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THE DECORATIVE POSSIBILITIES OF CONCRETE

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Presented June 16, 1913.

In the early days of construction, the architect and engineer appeared on the work under the title of master-mason. This individual wore long robes as an indication of his authority, and the designs on his trestle board are a matter of history. With the passing of the master-mason came the architect and engineer, the one a worker in lines, and the other a worker in figures.

The combination is ideal; one specializing on beauty and the other, safety and efficiency. Too often, however, safety and efficiency receive first consideration, and the beauty only gets its share after costs have been carefully calculated.

In reality, the most common buildings of a manufacturing type can be made to conform to pleasing lines without the additional expenditure sometimes thought necessary. After pleasing lines have been determined, then comes the question of decoration. In many instances this is carried to extremes and we find exquisite examples of stone carving and cornice work being placed at the top of an eighteen or twenty-story office building, which no one can see or appreciate except a possible few located in the offices upon the opposite side of the street.

This may be said of the Chicago Post-office (Fig. 1), with the exception that here the entire structure has been injudiciously placed. It is well recognized that a structure of this kind occupies a maximum ground area with a minimum return in floor space and light area. This building was a large undertaking from an engineering standpoint, but whether or not it is an architectural success, few may judge because of the impossibility of viewing the entire building at one time. Of the same type is the Capitol at Washington, but so judiciously has it been placed that a full view may be obtained from all sides without obstruction. In the open, or upon the crest of a hill, the Chicago Post-office, even though inefficient in design, would be architecturally beautiful.

There is an old maxim to the effect that the designer should ornament his construction and not construct his ornamentation. This is an admirable saying, but should be subordinated to another

rule, that he should ornament his structure only if he lacked the skill to make it beautiful in itself. A structure of any kind that is intended to serve a useful end, should have the beauty of appropriateness for the purpose it is to serve. It should tell the truth, and if the character were such that it can be permitted to tell the

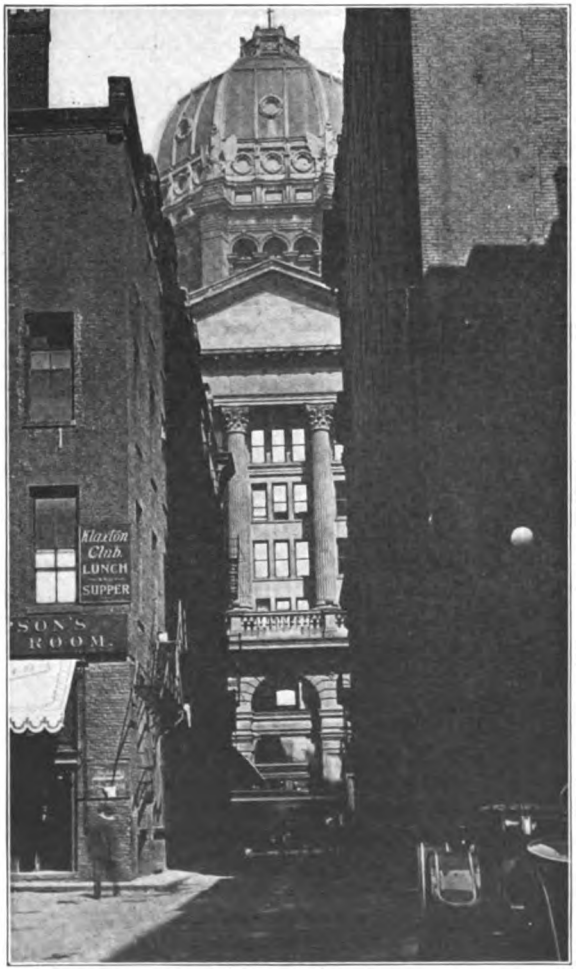

Fig. 1.—Chicago Postoffice, West Front.

whole truth, so much the better. It should preferably be beautiful and not beautified.

There is a certain charm about a massive structure almost irrespective of design. The sight of a pyramid on the desk would call

forth no expression of interest or enthusiasm, but let this grow in size until it assumes the proportions of those famous structures of Egypt and many pilgrimages will be made to view it. Of course the Egyptian pyramids are assumed to be the resting place of kings, and the placing of the blocks required the use of more muscle or machinery than we at present have any knowledge of,

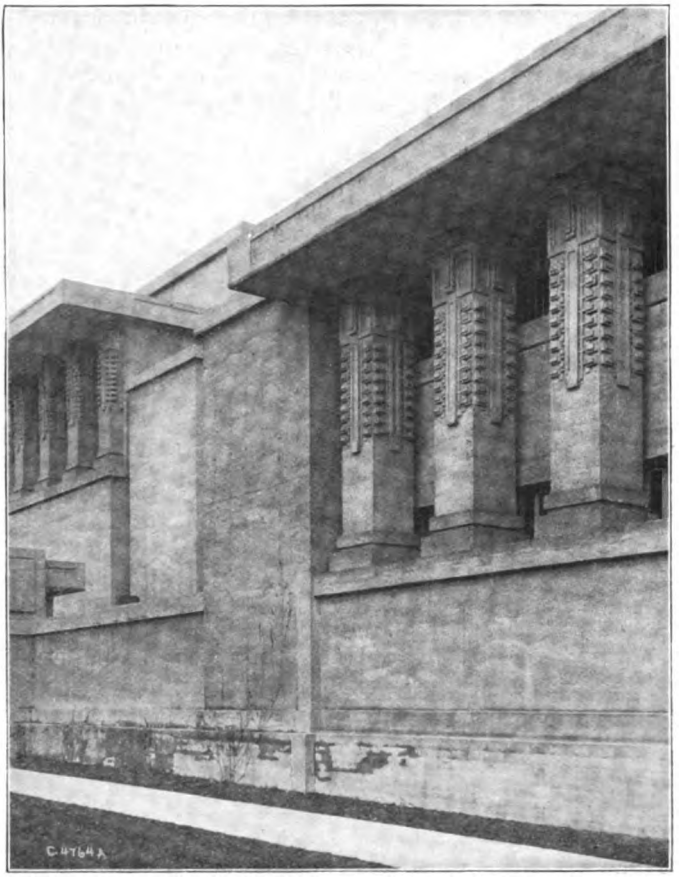

Fig. 2.—Detail of Unity Church, Oak Park, Illinois.

but our idea of their beauty and grandeur obtains primarily from the immensity of the structures.

There is no reason, however, why mass should not be combined with decoration, provided the design is not made subordinate to the decoration. This combination has often been used very effectively. The question is, what medium shall be chosen? At the Unity Church, Oak Park (Fig. 2), the building is not only monolithic concrete but

the ornamentation partakes of the same characteristics, having been cast at the same time and of the same material. In a building of this type, however, much attempt at decoration would be fatal and the unobtrusive style adopted detracts not in the slightest from the dignity obtained by large areas and massive construction. With a different style of building, such as the Administration Building at Washington Park (Fig. 3), the treatment may be entirely different and the concrete be called on to assume the most intricate shapes.

Both of these buildings show the same surface finish. The architecture determines the decoration. With conditions reversed and the decorations transposed, the effect would be ludicrous. In

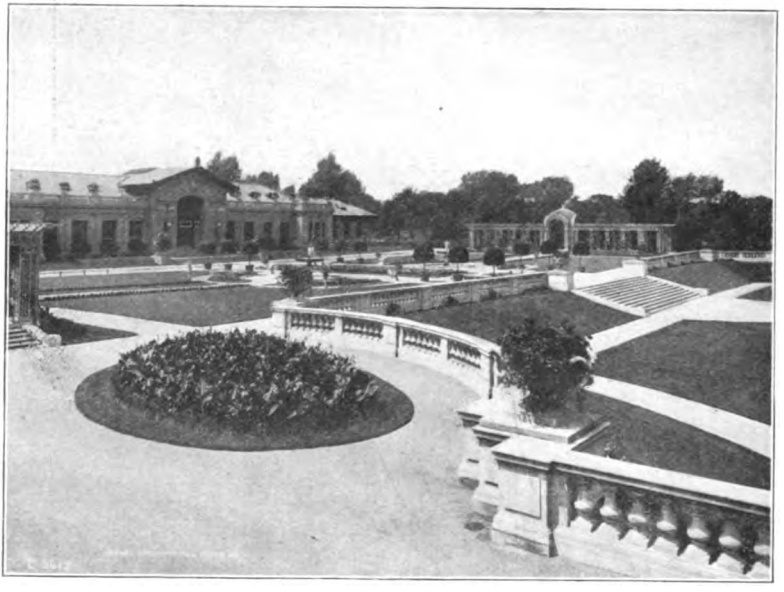

Fig. 3.—Concrete in the Administration Building and Balustrade, Washington Park, Chicago.

these buildings the monotony of the form concrete has been relieved by the use of a rather dry surface mixture which discloses the nature of the aggregate used. In work of this kind, particular attention must be paid to methods of obtaining uniformity of surface and absence of horizontal joint markings (Fig. 4), although the latter blemish is not nearly so noticeable on work of this character as with the wet mixture.

After all, the question of pleasing effects depends not only on the surfaces and the surface treatment, but on the combination of design with the surface texture. Compare, for instance, the factory of the Carter's Ink Company with that of the Piqua Hosiery Com-

pany (Fig. 5). Both have been finished with the same tools but the former shows infinitely more work without obtaining a pleasing effect. The difference seems to lie mainly in the appreciation of the possibilities in a molded material. A number of large surfaces have been substituted for the cut-up stone effect and the judicious use of

Fig. 4.—Entrance Detail. Administration Building of the South Park Commissioners, Washington Park, Chicago.

the bush hammer has accentuated the massive and graceful design of the building (Fig. 6). And this effect has been achieved without any expensive decoration or form work other than would be required for the most simple structure of reinforced concrete. On a smaller building, such as a subway entrance in Boston (Fig. 7), the method of dividing off the panels is more pleasing, possibly because the

Fig. 5.—Manufacturing Building of the Piqua Hosiery Co., Piqua, Ohio.

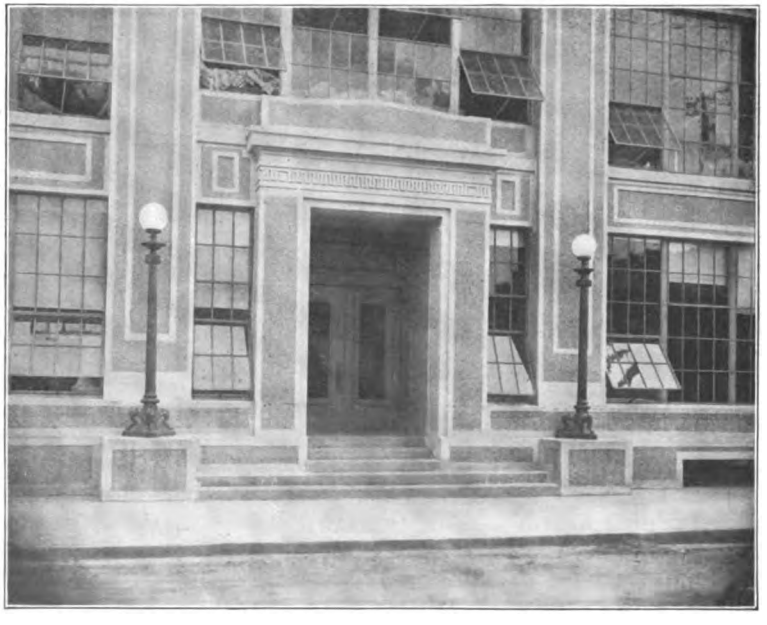

Fig. 6.—Detail of Entrance to the Building of the Piqua Hosiery Co., Piqua, Ohio.

proportion of small areas to the whole is so much greater. Nevertheless, you will agree that the method of treatment used on the Piqua building is even superior on a small structure, such as the Weston Fire Station (Fig. 8), where also the panels have been bush hammered, preserving the corners and margins intact. Consistent with its purpose, the entire structure is of reinforced concrete.

When not carried to extremes, the judicious use of a few division marks, such as have been employed by the Witherbee Sherman Company in its power station (Fig. 9), relieves the plainness of design and forms a rather interesting framework for what would otherwise be a monotonous surface. Had the block surface been carried across the entire wall, the pleasing effect would have been ruined.

No doubt everyone is familiar with what seems to be the proverbial small town water supply tank, with its hemispherical bottom and

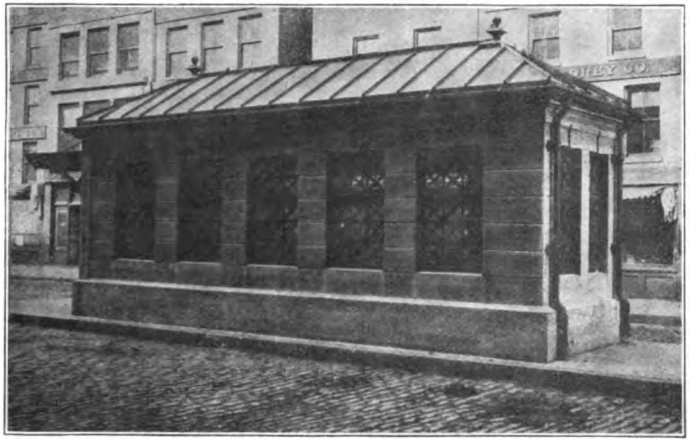

Fig. 7.—Subway Entrance, Boston.

sprawling legs; anything but an ornament in the community. This same type of structure was installed at Gary, Indiana (Fig. 10), but so well has it been concealed that the tower is a thing of beauty and possesses real architectural merit. The work of molding so large a structure in reinforced concrete was greater because of the forms required, the total height being 125 ft. But the finished structure justified the labor. The lower 25 ft. and the upper cornice are of cast concrete stone, made by George Rackle & Sons of Cleveland. The remainder is of reinforced concrete. The relief for the surface monotony is seen in the decorative work at the top and base.

Decoration, however, is not an essential of mass construction, as has been clearly demonstrated by the Spanish in the design of the adobe dwellings and missions. But adobe perishes and our interesting relics of former days will soon be a thing of the past. Noting

the possibilities of monolithic concrete for preserving this architecture, Frank Miller has undertaken to petrify indefinitely, as it were, some of the most interesting details of the mission architecture developed by the Franciscan Fathers in California (Fig. 11). Thus when the last adobe wall has crumbled we still shall have a replica of the Campanile of San Gabriel (Fig. 12) and the imposing arches of San Fernando, these having been duplicated in the Glenwood

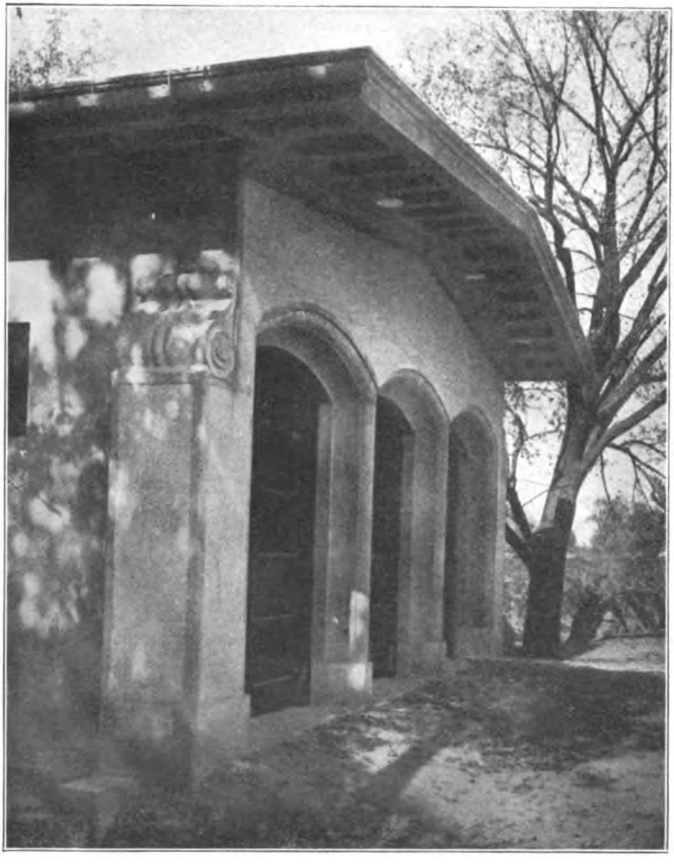

Fig. 8.—Weston Fire Station, Weston, Mass.

Inn at Riverside, California. Little other material than concrete has been employed—except the roof tile, which undoubtedly lend color to the scheme and interest to the picture. On the roof is a famous collection of bells, over 300, dating back to 1278. It seems, consequently, particularly fitting that these old relics, after their furious experiences, may now rest content, enclosed

and surrounded by a structural material which will preserve their last resting place intact through the centuries to come.

Of a mission type, also, are the rest or way stations of the Pacific Electric Railway, at Pasadena, California. These are fast replacing the old wooden rough and ready stations, none of which was consistent with the high class residential district through which the company operated. On both sides, a bench is built into the wall so as always to furnish protection from rain.

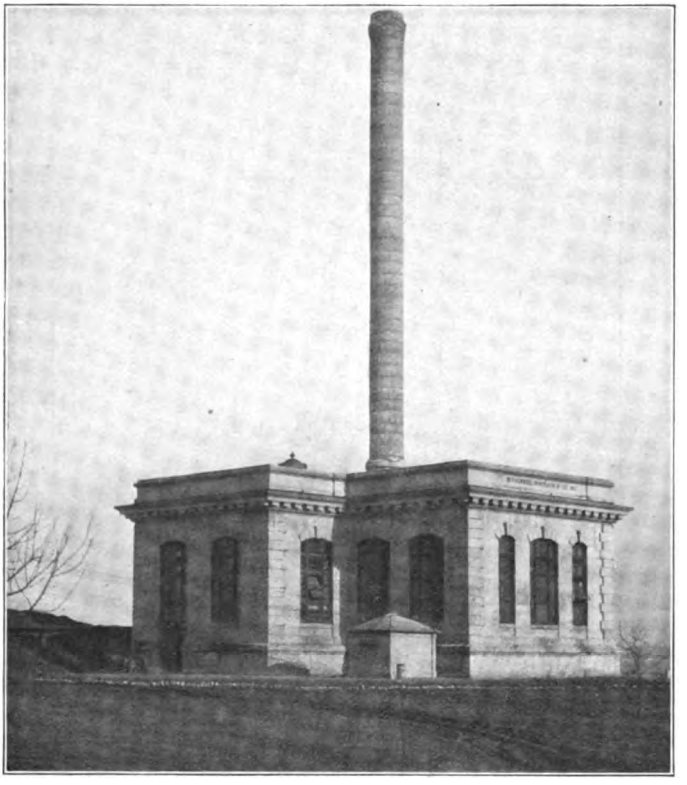

Fig. 9.—Power House, Witherbee Sherman, Port Henry, N. Y.

An unexpected test of building materials presented itself during the San Francisco earthquake, and the architect for the delightful bell tower on the Mills College campus, Miss Julia Morgan, states that it was one of the few buildings which remained undamaged in that vicinity (Fig. 13).

Because it includes some of the most notable sculpture on the coast, the building of the Throop Polytechnic Institute at Los Angeles, Cal., may have interest (Fig. 14). It is all of reinforced

concrete even to the tower, and was designed by Myron Hunt, of Los Angeles. The sculpture was executed in New York and cast in glue molds by a local company, the cost of this one item being something over $5,000. Warm climates seem particularly suited to

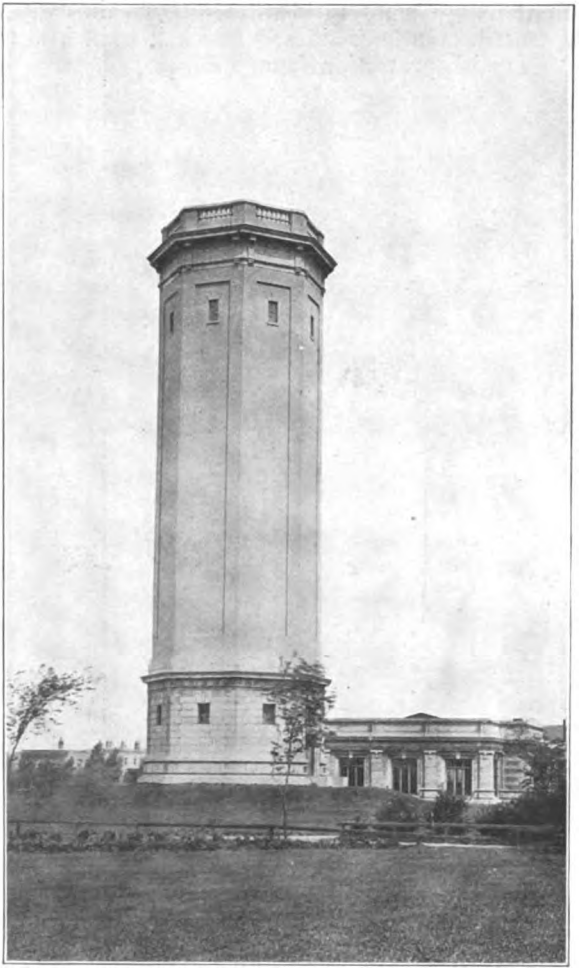

Fig. 10.—Gary Water Tower, Gary, Indiana.

plain concrete construction, and its general adoption may partially be explained by the cool appearance of the plain surface.

Concrete, still in its formative state of development, is a comparatively new architectural material, although structurally it has been proving its permanence for many years. The particular reason

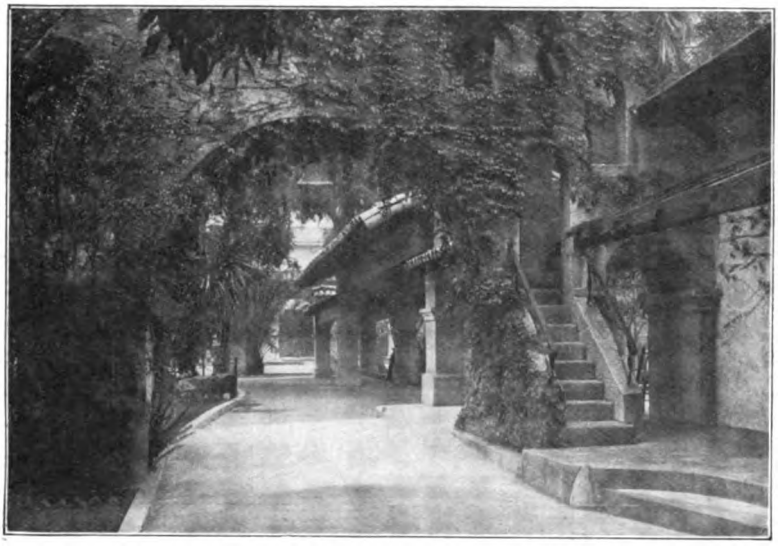

Fig. 11.—Courtyard, Glenwood Inn, Riverside, Cal.

Fig. 12.—Glenwood Inn, Riverside, Cal., Looking from the Street into the Courtyard.

Fig. 14.—Throop Polytechnic Institute, Los Angeles, Cal.

Fig. 15.—Pouring Concrete Floor with Panel Inserts of Molded Sand or Plaster.

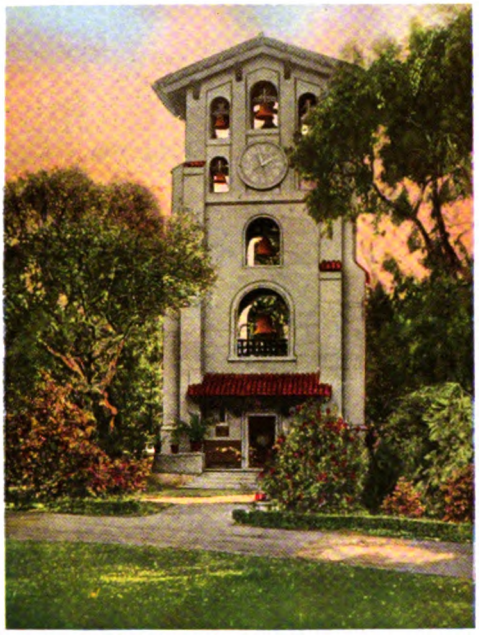

FIGURE 13.
BELL TOWER, MILLS COLLEGE, CAL.

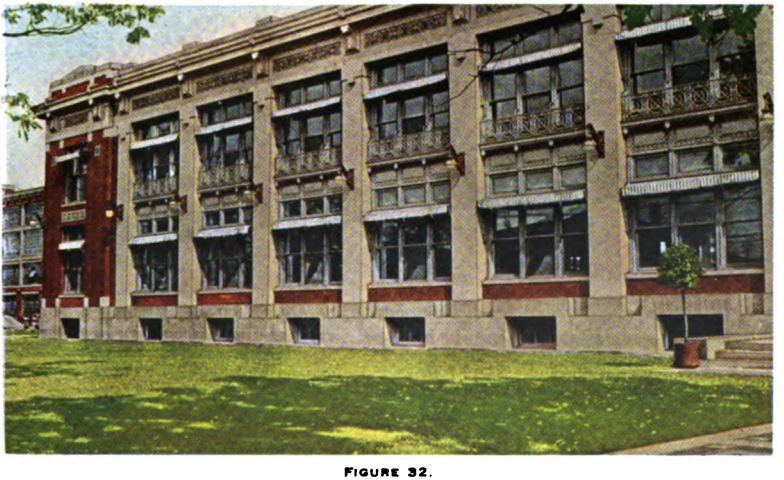

FIGURE 32.
OFFICE BUILDING, FORD AUTOMOBILE CO., DETROIT

for gratification comes in the new discoveries, and new uses to which it is continually being put. Every day there arises some Philistine who has discovered something new and worthy of consideration.

Frederick Squires, of New York City, had viewed with regret the present slab and beam floor construction. After several years of study, he devised a method of duplicating the most intricate of cast ceilings in solid concrete, with a decided saving of material. His scheme consists simply in employing reverse coffers of moulder's sand (Fig. 15) which are placed on the form before the concrete is poured. When the forms are removed, the panels are exposed, the whole being accomplished in one operation. Far more pleasing surfaces are obtained than were ever presented by the old plaster-of-paris method of applying previously cast panels to the work (Fig. 16).

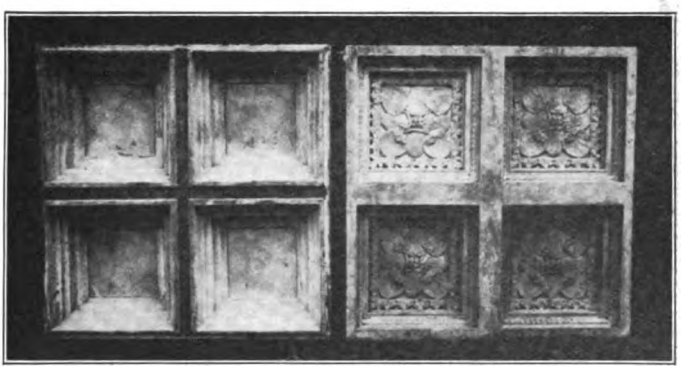

Fig. 16.—Sample of Paneled Ceiling Work Done with Sand or Plaster Molds.

A few years ago the theory of applying concrete by means of a hose and nozzle met with derision, but every day we hear of more work being done by this method, the machine being designated as the "cement gun" and the concrete "gunite." An interesting piece of work has been accomplished by the Boston Elevated Railroad at the foot of O Street, Boston, where a garden fence has been constructed by this method. The base and posts are built of concrete poured into the forms in the usual way, the posts being relieved by protecting brick quoins (Fig. 17). The street face of the panels were shaped by means of a wooden form and each central panel was faced with steel. The concrete was applied from the rear with the cement gun, making the panels 2½ in. thick and the styles 4 in. thick. The interesting point in the operation is that the entire panels are made in one piece and at one operation.

The very fact that concrete is simple in operation has caused many to undertake construction who are in no way fitted to carry it

out, but with proper supervision even the most unskilled laborer can accomplish pleasing results. This has been proved conclusively by the work of the Aberthaw Construction Company at Port Antonio, Jamaica (Fig. 18). The 56 columns for the structure were cast in sand molds, then put into a lathe and turned down and polished so as to expose the coarse aggregate. An intensely red coloring matter present in the natural aggregate has given the walls a light salmon tint, which is very attractive. Particular attention is directed to the methods of elevating the concrete to the work, and judging from the smiling faces of the women shown in Fig. 19, the task does not seem to be over-tedious. For this hard labor they receive about 25c per day. Able-bodied men on the same work receive about twice this amount. Even with the lack of artistic appreciation

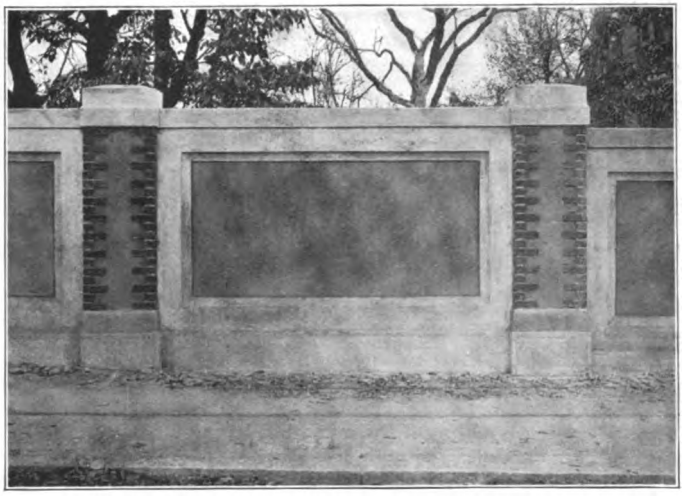

Fig. 17.—Cement Gun Construction on Wall of the Boston Elevated Railway.

which the people of this class possess, the building has been designed so as to be architecturally pleasing and will undoubtedly have its effect in educating the people to a better realization of what constitutes good architecture and design.

A building should be fitted to the country in which it is to be located, and more and more attention is continually being given to the unity which must exist between the landscape and the layout of concrete structures which are to be added as permanent improvements. A striking example of this is to be found on the Duke Estate at Somerville, N. J. (Fig. 20), where white cement and white sand have been used in facing the concrete, in order, possibly, to give more contrast against the natural beauty of the surroundings. The bridge (Fig. 21) harmonizes with the rest of the work but might be improved if the surface markings were eliminated—the general

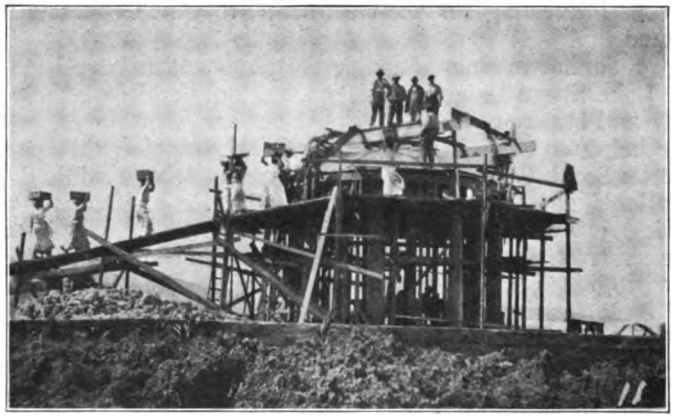

Fig. 18.—Concrete Construction in Jamaica, Showing the Method of Elevating Concrete.

Fig. 19.—Concrete Elevators on Construction Work in Jamaica.

lines accentuated by bush hammering, or some one of the other numerous interesting surface treatments, to which concrete may be subjected.

In a similar manner the concrete posts which have been added to the Lake Shore Drive in Chicago, not only add materially to the dignity and beauty of this boulevard but are, themselves, better set off by being so well located (Fig. 22). Imagine this particular design on South Clark and Harrison Streets. For a while the posts would look entirely out of harmony with their surroundings, but there is every probability that their advent would produce a desire on the part of the property owners to clean up the streets and buildings so as better to accord with the dignity of the lamp standards.

A note on the method of construction of these poles may be of interest since they are of reinforced concrete, cast in one piece including the base (Fig. 23). The surfacing is made of a special mixture of cement, dark red Wisconsin granite, and a small amount

Fig. 20.—Concrete Retaining Wall and Balustrade on Duke Estate, Somerville, N. J.

of mica, which is washed, after removing from the mold, with a weak solution of hydrochloric acid. The design is the result of a contest in the Chicago Architectural Club, the successful contestant being John Hamilton.

Of a similar nature is the work on the concrete railing around Jackson Park Harbor, also in Chicago (Fig. 24). Here, as before, the concrete depends for its beauty upon the surroundings rather than upon the excellence of the design, although it is well agreed that little could be added which would improve the dignity and solidity indicated by this superior example of a concrete railing. The white surface is obtained by the use of limestone screenings which emphasizes the important part the aggregate plays in determining the color of the concrete into which it enters.

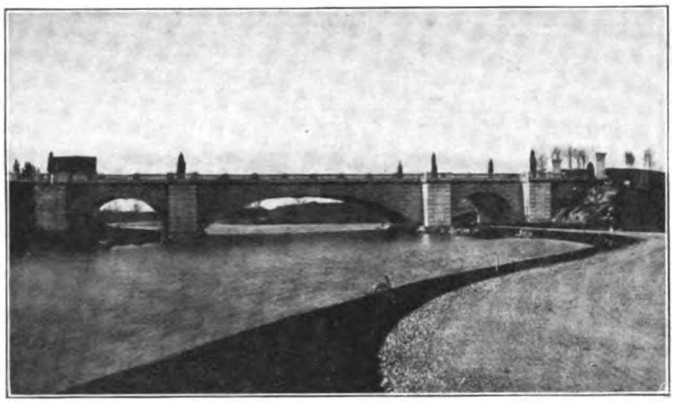

Fig. 21.—Concrete Arch Bridge on the Duke Estate, Somerville, N. J.

Fig. 22.—Lake Shore Drive, Chicago, with Concrete Lamp Standards.

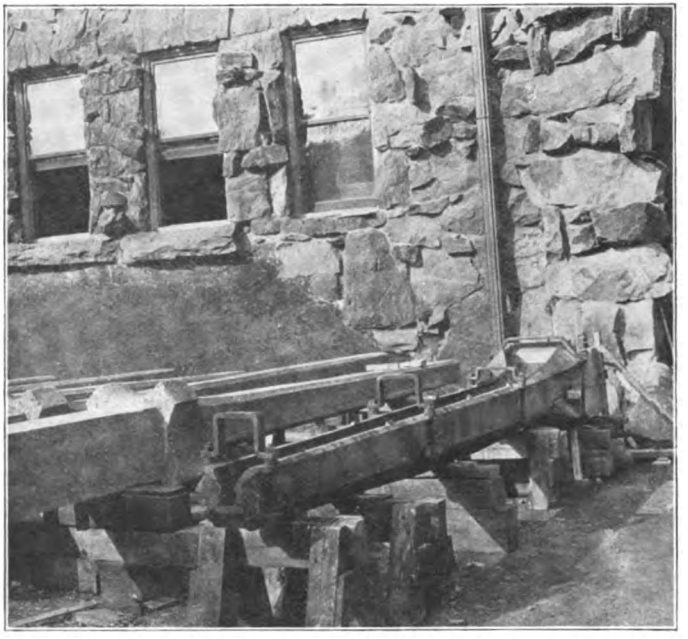

Fig. 23.—Steel Molds for Casting Concrete Poles.

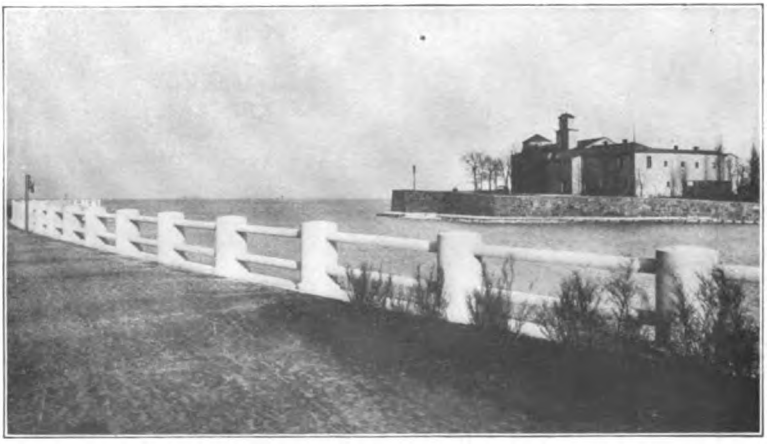

Fig. 24.—Concrete Railing Around Entrance to Jackson Park Harbor, Chicago.

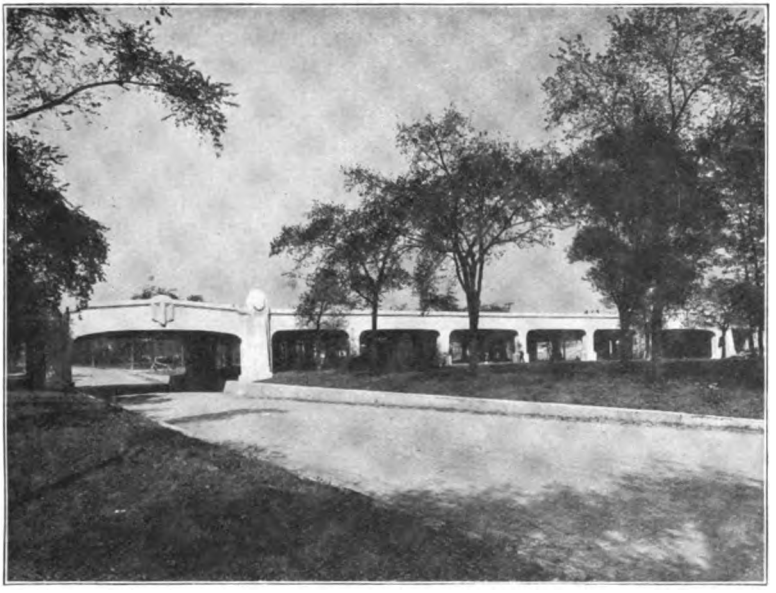

Fig. 25.—Independence Boulevard Viaduct, Baltimore and Ohio Railway, Chicago.

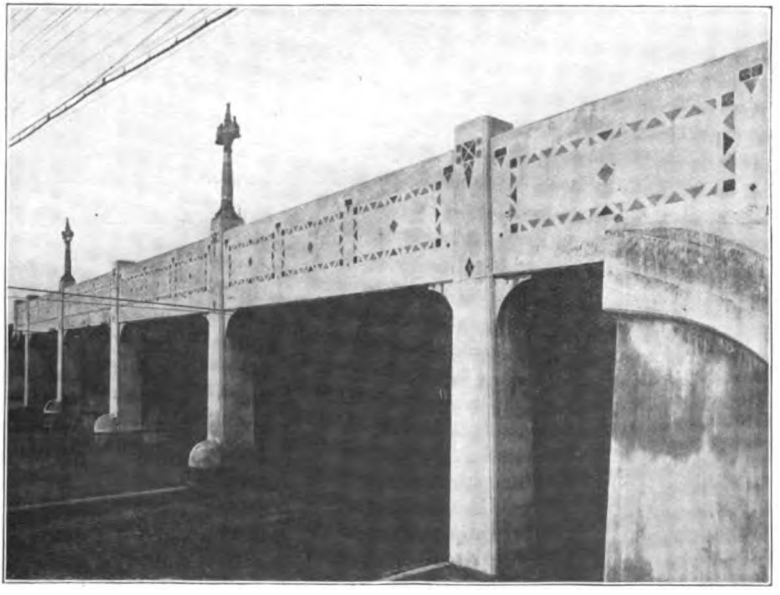

Fig. 26.—Ogden Avenue Viaduct, Baltimore and Ohio Railroad, Chicago, Showing Tile Inserts.

The attention which is being paid to the design of improvements which will harmonize with the surroundings may well be illustrated by the work of the B. & O. Railroad, on its Independence Boulevard viaduct, Chicago (Fig. 25). A total of some twelve to fifteen different designs were prepared and only after careful consideration was one finally decided upon, which the railroad officials thought would be suitable to submit to the Park Board. How well they succeeded is evident. Were the plain steel structure considered by itself, a realization could he had of the tremendous improvement which has been effected by the simple addition of the reinforced concrete covering. Some of the earlier work of the B. & O. Railroad shows an entirely different method of handling concrete, depending

Fig. 27.—Sacramento Boulevard Viaduct, Baltimore and Ohio Railroad, Chicago.

upon inlaid tile for decoration rather than upon the excellence of the design (Fig. 26). Of course, as this bridge is located on West Ogden Avenue, Chicago, there is nothing in the way of beautiful landscape to mention and probably the officials believed that a little brightening of the concrete surface would relieve the monotony of a busy business street. But work of this kind is extremely expensive and can best be illustrated by a comparison of this bridge with the Independence Boulevard structure which is of 250-ft. span.

The Ogden Avenue Viaduct is 135 ft. between abutments, and yet the cost of concrete finish and inlay tile was greater than the total for the other structure of 250-ft. span. A simpler structure has been designed for Sacramento Boulevard (Fig. 27), but as this street is much narrower than Independence Boulevard, naturally an

entirely different method of treatment was necessary and the lines have been made to follow somewhat along the Mission style.

Concrete surfacing not only protects the steel, making painting unnecessary, but it improves the general aspect of the structure. This is well illustrated by a very unimposing viaduct in Pittsburgh which recently was found to be rusting away for lack of paint. Feeling that the structure's existence was justified, the officials made arrangements to cover the steel with concrete, in much the same manner as has been used by the B. & O. Railroad, although no particular attempt was made at architectural effect. Nevertheless, the appearance of the viaduct has been improved and its life undoubtedly materially lengthened.

Another railroad which is paying particular attention to the appearance of its viaducts is the New York, Chicago & St. Louis Railroad, under the supervision of A. J. Himes, Engineer of Grade

Fig. 28.—Euclid Avenue Viaduct, New York, Chicago & St. Louis Railroad, Cleveland, Ohio.

Elimination. In the majority of instances the attempts have been thoroughly successful, although at Maysfield Road, Cleveland, the structure may be questioned as to its pleasing architecture. A great number of arches with short columns has not only made a large amount of form work necessary but has hardly justified the expense involved.

More pleasing work has been accomplished on the Euclid Avenue Bridge and at probably less unit expense (Fig. 28). In Cleveland also, attention has been paid to the combination of landscape with structure, as indicated by the East Boulevard Bridge (Fig. 29), which is particularly well located so far as the contour and beauty of the surrounding country is concerned. The color which has been added to the arch and abutments tends only to brighten the picture

and improve the general impression. The paneling for this bridge has all been finished with a bush hammer and the red framing was obtained by mixing iron oxide with the concrete.

As has been stated, massive structures are impressive, irrespective of their design or location, but the interest is generally enlivened by such a waterfall and stream as is included in the photograph of the concrete bridge at Spokane, Washington (Fig. 30). The design is undoubtedly excellent and would stand alone, uncriticized, but the touch of romance which the scenery furnishes engages the attention and makes the picture more alluring than that of the Paulinskill Viaduct of the Lackawanna Railroad at Hainesburgh, N. J. Though equally well designed, it is surrounded by uninteresting prairie on every side, which, of course, cannot by any means be charged against the bridge design.

Notwithstanding the excellent decorative work which has been done in plain and reinforced concrete, there are, nevertheless, numer-

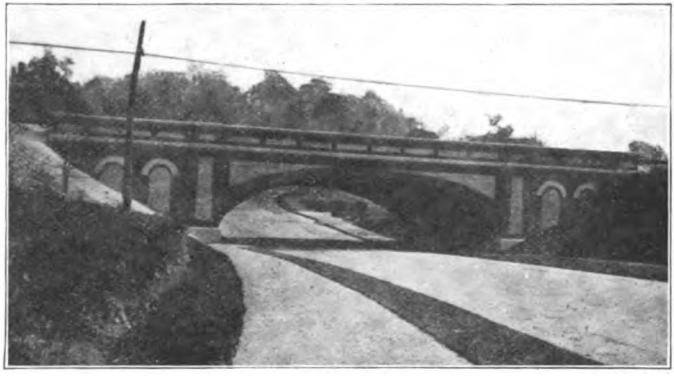

Fig. 29.—East Boulevard Bridge, New York, Chicago & St. Louis Railroad, Cleveland, Ohio.

ous advocates of tile decoration. Instances are many where the use of brick or tile emphasizes the contour and enlivens the surface at very little expense. A little touch of color relieves the monotony of a single toned exterior and is illustrated in the seed warehouse of Otto Schwill & Co. at Memphis, Tennessee. This building would undoubtedly be equally as efficient were it built without any attention to pleasing architectural effects. With the present leaning toward pleasant work rooms for employes, this idea has spread to the exterior with the result that our factories are surrounded by grass plots and gardens and the buildings themselves, so far as possible, are made to conform with the tendency toward providing pleasant environment.

The office building of the Packard Automobile Company at Buffalo, New York (Fig. 31), is an equally good example of the combination of concrete and brick, although the decoration is of cast

Fig. 30.—Concrete Arch Bridge, Spokane, Wash.

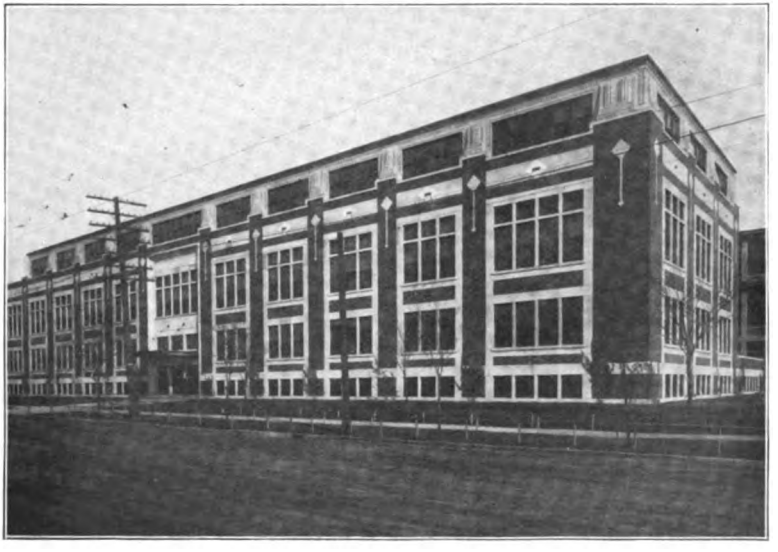

Fig. 31.—Office Building, Packard Automobile Company, Buffalo, N. Y.

concrete. Carrying this idea further, the Ford Automobile Company at Detroit, has not only built of reinforced concrete with brick inlay and corner towers but has called in mosaic tile to brighten up the panels under the cornice, and though the embellishment was achieved at some expense, the architect felt that the attention to this detail was deserved (Fig. 32).

Another example of the use of colored clay tile for concrete decoration is to be found in Minneapolis, where on the north shore of Lake Calhoun a large building has been constructed of reinforced concrete, called the Calhoun Baths (Fig. 33). The central portion of the building is roofed and serves as the entrance, housing the ticket office, the rooms where bathing suits, towels, and keys to lockers are distributed, and the refectory. It also connects directly with the terrace above the bathing beach. The dressing rooms on the opposite side of the central portion of the building are without

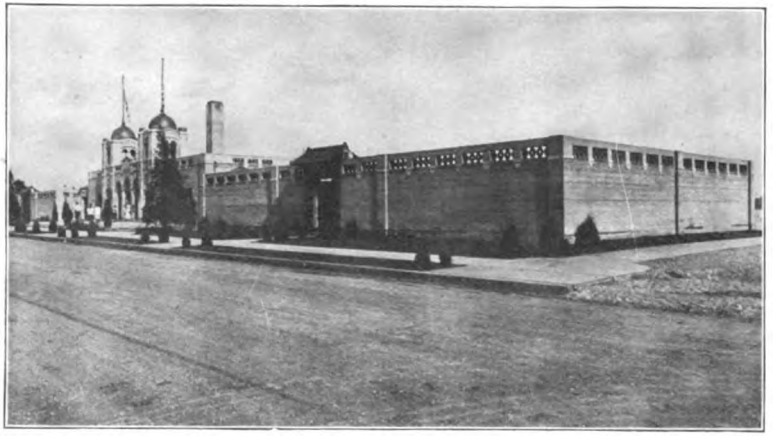

Fig. 33.—General View of Calhoun Baths, Minn.

roof but are fitted with concrete rooms and steel lockers in double tiers. In order to reach the beach, the bathers must pass through a pool of water and through a triple shower direct from above and from both sides, so that a partial wetting is received before reaching the beach.

The concrete was deposited rather dry in order to obtain a rough finish, and the form marks do not seem to detract in any way from the pleasing surface made by the coarse aggregate (Fig. 34). The decorations are of brick and clay tile, the brick having been placed when the concrete was poured, but the tile subsequently, space being made for them by tacking wooden shapes to the inside of the form. The design and construction for this building were handled by Chapman & Magney of Minneapolis.

It is not surprising that an individual directly connected with the

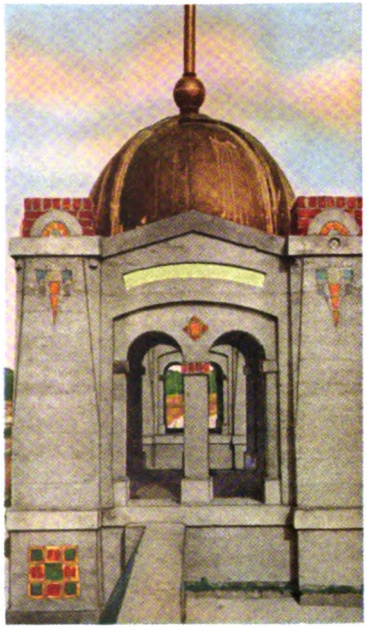

FIGURE 34.
CALHOUN BATHS, MINNEAPOLIS

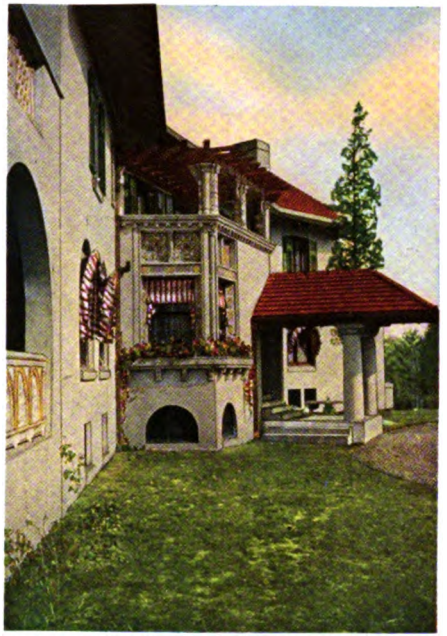

FIGURE 37.
RESIDENCE OF CHARLES E. RUSHMORE
WOODBURY FALLS, N. Y.

cement industry as is Albert Moyer, should build of concrete, nor is it surprising that one who is so well versed in concrete construction should obtain very pleasing effects as indicated by the work on his residence at South Orange, New Jersey. Liberal use has been made of exposed aggregates, employing a mixture of Portland cement with limestone screenings, marble chips, and dark trap rock (Fig. 35). Not stopping here, much dependence has been placed upon Moravian pottery decoration, which harmonizes well with the concrete surface, as is shown in the fireplace, with its inlaid panel showing an Indian at a fire, whether warming his hands or starting the blaze being not self-evident (Fig. 36). The balcony, also, has

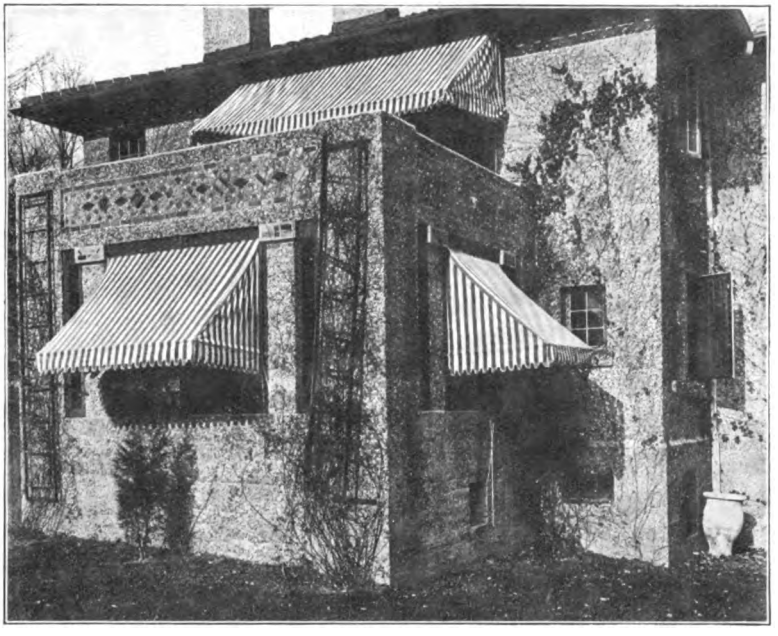

Fig. 35.—Porch Detail, Residence of Albert Moyer, South Orange, N. J.

been worked out in pottery but somewhat differently than the fireplace. The distinguishing feature lies in the fact that instead of being inlaid, the figure comes out in bas-relief and although somewhat serpentine in design, seems fairly consistent with the grape-vine motive. Undoubtedly this panel would be somewhat softened to its improvement by the ivy which was evidently not in leaf when the picture was taken.

For some time, Alfred Hopkins, of New York City, has been a strong advocate of reinforced concrete for the construction of buildings and has added a large amount of information to our knowledge of the concrete of the old Romans, having investigated this point

personally and in some detail. Nevertheless, Mr. Hopkins has never brought himself to believe that concrete should be used for the ornamentation upon buildings of the same material. For this purpose he advocates terra cotta, and judging from the excellent work which he has achieved on the residence of Charles E. Rushmore, there is reason in his contention (Fig. 37). This building is all of reinforced concrete to the roof and part of this has been constructed of concrete slabs. But for the panels and column capitals, Mr. Hopkins

Fig. 36.—Fireplace in the Home of Albert Moyer, South Orange, N. J.

has turned to terra cotta tile, with excellent results. For the average individual, of course, a detail of this kind would be prohibitive in cost. But with such a sized undertaking as this mammoth residence, the high individual cost of these panels (Fig. 38) is small when compared with the total cost of the building. However, with the advances which are being made in the use of colored aggregates, it is generally possible to obtain all the color variations necessary in the concrete itself.

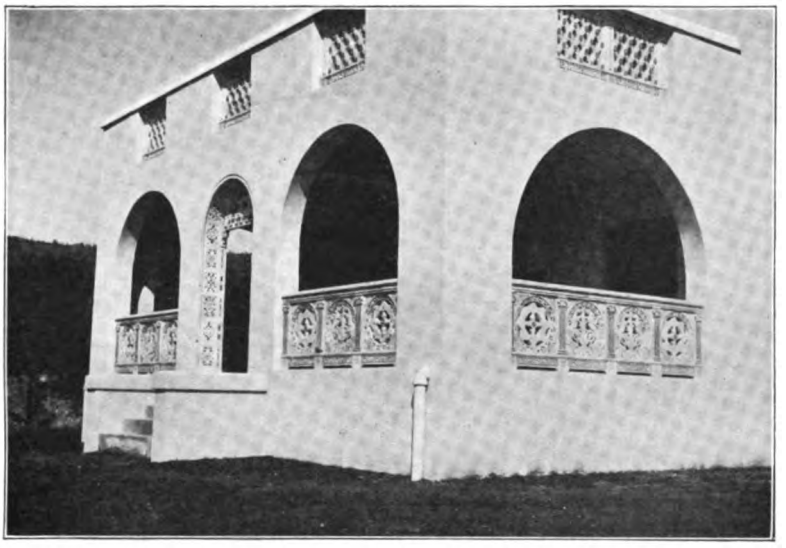

Fig. 38.—Porch Detail, Residence of Chas. E. Rushmore, Woodbury Falls, N. Y.

Fig. 39.—Cement Stucco Residence of L. G. Stumer, Chicago.

It is not customary to build reinforced concrete roofs of the pitch type. In fact, there is no sensible reason for adhering to this construction when designing reinforced concrete (Fig. 39). The ideal concrete house is built with a flat roof not only because architecturally the design may be made pleasing, but because this type is the most economical in cost and space. An attic is of little use except for the storage of material which, in the majority of instances, will never be needed again, and when stored away in an attic corner, invites spontaneous combustion. Reinforced concrete has brought with it a new architecture and the sooner we appreciate its value, the earlier will be the general adoption of reinforced concrete for residences as well as the endless other types of construction to which it has already been applied.

Within the last few years, there has been a decided leaning

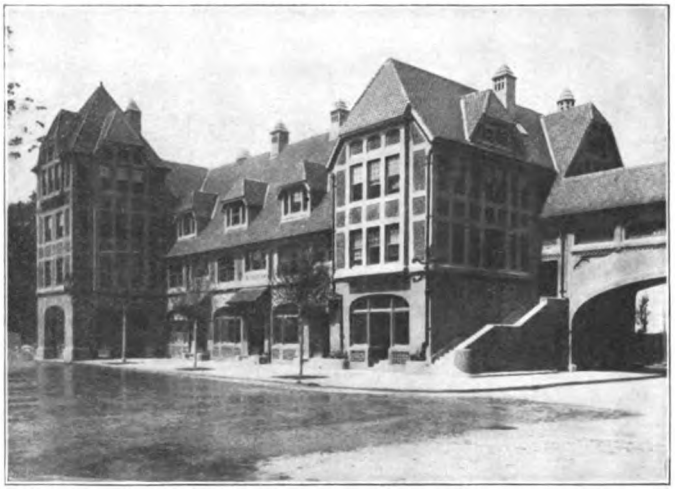

Fig. 40.—Forest Hills Gardens, New York.

toward the community settlement idea, and with this in view, the Forest Hills Gardens were designed (Fig. 40), not, as many people have inferred, an endowed neighborhood where buildings have been erected to house working people, but a business investment of the Russell Sage Foundation Company. It is in no sense managed as a charity, for whoever deals with it is expected to pay fair value for everything received. It is, however, an attempt to solve the housing problem for persons of modest means and its development will consequently be watched with interest. Perhaps this is the first example in America, where an absolutely barren site has been taken and treated along the lines of modern methods of town planning. Throughout the village, advantage has been taken of practically every structural material for building the dwellings, but a large part

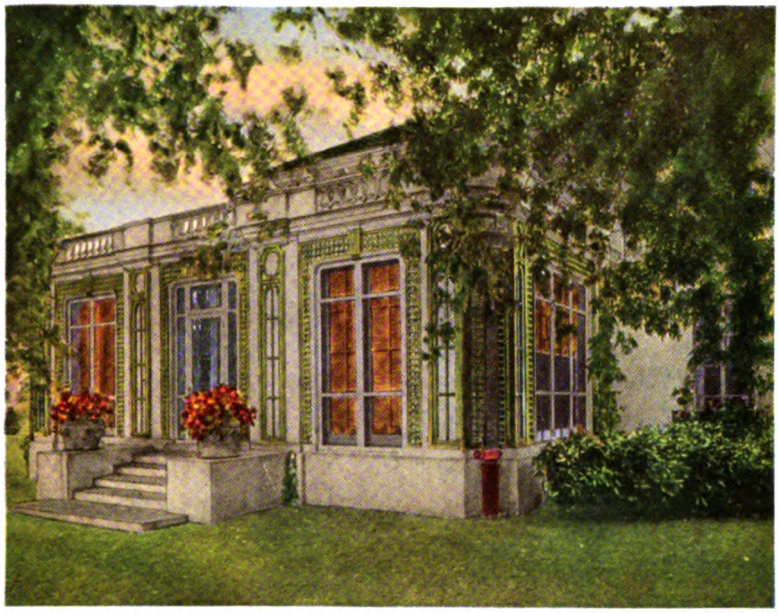

FIGURE 41
RESIDENCE OF GAGE E. TARBELL, NASSAU BLVD., L. I.

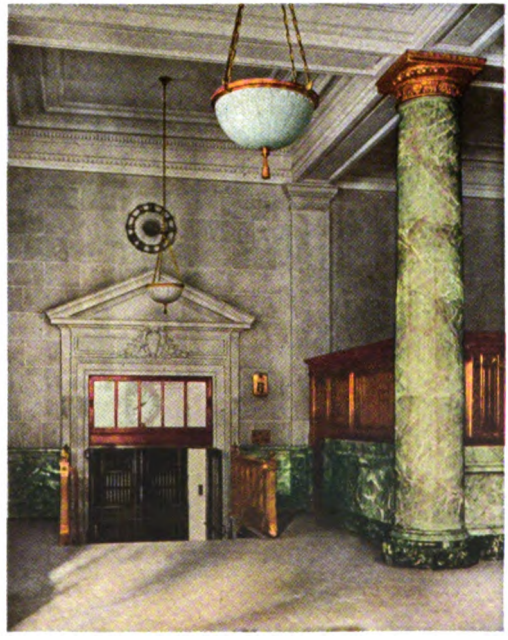

FIGURE 46.
INTERIOR SECOND NATIONAL BANK, BOSTON
SHOWING CONCRETE BLOCK INTERIOR

of the improvements has been worked out in concrete, including the railroad station, the city market, and many of the individual dwellings as well as garden walls, foundations and the like.

Oswald Hering has utilized lattice work on one of his most important dwellings in combination with decoration of molded concrete. But where Mr. Hopkins would use terra cotta, as in the panel inserts, Mr. Hering has used concrete, depending upon exposed aggregate to furnish the touch of color needed. Attention is directed to detail view of the summer house (Fig. 41), which better shows the green lattice harmonizing so well with the trees surrounding it upon every side. Within, the lattice idea has been continued, but in an entirely novel manner by simply stenciling the lines

Fig. 42.—Interior of Gage E. Tarbell's Residence, Garden City, L. I., Showing Substitution of Fresco for Lattice.

upon the wall, instead of using wood as in the exterior panels (Fig. 42). Such lattice work would not find great favor with the particular housewife because of the tedious work of dusting.

Wood paneling will also break up large areas of concrete surface and is entirely in keeping with the old half-timbered style of architecture, so familiar to our forefathers. It is impossible to appreciate the pleasing surface which has been obtained on this modest appearing dwelling (Fig. 43), but a slight explanation may help to make clear how the effect is obtained. The finish is known as a dry dash and in this instance has been applied to concrete blocks. After the plaster coat has been placed, a dash mixture of white marble and blue stone chips with gravel screenings is thrown on, which

imbed in the mortar and furnish a clean, bright surface without further treatment. When a coarser effect is desired it can be obtained by a rough cast, the mortar mixture being thrown on with a paddle and the texture of the surface depending entirely upon the size and character of the aggregate and the consistency of the mixture.

Stucco finish has found favor when applied to concrete blocks as a backing, and there are some architects who believe that this is the only satisfactory means of handling what has seemed to be in

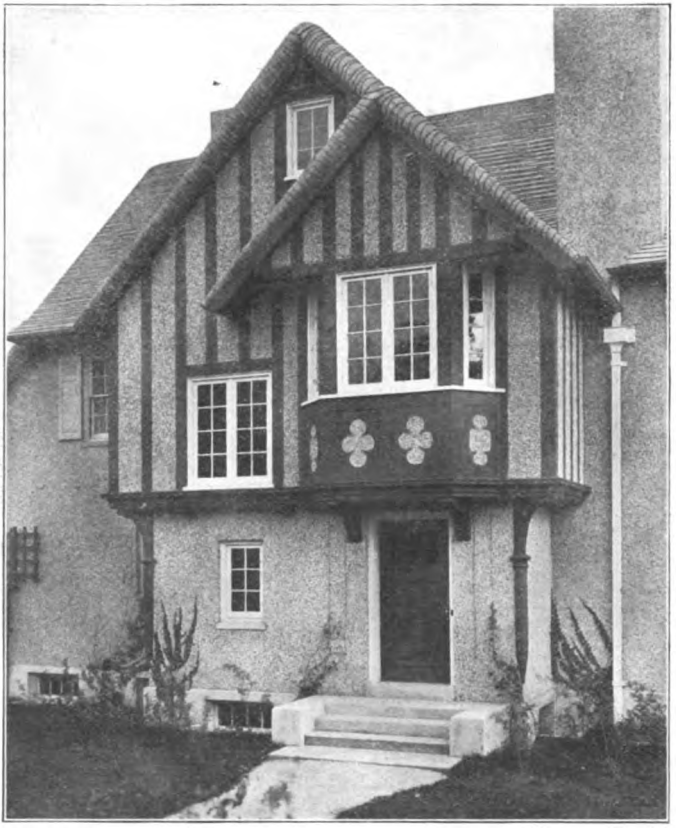

Fig. 43.—Residence, Jamaica Estate, L. I.

many cases a sad makeshift so far as a building material having architectural merit is concerned. This impression has probably grown from the continued manufacture of rock-faced and inferior blocks by those who are entirely unqualified to undertake this kind of work. Such examples as the Normal Park Methodist Church in Chicago (Fig. 44), the blocks for which were built by the Ameri-

can Hydraulic Stone Company, and the design executed by H. B. Wheelock, has done much to eliminate this impression. The tone contrast was here obtained entirely by the use of colored aggregates, using the natural sand finish on the trim but a dark granite for the body. The surfaces were then scrubbed to expose the aggregate and the building is itself a strong recommendation for the much maligned concrete block.

The residence of E. S. Harkness, at New London, Conn. (Fig. 45), is also of the same kind of blocks and depends for its merit not only upon a design appreciative of the value of the ma-

Fig. 44.—Concrete Blocks in the Construction of the Normal Park Methodist Church, Chicago.

terial but also upon the care in laying up the walls. Concrete blocks are not confined to exterior use, by any means, however, as is illustrated by the work of Emerson & Norris, on the interior of the Second National Bank Building in Boston (Fig. 46). A combination of a tooled surface with careful laying and a little introduction of cast stone work has made the interior of this structure not only dignified, but thoroughly cool and reposeful.

Oswald Hering says that the so-called dry process concrete block is not of concrete at all. Having had little acquaintance with water during its process of manufacture, it consequently harbors an

Fig. 45.—Residence of E. S. Harkness, New London, Conn., Built of Concrete Blocks.

Fig. 47.—Kingsbury Apartments, St. Louis, Mo.

unquenchable thirst and when used in the outside walls of a building, proceeds to make up for lost time, every rain-storm furnishing the elements of a "spree" to the detriment of the block and the appearance of the dwelling. The dry process, however, is not necessary, it being equally as easy to add enough water to insure excellent concrete. The possibility of careful inspection during its manufacture is a strong point in favor of the continued use of this really excellent building material.

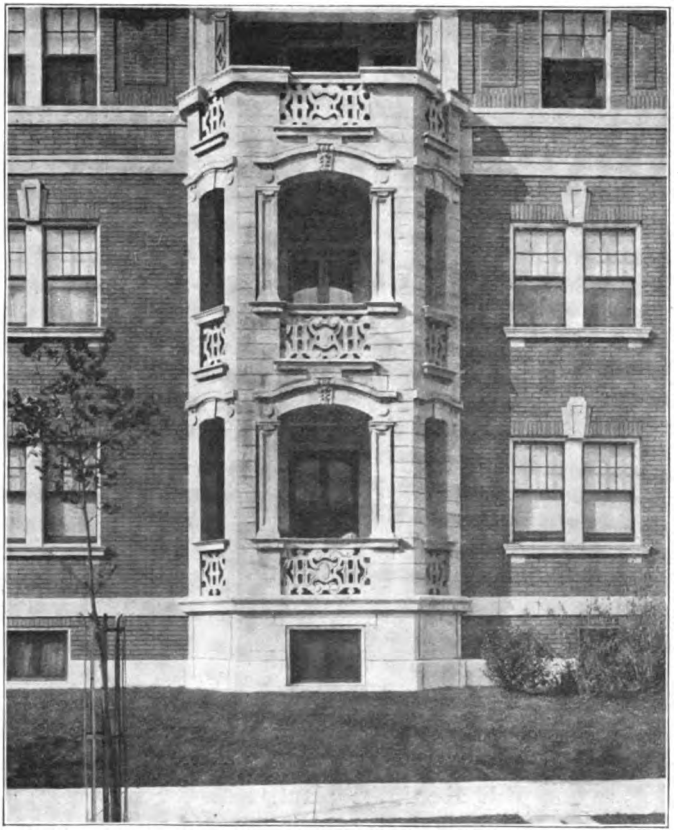

Fig. 48.—Detail of Concrete Trim on Kingsbury Apartment Building, St. Louis, Mo.

After considering the all-concrete buildings and the buildings in which other material has been used for ornamentation, it is interesting to turn to work where the latter condition has been reversed and is well illustrated by the work of S. T. Yourtee on the Kingsbury Apartments in St. Louis (Fig. 47). The blocks were cast in sand molds, and on account of the surface given by this

method, subsequent treatment was unnecessary because of the peculiar matte surface which the rough sand mold provides (Fig. 48). Very intricate figures are easily worked out by this process and many buildings in St. Louis attest to Mr. Yourtee's skill in handling concrete.

Another prominent figure in the manufacture of decorative concrete stone is the Economy Concrete Company of New Haven, Conn., which has begun at home to demonstrate the possibilities of concrete for furnishing the ornamentation for buildings of other material. Some of the most interesting work which this company has done, and that which it prizes most highly because of the personal interest, can be seen by all those who visit the home office,

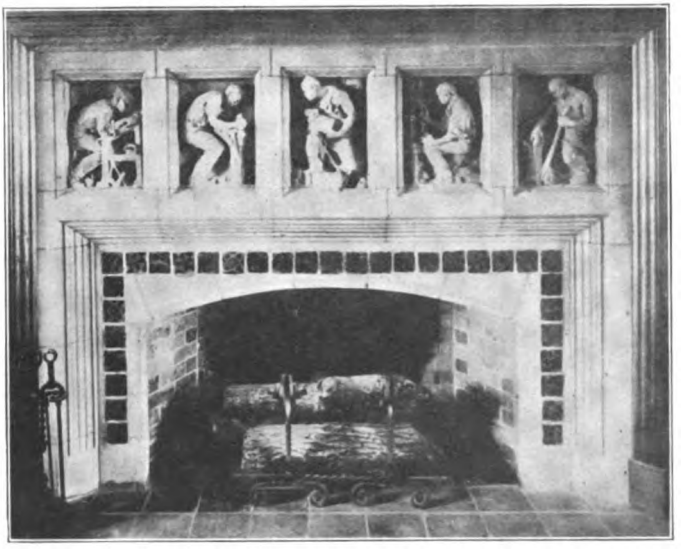

Fig. 49.—Fireplace Detail, Economy Concrete Co., New Haven, Conn.

where the fireplace is composed principally of ornamental concrete stone (Fig. 49). The figures above the mantel are molded after the various workmen about the plant, with the exception of the one at the far right, who represents transportation. The other figures represent in their order (1) the draftsman laying out the plan, (2) the sculptor working over the pattern, (3) the laborer pouring the concrete, and (4) the workman putting the finishing touches on the surface and correcting any flaws caused by removing the forms.

The work is all cast in solid and uniformly proportioned concrete without special surfacing, using wooden or plaster molds. Where necessary, glue molds are employed for the under-cut work. This, of course, gives a rather smooth surface and is the only criticism

which could be made of the product. With but slight additional expense, however, the surface can be chiseled so as to relieve what sometimes appears to be a rather putty-like surface when fresh from the molds.

The work of this company has favorably impressed such architects as Cram, Goodhue & Ferguson, who designed a number of buildings at West Point, including the gymnasium and cadet barracks (Fig. 50). In these structures all the stone work above the first story has been cast by the Economy Concrete Stone Company. The close scrutiny which the government gives the building materials it uses is well recognized and the use of concrete stone in so important structures is a strong recommendation for the material.

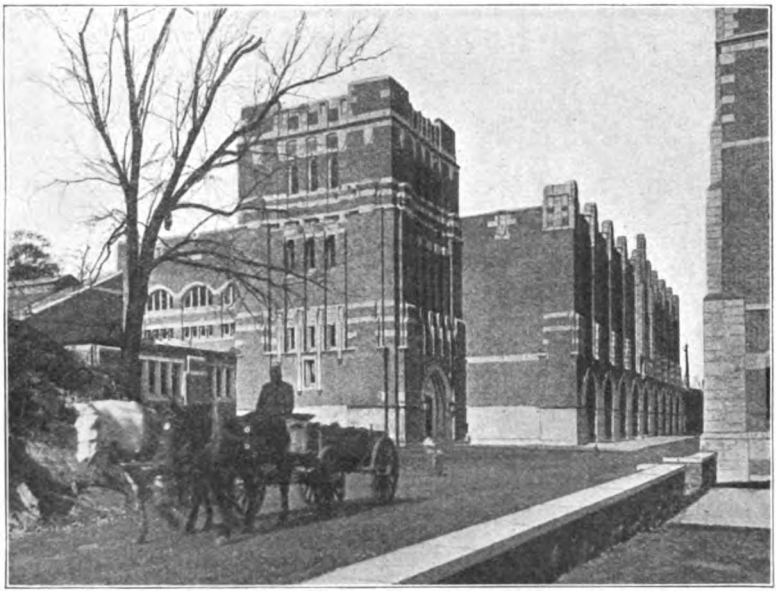

Fig. 50.—Gymnasium, U. S. Military Academy, West Point. All Trim Above the First Story of Concrete Stone.

On the interior, all the stone decoration is of concrete, including appropriate relief panels of athletes at various sports (Fig. 51).

The chapel at St. Paul's Church at New Haven, Conn., has furnished another opportunity for this company to demonstrate the superiority of its product, as concrete stone has been used for decorating the old granite structure over 75 years old (Fig. 52). Just lately, the opportunity presented itself to brighten up the old building with concrete, and how satisfactory has been the result is self-evident.

It should make no difference whether the stone trimming is artificial or natural, the end achieved is that upon which we should

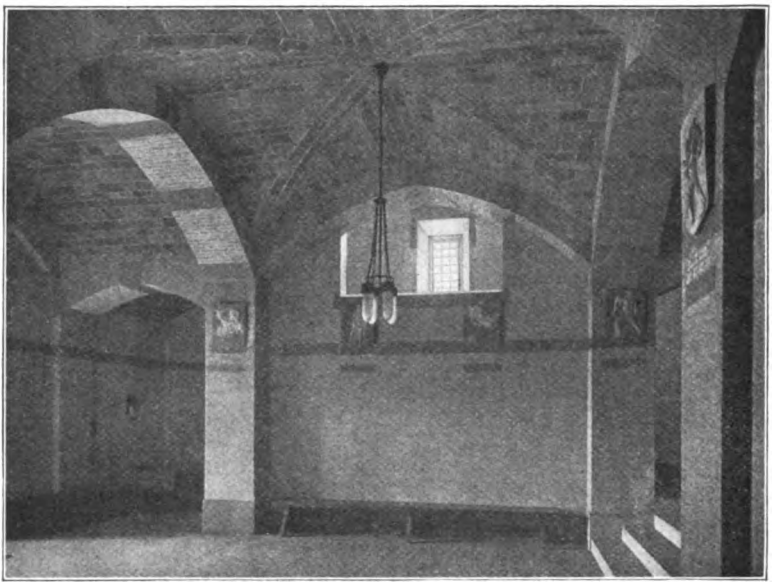

Fig. 51.—Interior of Gymnasium, U. S. Military Academy, West Point.

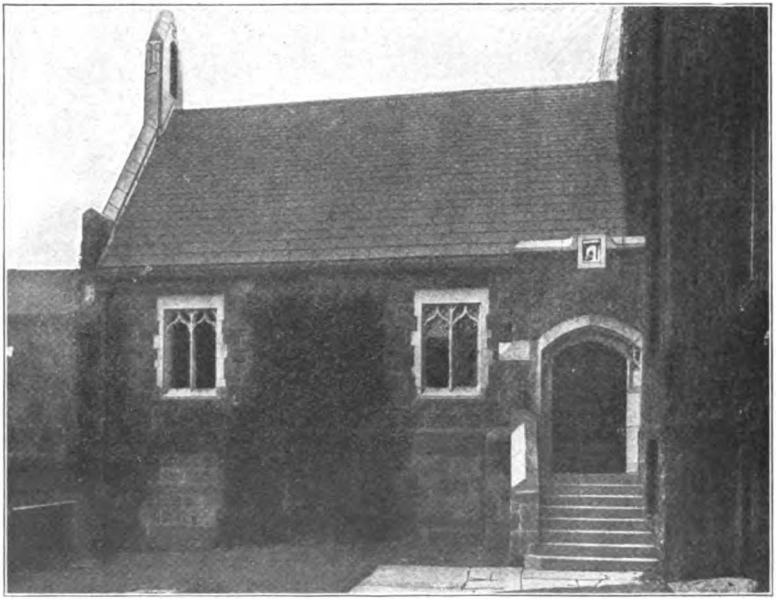

Fig. 52.—Chapel of St. Paul's Church, New Haven, Conn. Window Tracery of Concrete Stone.

pass judgment. In reality, it matters not whether the aggregate in the concrete has been bonded by nature, or by the hand of man with Portland cement as the binding material. So far as permanence is concerned, concrete has already proved beyond a doubt its superiority to many of the natural stones.

St. John's Church is built of a local trap rock which is of a natural gray surface (Fig. 53). But mingled in through the walls are many stones which are rusted, giving a weathered effect, which unobtrusively accentuates the concrete ornamentation, carried even through the tracery of the windows and the tower, and is much in evidence on the interior.

Another instance of concrete applied to ecclesiastical architecture is found in the Broadway Presbyterian Church of New York

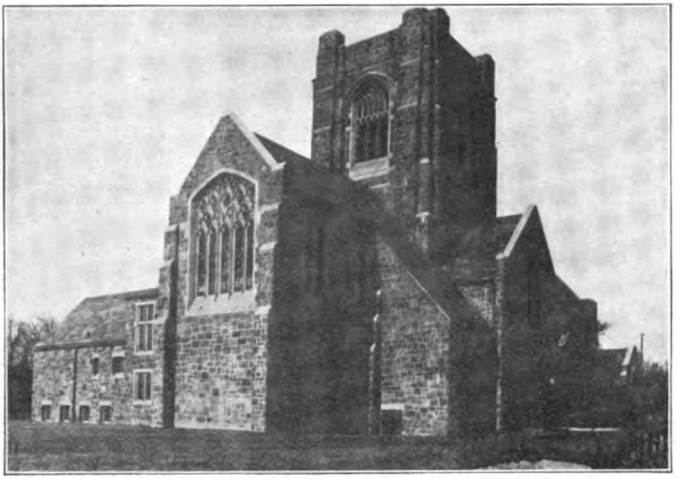

Fig. 53.—St. John's Church, Hartford, Conn. All Trim and Tracery of Concrete Stone.

City (Fig. 54). The natural stone walls of the building are of New York gneiss laid up in random ashlar, and all the trimming, including the window tracery, is of concrete stone. This was cast in sand molds by the Onondaga Litholite Company of Syracuse. The aggregate used for manufacturing this particular stone is made from Gouverneur marble, a hard calcite product from northern New York. This flinty material in crushing, breaks into sharp angular pieces, which are graded into several sizes, depending upon what work they are to enter. After removal from the sand molds, the concrete is carefully cured and then tooled and surfaced by machinery. The surface obtained is identical with natural stone—but oftentimes is superior to it, because of its greater ability to resist the action of the elements. Conclusive evidence of this character-

istic is to be found in the old sandstone decoration on the Königsbau at Stuttgart, erected about 30 to 50 years ago. The upper cornice was ornamented by a number of large figures which began to disintegrate, making replacement of some of the parts necessary from time to time. As a final remedy, the officials proposed duplicating the figures in concrete. This decision was arrived at after inspecting several artificial stone figures which had shown practically

Fig. 54.—Broadway Presbyterian Church, New York City.

no deterioration after 20 years of exposure to the elements. The surface of the new figures was tooled after coming from the forms so that they were identical in texture with the discarded sandstone models.

The Universal Portland Cement Company attempted something unusual in the construction of its new office building at Buffington,

Ind. (Fig. 55). The building is of plain faced concrete blocks with the monotony broken up by the insertion of smaller squares and bands. The surface is further brightened by a ground surface finish which exposes the limestone aggregate and adds life.

In Boston, an imposing memorial showing tooled surface has been erected in Post Office Square (Fig. 56). This pleasing combination of cast stone with monolithic concrete was erected by Emerson & Norris and designed by Messrs. Peabody & Stearns, all of Boston. The monument is supported on reinforced concrete piles and the central portion is faced with cast stone, but the shaft was cast in place and afterward bush hammered to match the ornamentation. For aggregate, a mixture of granite, white and black marble, was used, which when exposed gives a sparkling and contrasty surface, displaying the combined characteristics of the individual materials.

The writers, not being architects, have dealt somewhat sparingly

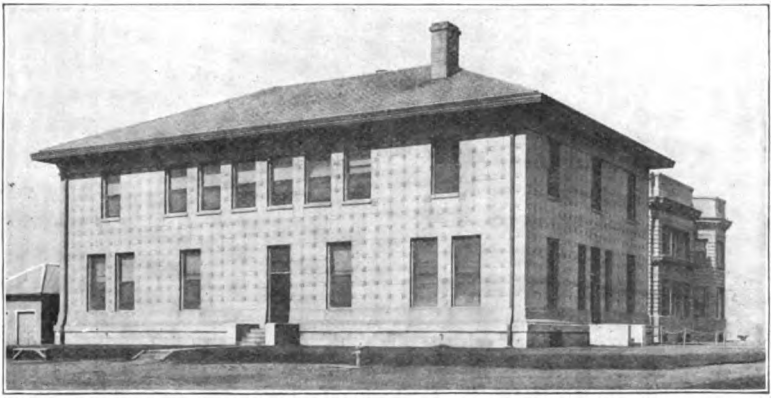

Fig. 55.—Office Buildings, Universal Portland Cement Co., Buffington, Ind.

with the subject of architectural and decorative possibilities of concrete and have rather depended upon the illustrations to indicate the purpose of this paper. After all, architecture and architectural decoration is a peculiar study. On the one hand, we have those who contend for close adherence to the ancient styles of architecture, and on the other hand, we have many brilliant minds who have achieved wonderful results and designed some of our most pretentious structures along entirely new lines, yet without voluminous criticism from those who consider themselves authorities. However, since this paper has dealt more particularly with the architectural side of concrete, it is, perhaps, fitting that we close with a quotation from Oswald Hering, who has made a study of concrete and its architectual and decorative possibilities, and who, by the way, is a son of Rudolph Hering, an honored member of the Western Society of Engineers:

"Concrete can be easily and rapidly manipulated. It is less expensive than either clothed steel or masonry construction alone; it does not deteriorate with time and it is practically fire and waterproof. It grows in strength for a con-

Fig. 56.—Angell Memorial, Post Office Square, Boston.

siderable length of time and after having attained its ultimate strength, it never weakens, consequently, by its use, lighter, cheaper and more durable structures may be erected than with any other known materials."

Regarding concrete stone he says:

"The time would seem to be not far distant when concrete will very largely supplant marble and stone where castings are practical. These should not be termed 'imitations' of stone, for the ingredients are largely the same as are found in real stone. Nature's process of employing time and gravity has simply been superseded and accelerated by man's mechanical ingenuity."

Discussion.

President Reichmann: We have had the pleasure of listening to a very interesting paper this evening. Perhaps Mr. Boynton would like to start the discussion.

Mr. Boynton: We found many points of interest, in preparing this paper. The work of the Economy Concrete Stone Company is of particular interest because they have developed a type that they insist on making one way; if the architect likes it he can use it, if not, he can leave it alone. I think that is one reason why they have succeeded so well in getting a product that is uniform and really desired by the architect because it is dependable.

The Economy Concrete Stone Company cast their product in the different molds necessary to get the lines desired and then rub the product with rubbing stone, carborundum, or whatever is necessary to expose the aggregate product. When I last visited their plant they had a large piece that they were casting for a Government hotel at Panama. The Government holds this company in high esteem, because of the quality of the stone they are producing.

The work that the Emerson & Norris Company are doing is wonderful in that they have practically displaced building stone for entrance decoration in Boston. There are block after block of apartments in which all the entrance work and all the stone trim from the ground up to the window-sill, on the first floor, is cast stone or concrete stone rather than natural stone. Natural stone is no longer "in the running" where other stone can be obtained, because the latter is more uniform; it is more economical, because it can be cast in practically the shape and form required and thus reduce the cost of cutting to a minimum. This does not mean that it is sold cheaper because it is less attractive or less desirable (it is really more attractive and more desirable), but being influenced by the cost of the product it results in economy.

The Germans have been replacing with concrete, for twenty years or more, all the old stone work that has deteriorated. The stone work referred to as being now replaced with concrete was mentioned last December at the annual meeting of the National Association of Cement Users. A gentleman from Germany was in this country at the time, who had some lantern slides showing work in which they were replacing figures on the top of some of the German Government buildings. Some of the pictures showed where they

were replacing with concrete the old sections of heavy stone columns which had deteriorated, retaining the form and texture and color. He said it was not at all uncommon to do that.

Q. Where cutting of the cast stone is necessary, can as delicate work be done as on the natural stone, or is there a tendency of the material to spall or crumble under the chisel?

Mr. Boynton: I believe good concrete will not spall as readily as natural hard stone. You doubtless have noticed some effects of concrete blocks (for instance, such as Mr. Hering referred to) where sufficient water had not been used in mixing the concrete, and where the blocks had been improperly cured, etc. That results in a crumbly product and chiseling is impracticable. In fact, the ends could be rubbed off with the finger. But a well-made concrete product can be worked in a manner similar to that of good building stone. The way it will cut will depend somewhat on the age and the size of the aggregate. If made of large aggregate it would require more time, so as to resist the tendency to break through the aggregate at a point not broken by the chisel, but after it is properly aged the size of aggregate makes no difference. If a product were to be chiseled it would naturally be made of finer aggregate; that is, ¼ to ½ in. rather than 1½ in. stone. There is no danger of properly-made concrete spalling or crumbling after it has reasonable or proper aging.

President Reichmann: About how old must concrete be before it can be worked with a chisel?

Mr. Boynton: If necessary, and the concrete were cured under steam, it could be chiseled in a week's time, if made with that in view; but under ordinary circumstances with normal aging under normal temperature and with water only, I think it could be chiseled safely in thirty days.

Q. I would like some information as to how the ornamental tiles are applied. Are they placed in the forms before the concrete is poured, or, if not, are blanks for them provided, and the tiles subsequently inlaid? Also, is any material or backing or mechanical bond for them necessary?

Mr. Boynton: It is usually the practice to put a blank in the form, outlining in a general way the shape of the figure or the tile that is to be set in, having the blank the same depth as the piece to be set plus a light mortar backing. Then with careful setting, thorough moistening of the concrete, and careful placing of the tile in the proper mortar, it adheres firmly.

Q. What material was used in stenciling the interior of the building that represented the lattice? Was it paint?

Mr. Boynton: I presume it was. There are a number of formulæ that will produce good paint for painting on concrete, even on green concrete. Any form of linseed oil paint can be used, if the concrete is thoroughly aged. But we never know exactly when it reaches that point and we are apt to want to decorate the surface

before that time. With the use of the proper formula it is perfectly safe to paint concrete as soon as it ordinarily dries out, say in thirty days' time.

Q. Must the paint be something special?

Mr. Boynton: Yes, but it is an inexpensive paint. Linseed oil on concrete may prove troublesome and have to be removed.

Mr. Stineman: The statement is made in the paper that pleasing architectural effects may be made in concrete with very little or no additional cost. That is something which engineers should bear in mind, because many of them are inclined to the belief that anything which looks well will cost too much. As a result they erect buildings which are nothing but walls with holes in them, and bridges and structures that are unsightly from an architectural standpoint. They say, "We will put up the structure so it will hold and do the work, and never mind how it looks." Yet with the same or a little more money a pleasing architectural effect might he had. I notice among the illustrations several viaducts in this city, plain in surface or plain in line, which have a pleasing effect because some architect or some man who understood architecture designed them. I would not go so far as to say that engineers should be architects or should make a study of architecture, but I believe engineers should either learn something about architecture or else, in the case of structures which are built in places where people must look at them for years and years, engage an architect to design for them, if they are not able to do it themselves.

President Reichmann: I think that is a very good point. It is only within the last few years that engineers have ceased using most of their time developing new theories for the engineering profession. We are now spending a little more time developing architectural effects of our designs. Years ago, any attempt in the line of aesthetic design in connection with factories was immediately cut short; the owner would not allow the engineer to put anything on the structure in the way of ornamentation, because it would cost a few dollars. But we are now approaching the time when there is more willingness to give the structure attention from an aesthetic standpoint. I believe the engineer is capable of doing this, but heretofore he has not been permitted to do it. There is a great difference in the factory of today and the one built twenty years ago. At the present time, the light and the general features are thoroughly considered before the work of planning is started.

Mr. Boynton: Regarding the work of Mr. Squires in New York, there is one point I might mention as to getting the decorated ceiling effect by using inverted sand molds for the forms. We tried to secure a photograph of the finished ceiling, but had to give up the idea after making several efforts, because of the difficulty in getting back far enough and securing the proper lighting.

In that work Mr. Squires has gone a step forward, I think, in that he will get all the strength he requires through the beams be-

tween the decorations. He will also do away with the plain ceiling at a cost that will be taken care of by the cost of a plain ceiling. He says the cost of building such a ceiling is practically nothing, over the plain ceiling. He saves weight with his structure—saves all the way down the line—and he has a decoration when he gets through that is attractive. Those things are well worth our consideration, and doubtless many of us in our every-day work will see how by study we can get some decoration or pleasing effect without adding materially to the cost; possibly decreasing the cost. Mr. Squires is an architect and not an engineer; that is, he is practicing as an architect, and his work has been confined very largely to residences and apartments. But the same principle can be used in other buildings where a decorated ceiling is desired or there is any desire or need for breaking up the monotony of a ceiling. The cost of such work will doubtless be a little more until we become accustomed to it, or until we have men trained to making the blanks.

One thing that has kept us back and interfered with the proper development of concrete, is that the man who makes the initial expense must necessarily be at more expense than the one who comes after him. We find this in building houses. For instance, in building houses at Gary, the first year's houses cost much more than the second year's work. The saving the second year was astonishing, and it was due to the fact that a trained organization had been developed the second year, avoiding delays and in many ways effecting savings.

The point we have tried to bring out in the paper is that in concrete we have a material from which we can get results. The only real lesson we have tried to teach is that in concrete there are great possibilities for beauty, and this beauty can be brought out by giving a little thought and study to the matter.