolled Steel Bars interlocked by patented Fenestra joints. Ventilators are equipped with adjustable, removable butts. Fenestra Gravity Cam Latch automatically locks ventilators when closed. Patented Channel Section gives ventilators double weathering.
Kawneer Mfg. Co., 1201 No. Front St., Niles, Mich.
Pomeroy, S. H., Co., Inc., 30 E. 42d St., N. Y.
Truscon Steel Co., Dept. 68, Youngstown, Ohio. Representatives in principal cities. "United" steel sash in all types; horizontally and vertically pivoted sash; counterbalanced and counterweighted sliding sash; center pivoted and top hung continuous sash; steel and glass partitions; sliding and swinging doors; casement sash of all designs.

CASEMENT:
(See Casement Windows)

WIRE GLASS
Mississippi Wire Glass Co., 216 5th Ave., N. Y. C. Polished Wire Glass—"Romanesque," "Syenite," "Maze," "Pentecor," "Ribbed," "Rough." Figured Wire Glass—"Apex," "Romanesque," "Syenite," "Maze," "Florentine," "Figure No. 2." "Ondoyant," "Pentecor," "Ribbed," "Rough."

WOOD
HEMLOCK:
Hemlock Manufacturers, The, 303 F. R. A. Bldg., Oshkosh, Wis.

WALNUT:
American Walnut Mfrs. Assn., Room 408, 115 Broadway, New York.

RATES for Classified Advertisements

243 West 39th St., New York

Positions Wanted, 75 cents for 25 words or less and 2 cents for each additional word; Help Wanted, Special Notices, Competitions, Proposals, etc., $1 for 25 words or less and 3 cents for each additional word. Ten lines or more 30 cents per line. Copy received until 12 m. Friday. PAYMENTS STRICTLY IN ADVANCE.

Position Wanted advertisements of men who have been serving in the army and who desire to make connection with architects' offices will be inserted free of charge.

POSITIONS WANTED

I WOULD like to find a job in an architect's office for a young soldier just discharged. He was a Lieutenant in the Aviation Corps, has a Croix de Guerre, and Special Citation by the French Government. He is a graduate of Cornell University in architecture (1917). Address A. J. B., McGraw-Hill Company, Inc., 10th Avenue and 36th Street, New York. (2263-64-65)

AN architectural draftsman with technical training, a designer, colorist and perspective delineator; also a competent structural engineer; fourteen years' experience; desires to associate with a practising architect, who has a general line of commercial work, particularly in the promotion of new building projects, working on the percentage basis. Location optional. Single, 34 years of age. Further information will be given if desired. Address 64-A, care The American Architect. (2264-65)

WANTED—By a discharged 2nd Lieutenant, U. S. A., B. S. in Architectural Engineering, an opening with a reputable architectural firm, preferably one in the engineering branch. Salary of no concern to begin with: the preference of location. John E. Baade, Box 131, College Station, Texas. (2265)

A SUPERVISING position, by a registered architect of New York State. Is up to date, has knowledge and long experience as chief draftsman and superintendent of construction. Address 65-A, care The American Architect. (2265)

HELP WANTED

ARCHITECTURAL SPECIFICATION WRITER—Ability to handle large industrial and commercial work desired. Good opportunity for right party. State fully regarding training and experience, also salary expected. Smith, Hinchman & Grylls, 710 Washington Arcade, Detroit, Michigan. (2265)

ARCHITECTURAL designers, superintendents and tracers wanted. Our calls for these men come from all States in the Mississippi valley. We charge no registration fee and our rates are reasonable. Registration blanks sent on application. (Architects needing men—communicate with us.) Architects Agency, 115 S. Dearborn St., Chicago. (t.f. 2272)

WANTED—Draughtsman who can make working drawings from sketches. Town of thirty thousand in Virginia. Salary $25 to $30 a week. Address 65-C, care The American Architect. (2265)

ARCHITECTURAL draftsman. Technical graduate; 16 years' experience; 6 years on plans and details; 10 years as field supervisor; now inspector of construction work Washington Navy Yard. Reference, Mr. John Laurence Mauran, Chemical Bldg., St. Louis, Mo. A. E. Garland, 515 Pennsylvania Ave. S. E., Washington, D. C. (2265-66)

DRAUGHTSMAN wanted. Thoroughly experienced on working drawings, also specification writer wanted. Rossel Edward Mitchell & Co., Ltd., Architects, Engineers, Town Planners, Norfolk, Virginia. (2265-66)

SPECIAL NOTICES

PARTNERSHIP—Architect, 32 years of age, university man, ten years' experience in city and suburban work, just finishing two years' service with government on industrial work, desires position in charge of established office, with prospect of immediate or ultimate partnership. Smaller city in South preferred, but location a secondary consideration. Present salary three thousand. Correspondence solicited. Address 64-C, care The American Architect. (2264-65)

FOR SALE—An old established architectural practice in a leading Eastern city. Well equipped office—fixtures, library, utensils, etc., included. Best of reasons given for sale and closest investigation invited. Address 64-B, care The American Architect. (2264-65-66)

DRAUGHTSMAN, architectural, good all around man, also steel and concrete engineering, would like to rent table and desk room in N. Y. City architect's office. Best references. Address 65-B, care The American Architect. (2265)

PROPOSALS

NOTICE TO CONTRACTORS: Sealed proposals for Construction, Heating, Sanitary and Electric Work—Additional Quarters for Acute Patients, Central Islip Sate Hospital, Central Islip, N. Y., will be received by the State Hospital Commission at the Capitol, Albany, N. Y., until 3 o'clock P. M., on Wednesday, June 4, 1919, when they will be publicly opened and read. Proposals shall be enclosed in an envelope furnished by the State Architect sealed and addressed, and shall be accompanied by a certified check in the sum of five per cent (5%) of the amount of the proposal. The contractors to whom the awards are made will be required to furnish surety company bond in the sum of fifty per cent (50%) of the amount of the contract within thirty (30) days after official notice of award of contract and in accordance with the terms of Specifications No. 3219, 3239, 3240, 3241. The right is reserved to reject any or all bids. Drawings and specifications may be consulted at the Central Islip State Hospital, Central Islip, N. Y., at the New York Office of the Department of Architecture, Room 1715, Tribune building, and at the Department of Architecture, Capitol, Albany, N. Y. Drawings and specifications and blank forms of proposal may be obtained at the Department of Architecture, Capitol, Albany, N. Y., upon reasonable notice to and in the discretion of the State Architect, L. F. Pilcher Capitol, Albany, N. Y.

Dated: May 7, 1919. E. S. ELWOOD,
Secretary, State Hospital Commission.
(2265-66)

Competition is not restricted when Carter White Lead alone is specified. This brand is so widely distributed that no dealer has any monopoly nor will any contractor submit a lower bid on any other brand of strictly pure white lead.

The client's interests may be safeguarded without increasing the cost of painting.

CARTER WHITE LEAD CO.
CHICAGO

THE STANLEY WORKS

Our good will—the reputation for quality we have established during our 76 years of manufacturing experience — is the foundation of this business. We could not afford to jeopardize it by placing this trade mark on anything but the very best hardware of its kind.

TRADE S.W. MARK

THE STANLEY WORKS
New Britain, Conn., U. S. A.

100 Lafayette Street
New York

Chicago
73 East Lake Street

"Use Ball Bearing Butts for Permanence"

In this Great Mercantile Establishment

Pope Building, occupied by Hahne Bros. Co., Cleveland, Ohio.

A statement of the conditions will bring you the applying bulletin. For immediate reference see "Sweets," Pages 1104-1107.

Four Deming Power Pumps are used. One supplies all the hot and cold water for domestic use above the second floor; another furnishes the drinking water.

The third one forces a brine solution to the refrigerating rooms and restaurant on the seventh floor, while the fourth maintains a pressure of 180 pounds for the sprinkler system throughout the building.

There are hundreds of other equally satisfactory Deming installations in office buildings, department stores, theatres, hotels, apartment houses, private estates, etc. Our engineers will be glad to cooperate with you.

Distributors:

Chicago: Henion & Hubbell Pittsburgh: Harris Pump & Supply Co. New York: Ralph B. Carter Co., 152 Chambers St. Boston: Chas. J. Jager Co. Buffalo: Root, Neal & Co. Philadelphia: W. P. Dallett Co. Denver: Hendrie & Bolthoff Mfg. & Supply Co. San Francisco: Simonds Machinery Co.

THE DEMING COMPANY, SALEM, OHIO

Deming
PUMPS THE WORLD'S BEST

American Wire Rope

Send for Special Illustrated Catalogue

American Steel & Wire Company

CHICAGO
NEW YORK
CLEVELAND
PITTSBURGH
DENVER
U. S. STEEL PRODUCTS CO.

Light Weight Construction for Light Loads

Does it not seem uneconomical to design a floor construction which weighs nearly as much as the load it supports? Yet this is what must be done with many types of fireproof construction to support loads such as occur in apartment houses, schools, hotels, office buildings, etc. A great part of the materials of construction is thus used to support itself.

The light weight of Truscon Pressed Steel makes it ideal for light-occupancy buildings. The beams are light in weight and correspondingly easy to handle, while only a minimum of materials is required for the floor and ceiling. All members are shop fabricated, saving field labor. Merely set the beams in place, attach Hy-Rib Lath and apply plaster and concrete. No centering nor forms are required.

Truscon Pressed Steel Construction is fireproof and permanent, and economical in all respects. It is the ideal construction for apartment buildings, schools, stores, hotels, etc. Endorsed by successful use in many important buildings.

On request, we will gladly furnish complete information, catalog, etc.

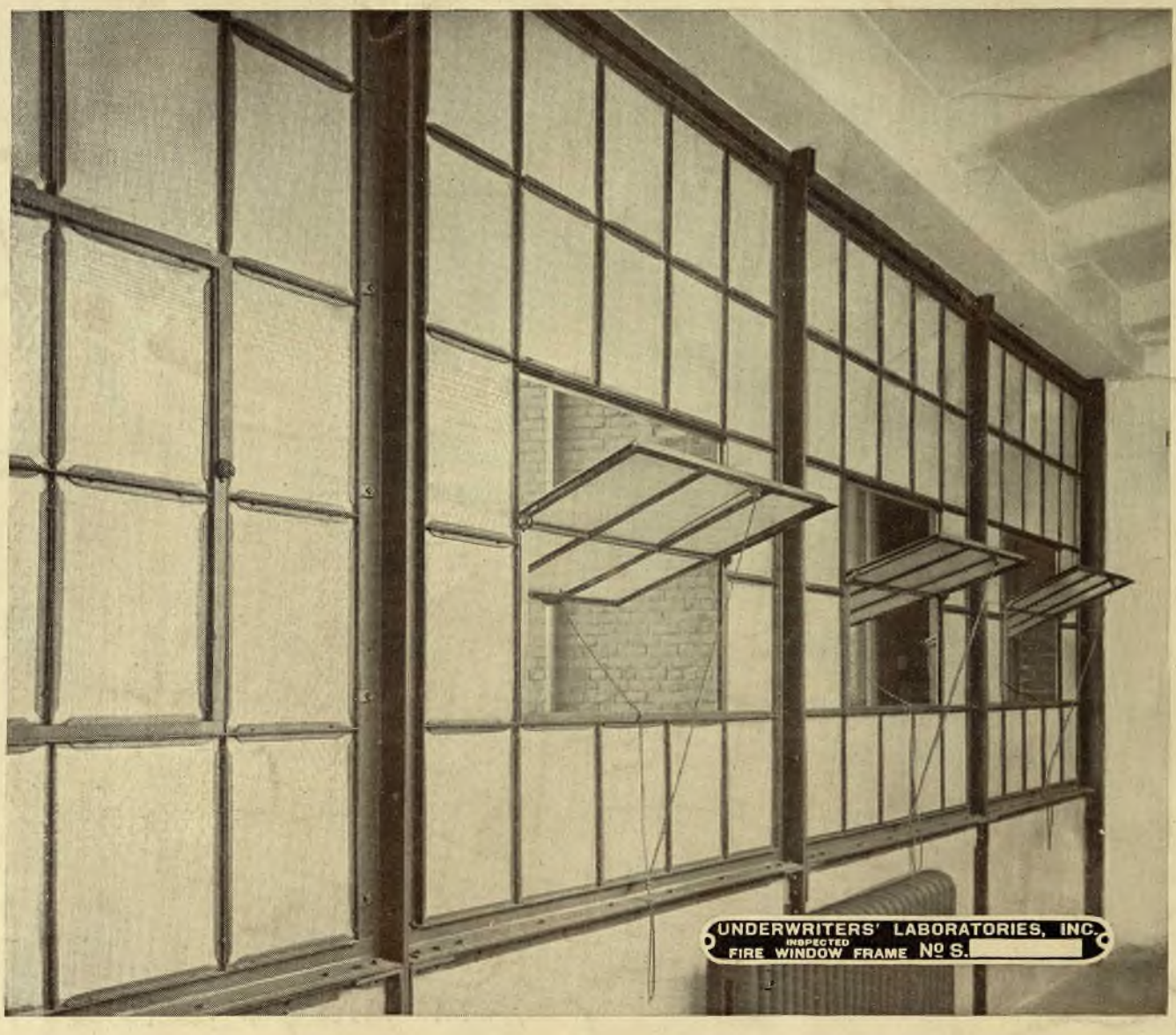
Structural Pressed Steel Dept.

TRUSCON STEEL COMPANY
·YOUNGSTOWN·OHIO· WAREHOUSES AND SALES OFFICES IN PRINCIPAL CITIES

Reinforcing Steel, Metal Lath, Steel Windows, Steel Buildings, Pressed Steel, Cement Tile, Etc.

Truscon
Pressed Steel
Joists
and Studs

TRUSCON STEEL CO
TRUSCON
BUILDING PRODUCTS



Fenestra Underwriters' Sash are Used to Fill Wide Openings

Connecting bridges between buildings of the J. L. Hudson Company's Department Store, Detroit, are lighted, ventilated and protected by Fenestra Solid Steel Underwriters' Sash.

Wide bays are filled by standard units combined by means of solid steel mullions. Light is unobstructed. Ample ventilation is provided.

Fenestra labeled Underwriters' Sash have all the exclusive features of Fenestra Standard Sash. In addition, they are equipped with approved glazing angles. Locked tight when closed by means of automatic cam latch.

These features win the preference wherever labeled sash are required. And in comparison with other types of "Underwriters' Sash," the cost is low.

DETROIT STEEL PRODUCTS COMPANY
2509 East Grand Boulevard Detroit, Michigan

Fenestra
SOLID STEEL WINDOWS