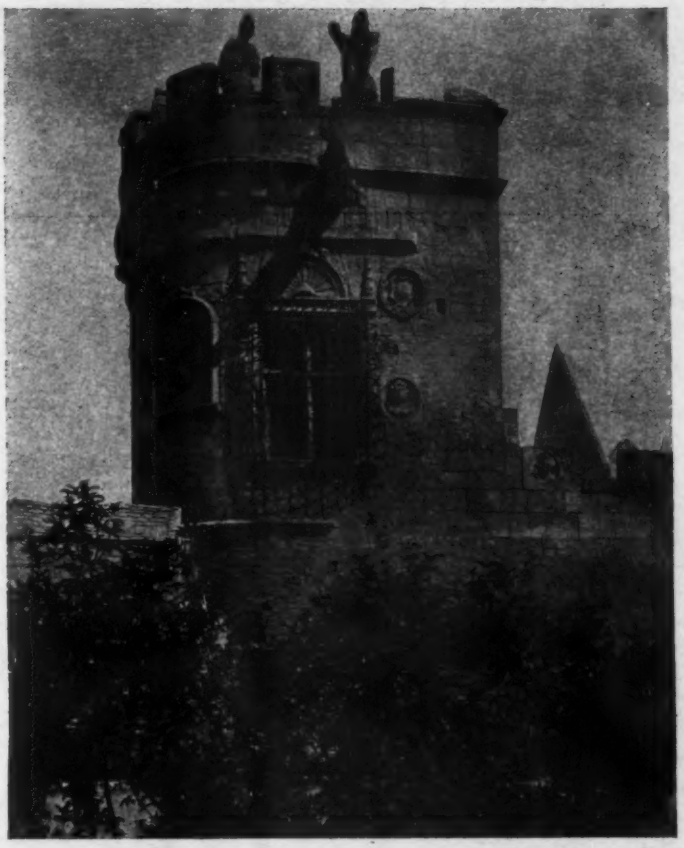
# THE AMERICAN ARCHITECT





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# Symmetry and Proportion in Greek Art

By JAY HAMBIDGE

SYMMETRY represents the orderly arrangement of composing elements of form observable in an organism in nature or in a good design. The investigation which resulted in the material now presented to the Society showed that, in nature, there were but two types of symmetry which could be of use to art. One of these is observable in the crystal and certain natural arrangements of mosaic pattern found in some flowers and cross-sections of seed envelopes. This type possesses a passive quality and was therefore given the name "static." The other type is manifest in the skeleton of man, in the living figure and in the distribution of leaves on plants, called "phyllotaxis." The sunflower disk, the pine cone and the pineapple furnish examples wherein the orderly arrangement of members is apparent by inspection. This type of symmetry possesses certain active qualities, indeed it apparently is the symmetry of growth and because of this it was given the name "dynamic."

In art static symmetry is used consciously or unconsciously. The presence of symmetry in art follows the appearance of order which we recognize as design. The pictures of the cavemen disclose no order or design, consequently no symmetry. The savage decorating his canoe or paddle, his war club, his pottery or his dwelling and producing thereby a recognizable pattern uses static symmetry unconsciously. As civilization develops and when certain periods mark an artistic achievement which is shot through with the character of a people, static symmetry is used consciously. We know this is so because books written upon art practice during such periods have survived.

Dynamic symmetry cannot be used unconsciously because of its peculiar, subtle character. Design remains of the past show that but two peoples understood and used dynamic symmetry in their art; these were the Egyptians and the Greeks. Use of this symmetry had its origin in Egypt very early, where it was developed by the "rope stretchers," the surveyors who "corded" the temples. Records of these "rope stretchers" appear on bas-reliefs of the time of Amenemhat I, 2400 years B. C. At that time "cording" must have been a generally recognized science. We also know that these "rope stretchers" were regarded by the Greeks as expert geometers as a quotation from Democritus shows:

"No one has ever excelled me in the construction of lines according to certain indications—not even the so-called Egyptian Harpedonaptae."

Allman, History of Greek Geometry from Thales to Euclid, Harpedonaptae is a compound Greek word, meaning literally "rope stretcher."

The Greeks obtained knowledge of Egyptian cording methods, apparently, as we learn from black-figured pottery and archaic statuary, some time during the Sixth Century, B. C. The pupils, however, soon surpassed their masters and in the short period of a little over a hundred years created the greatest fabric of design known. The history of the celebrated Delian problem indicates that a superb science was developed from design and architecture. This is familiar to us as Euclidean geometry; the application to design of the same fundamental ideas which underlie this science became lost. Technical methods of design usually disappear when demands for design cease. The case is parallel to the lost design methods of the cathedral builders.

Attempts to recover technical design methods must be attended with much care in order to avoid meaningless recipes and personal interpretations. The only safeguard here is to go to nature direct. This was the procedure in the present instance. When the dynamic symmetry of nature was defined and its technique for design purpose worked out it was found that it represented a symmetry of areas, and consequently solids; that units of length con-

*Synopsis of paper read before the Society for the Promotion of Hellenic Studies, London, Eng., November 11th, 1919. First paper on the subject read before the Society November, 1902. This paper was to have been read November, 1914, but was postponed on account of the war.

nected therewith as such were incommensurable or unmeasurable one with the other, but as areas were always commensurable. This fact discloses that the composing units of an organism constitute a rhythmic theme of areas modulating perfectly with the whole. Each individual or organism possesses a characteristic form theme. These themes may be defined and used in design; that they were so used in the past, classic Greek design abundantly attests.

There are three sources from which we may obtain material for the study and use of the rhythmic themes of dynamic symmetry, to wit, man and the plant, the five regular solids of geometry and classic Greek art. We study the symmetry of man and the plant to obtain the themes direct from nature. The five regular solids supply the abstract mathematical principles. Greek art shows us how the greatest artists used these themes in their masterpieces.

Dynamic symmetry was first discovered in the plant in the following manner:

### The Dynamic Symmetry of the Plant

It has long been known that a peculiar series of numbers is connected with the phenomena of the orderly distribution of the leaves of plants. The series is 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc. This is called a summation series from the fact that each term is composed of the sum of the two preceding terms. For those who may be interested in this subject from the botanical standpoint reference is made to the elaborate work of Prof. A. H. Church of Oxford on "Phyllotaxis in Relation to Mechanical Law." This series of numbers in reality represents the symmetry of the plant in the sense that the word is used as "analogy," which is its Greek meaning. From this series we obtain the entire machinery of dynamic symmetry, which applies not only to the architecture of the plant but to the architecture of man.

This summation series of numbers, because of its character, represents a ratio, *i. e.*, it is a geometrical progression. This ratio may be obtained by dividing one term into another, such as 34 into 55. The series does not represent the phenomena exactly, but only in so far as it is representable by whole numbers. A much closer representation would be obtained by a substitute series such as: 118, 191, 309, 500, 809, 1309, 2118, 3427, 5545, 8972, 14,517, etc. One term of this series divided into the other equals 1.6180, which is the ratio necessary to explain the symmetry of the plant design system.

The operation of the law of leaf distribution and its connection with the summation series of numbers is explained by Professor Church, who uses as illustration the disk of the sunflower:

"The most perfect examples of phyllotaxis easily obtainable are afforded by the common sunflower, so frequently selected as a typical Angiosperm, both in anatomical and physiological observations, owing to the fact that it exhibits, par excellence, what is regarded as a normal structure little modified by specialization for any peculiar environment. Not only is the sunflower a leading type of the composital which holds the highest position among Angiosperm families, but amongst this family it flourishes in the best stations, in which sunlight, air and water supply are perhaps at an optimum for modern vegetation. The very fact that it is as near an approximation to the typical Angiosperm as can perhaps be obtained, suggests that the phenomena of growth exhibited by it will also be normal, and from the time of Braun to that of Schwendener it has afforded a classical example of spiral phyllotaxis."

The sunflower heads "admit of ready observation. By taking a head in which the last flowers are withering and clearing away the corolla tubes, the developing ovaries are seen to mark out rhomboidal facets, and when the fruits are ripened and have been shed the subtending bracts still form rhomboidal sockets. These sockets, with or without fruits, form a series of intersecting curves identical with those of the pine cone, only reduced to a horizontal plane.

"A fairly large head, 5-6 inches in diameter in the fruiting condition, will show exactly 55 long curves crossing 89 shorter ones. A head slightly smaller, 3-5 inches across the disk, exactly 34 long and 55 short; very large 11-inch heads give 89 long and 144 short; the smallest tertiary heads reduce to 21-34, and ultimately 13-21 may be found; but these being developed late in the season are frequently distorted and do not set fruit well.

"A record head grown at Oxford in 1899 measured 22 inches in diameter, and, though it was not counted, there is every reason to believe that its curves belonged to a still higher series, 144-233. The sunflower is thus limited in its inflorescence to certain set patterns, according to the strength of the inflorescence axis, e. g. $\frac{13}{21}, \frac{21}{34}, \frac{34}{55}, \frac{89}{144}$. These were first observed by Braun (1835), and translated into terms of the Schimper-Braun series they would correspond to divergences of $\frac{13}{34}, \frac{21}{55}, \frac{34}{89}, \frac{55}{144}$, and $\frac{89}{233}$, respectively. Under normal circumstances of growth the ratio of the curves is practically constant. (Cf. Weisse. Out of 140 plants 6 only were

anomalous, the error being thus only 4 per cent)."

The ratio 1.6180 when reduced to an area makes a rectangle which has been given the name by the writer of the "rectangle of the whirling squares."

Many years ago the writer became convinced that the spiral curve found in plant growth which Professor Church describes in his work on the law of leaf distribution, as well as the curve of the shell, were identical, and must be the equi-angular or logarithmic curve of mathematics. It will not be necessary for the present purpose to enumerate all the evidence which justifies this assumption. For the benefit of those who may care to pursue the subject further reference is made to a paper by the Rev. H. Noleley, "On the Geometrical Forms of Turbinated and Discoid Shells," (Phil. Trans., pp. 351-370, 1838), and to the able and clear treatment of the spiral by D'Arcy W. Thompson (Growth and Form). Having become convinced that the spiral was indeed the mathematical curve mentioned, the writer saw that, because of a certain property which it possessed, this spiral could be reduced from a curve form to one composed of straight lines and thereby be used by the artist to solve certain problems of composition and connect design closely with nature. This property of the curve is: between any three radii vectors of the curve, equal angular distance apart, the middle one is a mean proportional between the other two. The drawing, Fig. 1, explains this.

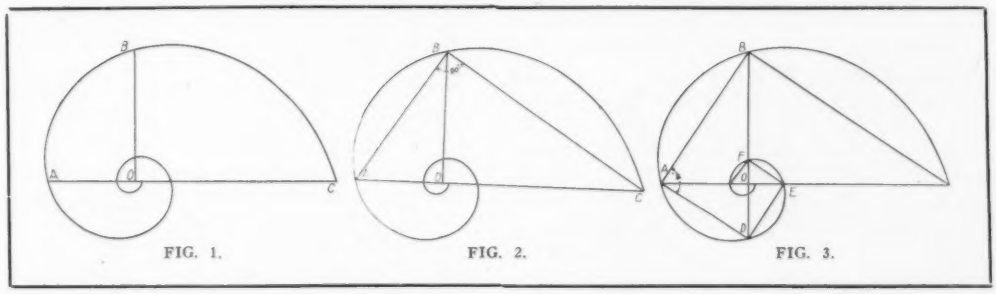


FIG. 1. FIG. 2. FIG. 3.

*O* is the pole or eye of the curve, and the lines *O A*, *O B*, *O C* are radii vectors equal angular distance apart. In this case the angle is a right angle. According to the definition the line *O B* is a mean proportional between the other two, i. e. *O A* and *O C*. This means, speaking in terms of area, that the line *O B* is the side of a square equal in area to a rectangle the end and side of which are the lines *O A* and *O C*. It necessarily follows therefore that if three lines stand in this relationship they constitute the essentials of a right angle. This is shown in Fig. 2.

The line *O B* is a mean proportional between the lines *O A* and *O C*, and the shape *A B C* is a triangle, right angled at *B*, and the line *A C* is the hypotenuse. One of the earliest geometrical facts determined by the ancient Greeks was that in a right-angled triangle a line drawn from the intersection of the two sides to meet the hypotenuse at right angles was a mean proportional between the segments of the hypotenuse. Simply stated, this means that three lines situated as the three radii vectors mentioned constitute three terms of a continued proportion: *O A* is to *O B* as *O B* is to *O C*. The relation between these lines could be stated arithmetically as a ratio, this following from the fact that lines in continued proportion form a geometrical progression. If we assume, for example, that the ratio is 2 and the length of the line *O A* is two units, then the line *O B* would be four units and the line *O C* eight units; 2, 4 and 8 constitute three terms of a simple proportion with a ratio of 2, and according to the rule of three the square of the mean is equal to the product of the extremes. In this case 4 is the mean and 2 and 8 are the extremes. Four multiplied by itself, or squared, equals 2 multiplied by 8. The mean is the side of a square equal in area to the area of a rectangle made by the extremes or 2 as end and 8 as side.

But the line *O B* may be produced through the pole *O* of the spiral until it touches the curve at the point *D* and *D A B* will be a right angle, and there will exist four lines in continued proportion, *O D*, *O A*, *O B* and *O C*. Also the curve cuts the vector lines at *E* and *F*, etc., and other right angles are created. In short, the curve may be reduced to a rectangular spiral and, as in the curve, the converging right angles wrap themselves to infinity around the pole. This particular curve never reaches the pole; it goes on forever. The essential point is that this simple construction enables the designer to introduce the law of proportion into any type of composition, and that, too, in much the same way as it appears in the plant and the shell. The operation by which this is accomplished is the drawing of a diagonal to a rectangle and a line from one corner,

cutting this diagonal at right angles, as in Fig. 5.

Fig. 5 is any rectangle and *A B* is a diagonal. The line *C D*, drawn from the corner *C*, cuts the diagonal *A B* at right angles at *O*. It is apparent that the angular spiral formed by the lines *A C*, *C B*, *B D*, *D E* and *E F* is identical with the angular spiral derived from the shell and from the plant. Having established a condition of proportion within the area of a rectangle it becomes obvious that the line *C D* must perform some important function.

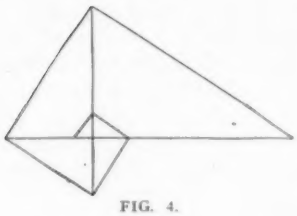


FIG. 4.

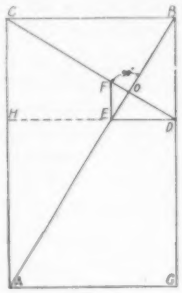



FIG. 5.

Artists are well acquainted with at least one property of the diagonal to a rectangle. It is well known, for example, that any shape drawn within the area of a rectangle whose diagonal is common to the diagonal of the containing area is a similar shape to the whole. This geometrical fact is utilized in the arts, especially the reproductive arts, for the purpose of determining similar shapes on a larger or smaller scale. This, however, is about as far as modern artistic knowledge of proportion extends. The value of the line *C D* is unknown to modern art. That the value of this line was known at one time in the history of art and its power appreciated is abundantly proven by dynamic analysis of classical Greek design. This line *C D* determines the reciprocal of a rectangular shape and is itself the diagonal of that shape. Following the construction we appreciate the fact that in a rectangular area the diagonal of a reciprocal cuts the diagonal of the whole at right angles. The line *D H*, Fig. 5, which is drawn parallel to the ends *A G* or *C B*, fixes the area of the reciprocal of the shape *A B*. With this notion of a reciprocal in mind it is apparent that the fatter or squatter the rectangle the larger will be the area of the reciprocal. For example, if instead of the rectangle *A B* of Fig. 5, one is constructed which much closer approaches the shape of a square, the area of the reciprocal, because it is a similar shape to the whole, will also much closer approach the shape of a square. The breadth of the reciprocal increases with the breadth of the parent form until it coincides with it as a square; or it decreases until both become a straight line. Obviously, also, there must be rectangles such that the reciprocal is some even multiple of the parent form, such as ½, 1/3, ¼, 1/5 and so on. Perception of this fact led the writer to discover the root rectangles. It was found that a rectangle whose reciprocal equalled one-half the whole was a root two rectangle; 1/3 a root three, ¼ a root four and 1/5 a root five rectangle, and so on. When the root five rectangle was defined and its commensurable area examined it was found that this shape was connected in a curious manner with the phenomena of leaf distribution. As has been explained, the ratio produced by the summation series of numbers which so persistently appears in the rhythmic arrangements of leaves and seeds in vegetable growth is 1.6180. When a rectangle was made wherein the relationship between the end and side was the ratio 1.6180 it was found that the end of the reciprocal of this area equalled .618. The side of a root five rectangle, arithmetically expressed, is 2.2360 or the square root of five. If the ratio 1.6180 is subtracted from 2.2360 the remainder is .6180. The area of a root five rectangle, therefore, is equal to a 1.6180 rectangle plus its reciprocal. The 1.6180 rectangle, because the end of its reciprocal equals .618 is a rectangle such that its *continued* reciprocals cut off squares and these squares form a spiral around a pole of the rectangle.

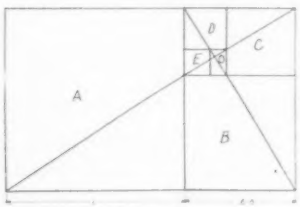



FIG. 6. (*)

Fig. 6.—*The Whirling Square Rectangle showing the squares *A*, *B*, *C*, *D*, and *E*, arranged in a spiral form around the pole *A*.

Fig. 7.—*A Root Five Rectangle and the method of construction. *A B* is a square and *C B* is a diagonal to half the area of that square. This line *C B* is used as a radius to describe the semi-circle E B G x AB. F D are whirling square rectangles and AD, EB are reciprocals. The root-five rectangle is really the base of the system of Dynamic Symmetry.

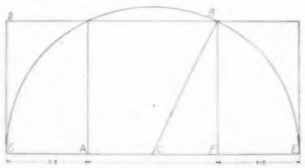


FIG. 7. (*)

This pole of course is the point where the diagonal of a reciprocal and a diagonal of the whole cross each other. Because of this property this shape was given the name "the rectangle of the whirling squares."

### The Difference Between Dynamic and Static Symmetry

Symmetry is that quality in a work of art or craft which we recognize as design.

Static symmetry, as the name implies, is a symmetry which has a sort of fixed entity or state. It is the orderly arrangement of units of form about a center or plane, as in the crystal. A snow crystal furnishes a perfect example. It is apparent in cross section of certain fruits. Diatoms and radiolaria supply other examples. In art it is the symmetry used by all peoples except the Egyptians and the Greeks, although a small percentage is found in the design products of these two nations. The static is the spontaneous type; i. e. an artist or craftsman may use it unconsciously. Static symmetry, as used by the Copts, Byzantines, Saracens, Mahomedons, and the Gothic and Renaissance designers, was based upon the pattern properties of the regular two-dimensional figures such as the square and equilateral triangle. The static symmetry used by the Greeks before they obtained knowledge of dynamic symmetry depended upon an area being divided into even multiple parts such as a square and a half, three-quarters, one-quarter, one-third, two-thirds, etc. The Tenea Apollo, a Sixth Century B. C. Greek statue, has a symmetry theme of three and two-thirds. This means that if a rectangle is made the area of which consists of three squares and two-thirds of a square it will be exactly the shape which will contain the projection of the statue. When we find that every member of the body is expressable in terms of this shape and that the theme produces a simple pattern form throughout we decide that this Apollo belongs to the static class. It is well understood that the Archaic Apollo statues of Greece closely followed an Egyptian prototype. A statue of Amenophis IV, of the Fourteenth and Fifteenth Century B. C., which is such a prototype, discloses quite unmistakably a dynamic theme. Diodorus Siculus, the Sicilian Greek historian, says the early Greeks obtained their sculptural knowledge from Egypt and tells the story of a certain Rhœcus who had two sons, Telecus and Theodorus, who, like their father, were sculptors. One of these sons worked at Samos, the other at Ephesus, and between them they made a statue according to a prearranged plan. When the two parts of the figure were brought together they fitted exactly, so the statue appeared the work of one man. Stories of this character suggest that the poet was possibly near the truth when he said:

"From Egypt arts their progress made to Greece
Wrapt in the fable of the Golden Fleece."

Now that dynamic symmetry supplies a means by which we may closely inspect any design and classify it according to its symmetry theme, we see that the Tenean Apollo, though closely resembling the outward aspect of an Egyptian prototype, such as the statue of Amenophis IV, is in reality, as far as its symmetry is concerned, quite a different thing. The archaic Apollo sculptors of Greece apparently did not have knowledge of the Egyptian symmetry secret when the Tenea figure was made. When we find that the identical symmetry theme disclosed by the Tenea statue was used by Greek designers to a limited extent, less than five per cent, throughout the classical period, we conclude that this represents the work of a small number of designers who apparently did not know the dynamic scheme. Probably they did not belong to the craft guilds. After the decline of Athens and during the Hellenistic Age we find that this Tenea figure or static symmetry type, used more and more until by the first century B. C., it is the only type observable; the dynamic type entirely disappears at this date.

As has been said, dynamic symmetry in nature is the type of orderly arrangement of members of an organism such as we find in a shell or the adjustment of leaves on a plant. There is a great difference between this and the static type. The dynamic is a symmetry suggestive of life and movement. Its great value to design lies in its power of transition or movement from one form to another in the system. It produces the only perfect modulating process in any of the arts. This symmetry cannot be used unconsciously, although many of its shapes are approximated by designers of great native ability whose sense of form is highly developed. It is the symmetry of man and the plant and the phenomenon of our reaction to Greek classic art and to certain fine forms of other art is probably due to our subconscious feeling of the presence of the beautiful shapes of this symmetry.

### Greek Symmetry Tradition and Roman Interpretation

Roman report of Greek tradition says that classic artists took extraordinary care to have their designs conform to the principles of a certain symmetry which they derived from the human figure. The Romans, however, assumed that this symmetry depended upon a modulus or length measurement which was multiplied or divided into even units to determine the proportions of the composing elements of a design, thus producing an ensemble, the parts of which were commensurable with each other and with the whole. Dynamic symmetry shows us that the Romans were in error in their interpretation of this tradition. No Greek design of the first class has been found wherein commensurability of line exists, and this is also true of the figure of man in nature. Design in nature and design in Greek art show conclusively that parts are invariably commensurable with the whole but not in line; the measurableness is that of area. When

the human figure is measured and interpretated in terms of area the result is a revelation to art.

Greek statuary and design in general as well as Greek buildings do not in any way bear out the Roman interpretation of the Greek tradition. In fact the Roman rules, by their definition prove their fallacy. The modulus idea, used in any manner, would necessarily produce static symmetry. It is not possible to express the human structure in even multiples or even fractional multiples of any member such as head, hand, foot, arm or leg. As lengths these members are incommensurable, unmeasurable, one with the other.

The members of the human body are indeed measurable one by the other but not in *line*, as the Romans thought. Both nature and Greek art show that the measurableness of symmetry is that of *area* an dnot *line*. The Romans were not given to scientific study or they would have heard of the Greek classification of irrationals, a subject which was taught at Alexandria in Roman times. This classification, familiar to us as the tenth book of Euclid's Elements, shows that lines incommensurable in length are not necessarily irrational; they may be commensurable in square. This is the secret. Dynamic symmetry deals with commensurable areas. The symmetry of man and plant is dynamic; the symmetry of the entire fabric of classic art, including buildings, statuary and the products of the crafts, is dynamic. The symmetry of all art since Greek classic times is static.

Since the First Century B. C. many treatises have been written upon the human figure and its proportions. The list of authors includes the names of most of the best known artists. Bertram Windle enumerates eighty-eight. The theories advanced in these works are developed upon the same general idea as the Roman scheme. There are slight variations occasionally, but nothing really new or true appears in any of them. In recent years scientists have measured an enormous number of men for the purpose of racial and type comparison and for military and economic statistics. If human figures were constructed in conformity to the canons of the artists or according to the measurements of the scientists the results would all be static and consequently untrue to nature. The measurements of the scientists, however, would result in figures truer to nature than those constructed according to the artist's canons for the reason that the former, as a rule, have reduced the stature of man to a system of decimal fractions which approximates the actuality of the unmeasurable lengths closer than do the rules of the artists. In no case, however, have the commensurable areas of dynamic symmetry been recognized.

There are three sources for the study of Dynamic Symmetry: The plant and the human figure, the five regular solids of geometry, the tetrahedron, the cube, the octohedron, the icosahedron and the dodecahedron, and Greek art. We study the plant and the human figure, particularly the latter, to learn how the rhythmic themes of areas are worked out in nature; we study the five regular solids for the abstract mathermatical principles of this symmetry; Greek art shows us how the greatest masters used this symmetry in their masterpieces. The Parthenon at Athens is a Greek design which exhibits clearly the nature of the commensurable arears of Dynamic Symmetry. When we take the measurements of this building and interpret them in terms of arear we find that its rhythmic theme is that of square and the square root of five. The geometrical figure necessary for the purpose of drawing this these of one, or unity plus a root five rectangle is very simple. When we find that the area of a design is commensurable in terms of Dynamic Symmetry we may reduce the scheme to terms of arithmetic and carry out the analysis by the simple operations of arithmetic. In the case of the Parthenon, the following figures represent the basic forms of construction.

1. equals a square
.4472 is the reciprocal of a root five rectangle
.7236 is half of 1. plus .4472
.691 is the reciprocal of 1.4472
.691 is half of 1.382
1.691 is a square plus .691
1.7236 is a square plus .7236

The correct proportions of a Greek temple cannot be obtained unless the Euthynteria is included. The Euthynteria is the lowest, or first levelling course. (See Fig. 8.)

FIG. 8.

Three step temple and Euthynteria.
The Euthynteria is the shaded small step at the base.

For the Parthenon:

Length 238.169 ft. plus or minus
Width 111.3408 " " " "

111.3408 divided into 238.169 furnishes the ratio 2.1382. This ratio is compound and is composed of 1.4472 plus .691. 1.4472 is a square plus a root five rectangle, and .691 is the reciprocal of 1.4472, and, therefore, a similar figure.

Plan theme throughout the building is a square

and root five. Natural source for this figure is the regular pentagon. (See Fig. 9.)

*A B* is a square plus root five shape.

Geometrical method for construction. (See Fig. 10.)

A side of the square *A B*, as *B D*, is bisected at *C* and the line *C E* drawn. *C F* is equal to *C B*.

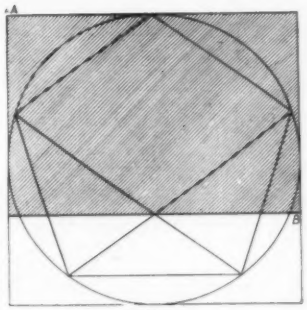



FIG. 9.

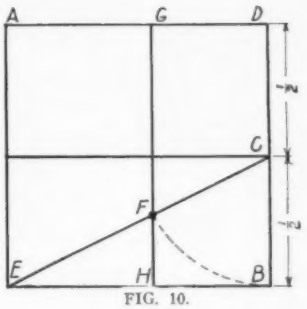



FIG. 10.

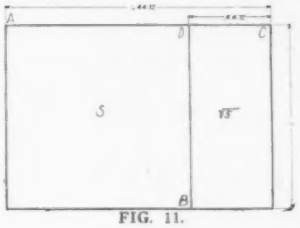



FIG. 11.

Through *F* draw the line *G H*. The area *G B* is a root five rectangle, and if *G H* is unity *H B* is equal to .4427 plus. (See Fig. 11.)

*A B* is a square and *B C* a root five rectangle. If *A D* is unity *A C* is equal to 1.4472 plus. (See Fig. 12.)

*A B* is a 1.4472 plus rectangle and *B D* a .691 rectangle. The two lines *A B* and *B D* meet at right angles at *B*. *B F* and *B C* are root five rectangles. *E D* and *A G* are squares. (See Fig. 13.)

*A* root five rectangle is composed of a square and two whirling square rectangles, 1. plus .618 plus .618 equals 2.236 plus, the square root of five.

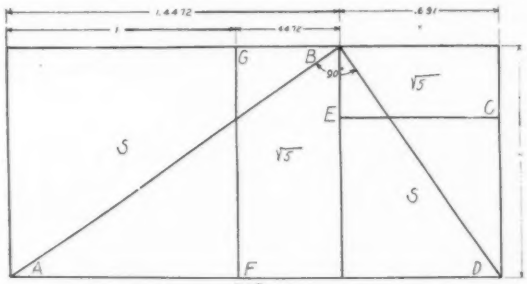



FIG. 12.

The ground plan of the Parthenon, by construction, has a large square on each corner, and these squares are the squares obtained from root five rectangles. (See Fig. 14.)

The geometrical method for placing the columns depends upon the subdivision of these squares to obtain smaller squares and root five rectangles.

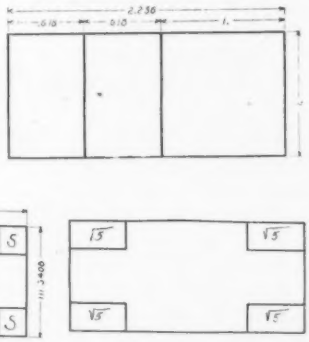
A square and a root five rectangle may be considered in two ways. (See Fig. 15.):

If No. 2 is comprehended in or applied to a square, No. 1 is the excess. (See Fig. 16.)

*C B* Fig. 9 is a square plus a root five rectangle applied to the square *A B*. *A D* or *F H* are excess areas. *E B* and *E A* are root five rectangles, *G E* and *E F* are squares. *A H* is a square plus a root five rectangle as is also *H F*. (See Fig. 17.)

The line *C B* Fig. 10 is the diagonal to a square plus a root five rectangle. It cuts the line *A H* at *D*. *F D E* and *I G* are the centers of the five angle columns. If this diagram were drawn to scale it would readily be seen that the columns D and *I* are closer to the angle column *F* than are *E* and *G* to *D* and *I*. The lines *C J* and *J K* are the outside lines of the Euthynteria. The line *K L* is the line of the cella wall. *C A* or *E D* represent the distances, center to center of all the columns

FIGS. 13. AND 14.




of the temple except the angle columns with each two adjacent columns. If lines are drawn through the centers of the columns, exclusive of the twelve angle columns, *i. e.* exclusive of *D F* and *I* and the similar columns of the other three corners,

the area of the ground plan from Euthynteria to cella wall, is divided into figures like *C H, i. e.,* into square and root five rectangles. The error throughout is the error of actual construction as is found in the building today.

The Façade

Width 11.3408 plus or minus

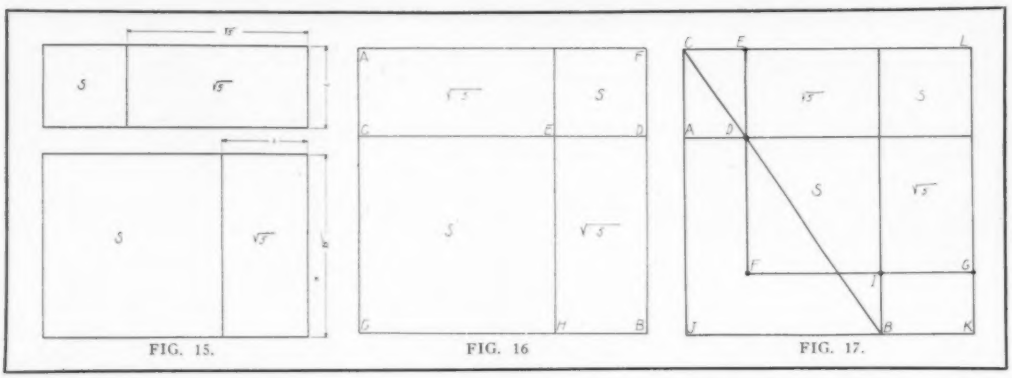


FIG. 15. FIG. 16 FIG. 17.

Height 64.59 plus or minus

The lesser divided into the greater produces the ratio 1.7236.

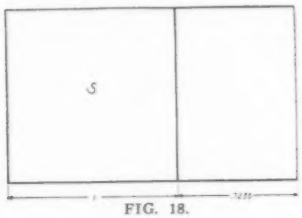


FIG. 18.

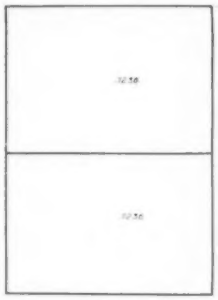


FIG 19

1.7236 is a square plus the fraction .7236.

1.4472 divided by two equals .7236.

The fraction .7236 is the reciprocal of 1.382.

.7236 divided into unity equals 1.382.

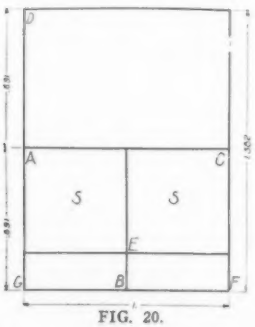


FIG. 20.

The relation of this area 1.7236 with the ground plan is apparent.

Average breadth of triglyphs 2.766 feet.

Average breadth of triglyphs 3.840 feet.

3.840 divided by 2.766 equals 1.382, the reciprocal of which is .7236.

The metopes were intended to be squares (see Penrose). In fact those in the middle of the façades are slightly longer than a square. If they were exact each triglyph and metope would echo the façade; *i. e.,* be a square plus .7236. (Fig. 18.)

The Antafix, from a rubbing of the plaster cast in the Metropolitan Museum, New York, is contained in a 1.382 rectangle, exact. (Fig. 19.)

If this shape is divided by two the area is divided into two .7236 rectangles.

That this was what was actually done is proven by the antafix itself in the arrangement of the volutes. (Fig. 20.)

The 1.382 rectangle *D F* is bisected by the line *A C*. The volutes are constructed in the two squares *A E* and *E C*. *A B* and *B C* are two 1.382 rectangles, *A E* and *E C* are two squares and *C E* and *E F* are two .382 shapes. (Fig. 21.)

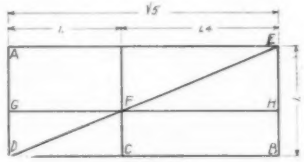


FIG. 22.

When the two volutes are drawn in the two squares *A B*, the area *C D* is fixed by the spirals, as at *E F*. The area *C D* is a 1.7236 rectangle.

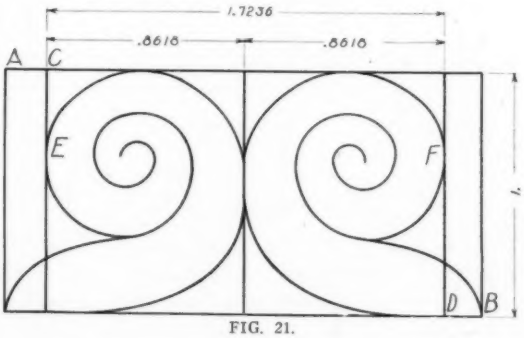


FIG. 21.

The angle columns of the Parthenon, taking the width of the abacus as end and height of column

as side, furnish a root twenty-five rectangle, or five squares. 5 is the square root of twenty-five. This root twenty-five rectangle is obtained from a root five rectangle of the ground plan by construction. (Fig. 22.)

Construction for a root twenty-five rectangle from a root five rectangle.

*A B* is a root five rectangle. *A C* is an applied square. *D E* is a diagonal to the root five shape. It cuts the side of the square *A C* at *F*. The line *G H* is drawn through *F*. The area *G B* is composed of five squares, or is a root twenty-five rectangle.

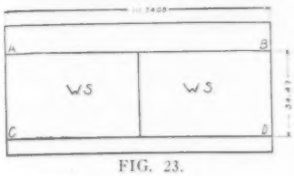


FIG. 23.

The details of the head of the Parthenon column are correlated by a root five rectangle.

| | |
|---|---|
| The square root of twenty-five equals | 5.000 |
| The square root of five equals | 2.236 |
| The square root of the difference equals | 2.764 |

2.764 divided by two equals 1.382
1.382 divided by two equals .691.
2.764 divided by four equals .691.
.691 equals a square plus a root five rectangle because it is the reciprocal of 1.4472.

The area occupied by the columns on façades and sides, *i. e.*, the area from top step to architrave is obtained by adding the increment of curvature. (Fig. 23.)

Façade Elevation.

*A B* is the architrave line.
*C D* is the top step line.
*A D* is equal to two whirling square rectangles.
*C D* equals 111.3408 feet.
*A C* equals 34.47 feet.
Height of column 34.254 plus feet.
Increment of curvature added 34.47 feet.
(Increment of curvature approximately .225.)
Penrose told the writer the Saggitta was anything between 2 and 2.50.
Two whirling square rectangles equal 3236.
3236 divided into 111.3408 equals 34.47. (Fig. 24.)

Side Elevation.

*A B* architrave line.
*C D* top step line.
*C D* or *A B* equals 238.169 feet.
*A C* or *B D* equals 34.47 feet.
238.169 divided by 34.47 equals 6.91.
6.91 divided by 10 equals .691.

It is curious that 34.47, and actual English foot length divided by two, equals 1.7236 English feet. Here we must be close to the Attic foot.

I might continue this square and root five theme until every detail of decoration and moulding was explained, but I believe this is enough to show

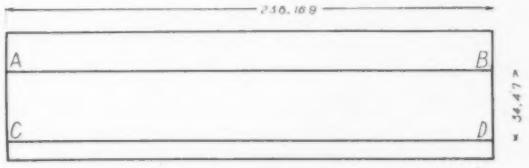


FIG. 24.

that the Parthenon plan was a geometrical scheme based upon natural form. Analyses of other Greek designs show conclusively that the Greeks possessed knowledge of a science of plan making. The history of Greek geometry also shows that this science was obtained from the five regular solids some time during the sixth century B. C. First knowledge of this science was undoubtedly obtained from Egypt and it in substance was a canon of proportion, capable of infinite diversity and was applied to all design during the classical period, including the human figure.

## Art Stoops to Conquer

Writing in the Providence *Journal*, F. H. Young presents an interesting discourse under the above head. Mr. Young states, in part:

British manufacturers, especially those in the textile and metal-working industries, are said to be keenly appreciative of the necessity of better and more artistic designs for their goods and to be seeking the greater co-operation of artists. A movement is under way to bring art and commerce into closer relations, and it is reported that the response has been cordial.

If this is true it shows an altogether new spirit on the part of artists, writes Mr. Young. Hitherto their traditional attitude toward commerce has been one of aloofness. To call an artist "commercial" has been a mortal insult. Of course, artistry in modern industry is a recognized commonplace, and there are thousands of "commercial artists" whose work is a mighty factor in business. But "artist" is a much inclusive word, and there is an implicit distinction between those who practice "art for art's sake" by painting pictures solely for the gratification of the eye and those who design picturesque labels, bed-spreads, garment fabrics and new automobile bodies. In short, about Art with a capital A there is an implied sanctity, and there has been an unwritten law that it should not be profaned by too close contact with commerce. Those who employ their talent to boost or beautify the ordinary utilities of life are regarded by "artists" as on a lower plane, as no more than mere "craftsmen" at the best. Their trade, worthy and respected as it may be, is really to be viewed as no better than a poor relation of Art.

Perhaps this is the most conspicuous feature of the snobbishness of art and it may not be a praiseworthy attitude. It is however, a fact. Art is exclusive and jealous.

It will brook no rivals and will tolerate the presence of no substitutes or near-limitations. When an artist is considered to have abandoned the divine torch by seeking a livelihood making pictures for magazines he is no longer esteemed as an "artist," for it is held that he has become an "illustrator" and he is so designated. For his own delight he may still paint pictures that command approval, but his work as an illustrator, except in rare instances, is not recognized as real art.

If this distinction arises in the general work of illustration, there is a much more emphatic distinction in the case of about all lines of artistic endeavor that are strictly commercial. In fact, the word "commerce" is regarded by art with abhorrence, except as it may relate to the traffic in Rembrandts, Corots and such. It is a matter of reproach for an artist to become "commercial" even in the sense of painting pictures "to sell"—that is, pictures that are deliberately calculated to appeal to the popular taste. In the aristocracy of art it seems to be assumed that the highest expression of art is that which very few people like. An artist who persistently paints pictures that nobody wants is likely to be regarded by his fellows with great admiration as a follower of high ideals. And yet it is a strange fact that the greatest artists have been those whose ideals seem to have coincided to a remarkable degree with the tastes of the crowd.

Of course, "commercial artists" are and will continue to be co-operating with commerce to the full extent of their ability. It would not seem necessary to stimulate their ambition in any way. Obviously, this British movement for a closer union between art and commerce has to do with artists—those whom for the sake of distinction we may call "real artists." In view of their reported enthusiasm over the project perhaps it may be concluded that artists are becoming more practical. The H. C. of L. has been sweepingly educative, and the C. of H. L. has also sharpened the appreciation of practical considerations. Even artists like to drive their own motor cars, and a steady job as designer for a manufacturer may supply the gasoline rather more reliably than picture painting for an uncertain public.

Still, it is to be hoped that artists will not turn to this new co-operation with commerce with too much zest and in too great numbers. The world will continue to want pictures. The movement affords a needed opportunity for a weeding-out process in the field of art. Many a good sign painter has been lost to the world because of the curious determination to pursue art at all hazards. If the bars are let down by this new enlightenment society is bound to gain many capable sign-painters and gingham designers, with a corresponding curtailment in the production of mediocre art.

That is one attractive feature—really the only one reported—about the Russian soviet government. It is attempting to encourage art by a process of restraint and elimination. As the conditions have been reported, there is a Commissary of Popular Enlightenment in Russia, one of the branches of which is the bureau of the Prolet-Kul, which controls art and education. As we understand the principle of the system, artists are compelled to prove that they are artists. If they succeed they are duly licensed by the government, but otherwise they are forced into some other line of activity. If they are good enough they may become sign-painters, but when a man shows up too poorly under the test he may find himself a blacksmith's helper or almost anything.

# EDITORIAL

## A Basis of Philosophy

"SOME day," says the editor of the *Journal of the American Institute of Architects* in the November issue, under the very appropriate heading "Shadows and Straws," " we shall learn to shun the man who calls himself practical, as we would an icthyosaurus, for we shall have learned that before starting out to 'do something,' you must have a philosophy, based on the whole problem. * * *"

Shall we really learn this? Can we ever learn it? Can we ever learn that a philosophy which is pure theory is a safe foundation on which to build a fabric of fact, of practical effort, based not on a philosophic theory, but on something that can be actually and practically demonstrated?

It is a line of reasoning such as is set forth in the above statement that is responsible for our lack of progress along many lines, and, referring to our own problems, particularly to the profession of architecture. Up to the outbreak of the great war the profession of architecture was ruled on the principles of a "philosophy based on the whole problem." Had such a philosophy, a philosophy that was acceptable to a majority of the long-headed men in the profession, ever been evolved? Had any one of the several groups of men ever successfully reached by philosophic reasoning alone any measure of practical conclusion?

IT is perhaps useless to refer to the condition in which the profession of architecture found itself at the outbreak of the war. But the question may be reasonably asked if the government's relative attitude towards architects and engineers was not the result of the opinion formed by men trained in efficiency as to the relative merit of men who based their claim to recognition on their philosophic basis of thought and action as opposed to men, who like the engineers, were everywhere known as the most practical of men, and who, if they had any basis of philosophy, subordinated it by the substitution of the utmost practical efficiency.

The group of practical men who dominated the recent convention of the Institute, everywhere created the impression of optimism for the future outlook of the practice of architecture. The Post-War Committee, by the character of its work and the personnel of its members, gave assurance that it would become a practical and vital element in the rebuilding of the dignities of architectural practice. Since the convention this efficient committee has further shown that it was its intention practically to consider every vital thing that could properly come before it. The closest scrutiny of its efforts fails to disclose any tendency toward "rainbow chasing" or to an academic discussion of the philosophy of any of its problems.

Further, there had steadily grown the feeling that from this committee would eventually come the correct solution of all problems affecting architecture, and that among its numbers would be found that clear-headed practical element that would lead the Institute back to its erstwhile commanding position.

BUT now we have from the editor of the *Journal* an expression of the hope that "some day we shall learn to shun the practical man," as some one that has no value as opposed to that man who evolves a philosophy for everything he does.

Further on in this issue of the *Journal* we learn that its editor has been appointed to the executive committee. Is the editor's opinion as to the value of practical men shared by a majority of this committee, and does this statement in the November *Journal* reflect the opinion of that committee?

President Kimball in his address before the Nashville convention urged that a thousand new members be secured in 1919. Does anyone suppose that this desirable increase in membership could be reached at any time if the policy of the *Journal*, which it is natural to assume reflects the policy of the Institute, is opposed to the very essence of the efficient practice of architecture?

## War Memorials in France and Belgium

FROM the early days of the war, when it became certain that many buildings of great architectural merit lying in the path of battle would be either destroyed or severely damaged, THE AMERICAN ARCHITECT has suggested the maintenance as ruins of the more important structures.

These, it was argued, would serve as war memorials in their respective localities, but would also in the most forceful way teach future generations the lessons of war's horrors and destructiveness.

It is now extremely gratifying to learn that the policy recommended will be in many important instances carried forward; that no attempt will be made to "restore" all of these buildings, but they will for all time stand as picturesque and pathetic ruins.

Recent communications from France state that the Cloth Hall in Ypres, the cathedral and the adjacent buildings are to be maintained in their present state as ruins. In announcing this intention the authorities frankly state that it is impossible to restore these buildings to anything approximating their original beauty, particularly in color and those many artistic evidences which accompany age, so it has been decided that steps shall be taken to preserve these ruins from vandalism. These buildings and others in different localities will constitute a place of pilgrimage for the relatives of men who have fallen in their vicinity and for the peoples of countries all over the world.

AMERICA is to be afforded an opportunity to express its appreciation of the heroic attitude of Belgium during the war and to make a concrete expression of its sympathy with that long harried country. The library at Louvain was in 1915 destroyed by the invader. Under plans recently announced by the American Committee for the restoration of Louvain it is proposed to raise by popular subscription the sum of $500,000 as a part of the world-wide campaign, participated in by twenty-nine countries to restore this shattered equipment of Belgium's foremost library. It is the aim of those in charge of this fund that contributions be secured from Americans in all walks of life, to create a memorial of the heroic services of the Belgian people in defense of human liberty.

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## Reducing the Tax on Building Valuations

AS a means of effecting a reduction of the present high rentals and of giving impetus to construction of low cost houses, the question of the lowering of the tax rate is being seriously considered in many communities.

We are now no less than three years in arrears of our normal building operations of low cost houses. As a result of this scarcity there has followed the present high rental charges. Further, it is maintained by many writers on economics that the present labor unrest, the largely extended strikes, are due to inadequate housing.

There is a large measure of truth in this contention, and it therefore becomes essential to the stabilization of our daily lives that some measures should be promptly taken that will solve the problem of the housing shortage. Will a decrease in taxes aid in this solution?

THE idea of a lowered tax on buildings is not new, in fact it savors strongly of certain features in the theories of the late Henry George whose "single tax" plan of twenty years ago was seriously considered but never reached in any section of the country a trial of its merits.

Lowering the tax on buildings would of course decrease the taxes that would be received on the land which it occupies. It would therefore become necessary to increase the tax rate on unoccupied land, and it is just here that the protest would arise from those whose money was invested in unoccupied land.

The advocates of those favoring the lowering of the taxes on building claim that the deficit thus created would be early made up by the largely increased building. Naturally the whole idea is a purely experimental one, and as its working out would be apt to touch the pocket of speculators in real estate, it is quite probable that there will be considerable and well sustained opposition.

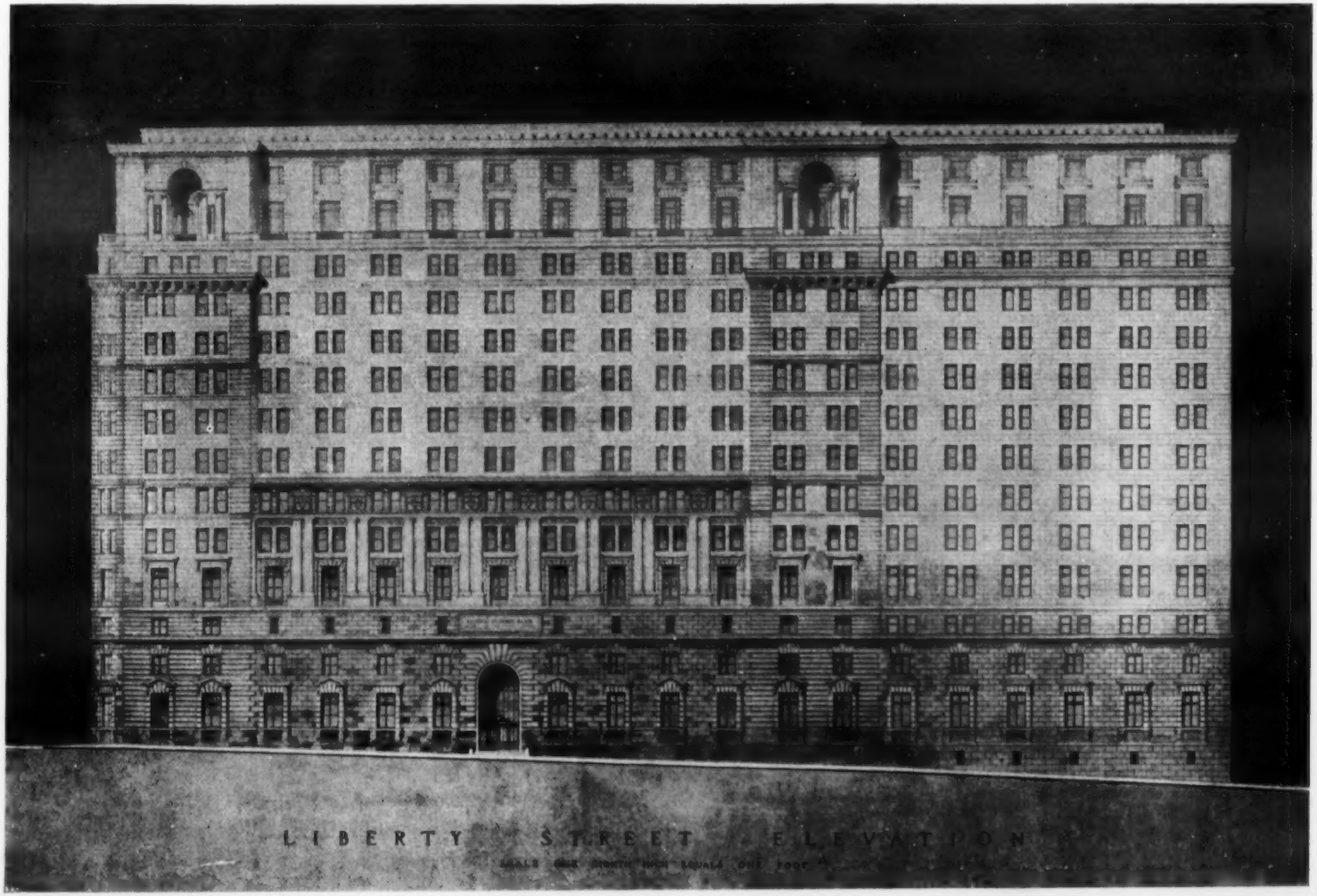


PLATE 162

DESIGN SUBMITTED BY CARRERE & HASTINGS, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

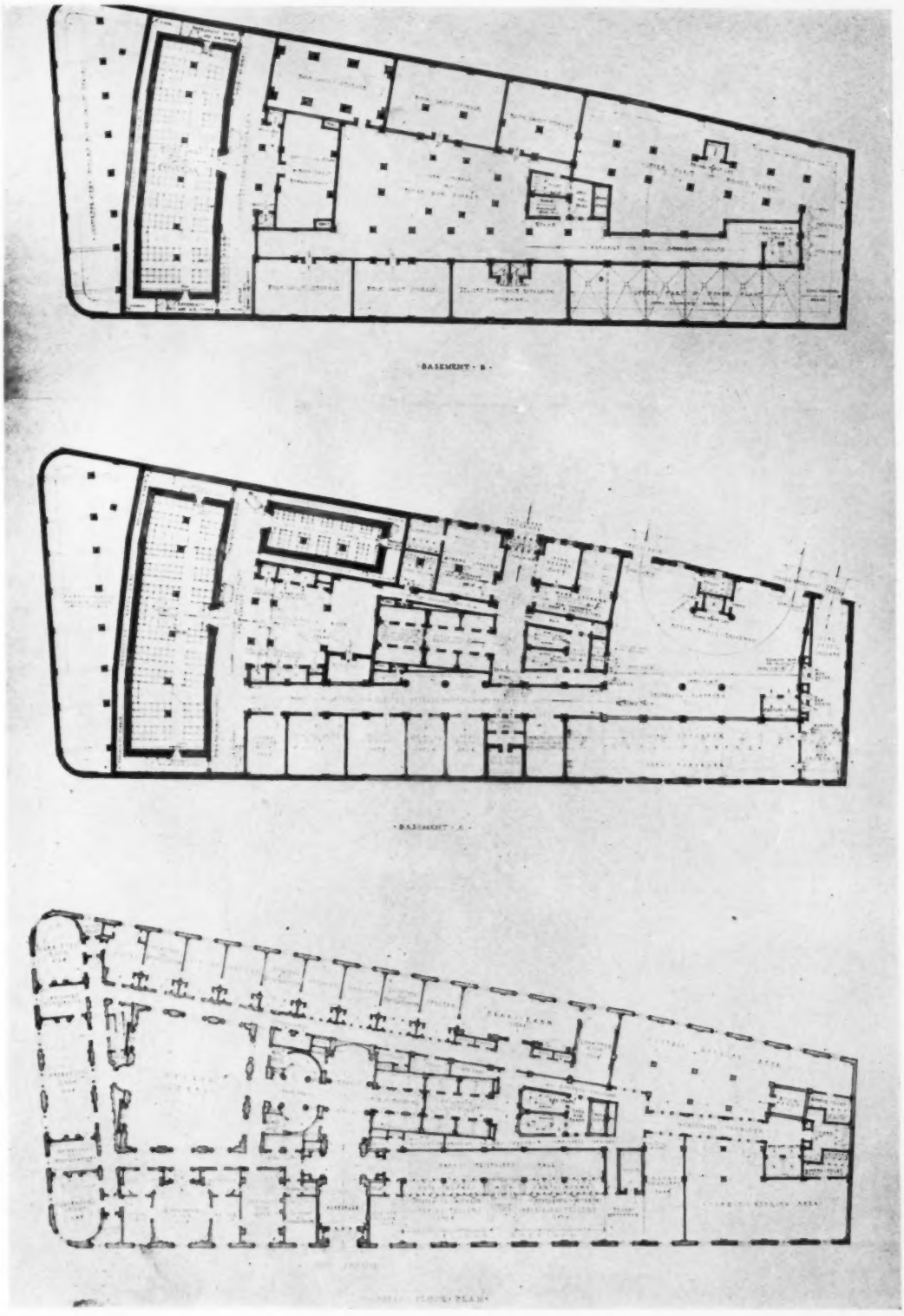

PLATE 163 DESIGN SUBMITTED BY CARRERE & HASTINGS, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

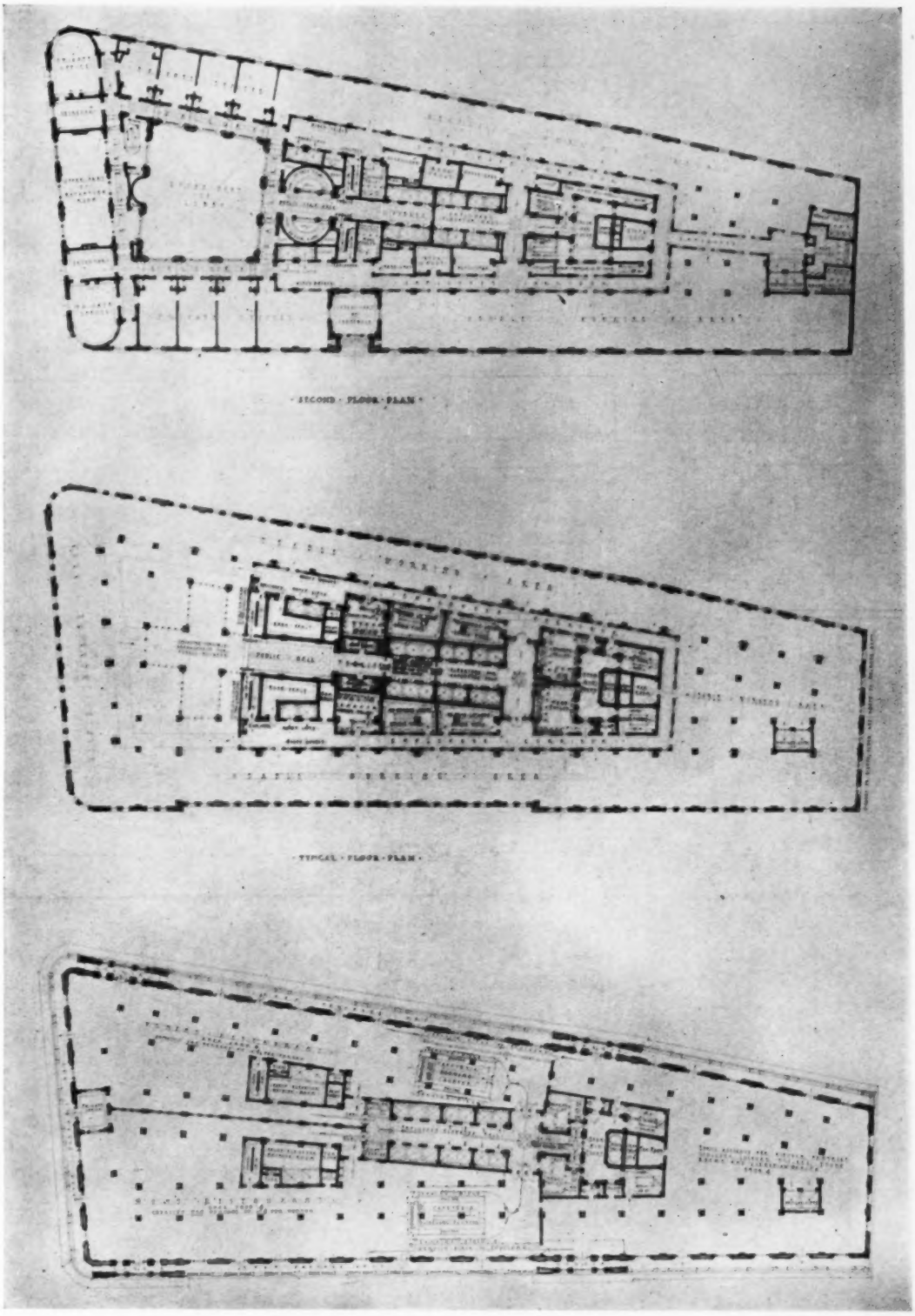


PLATE 164 DESIGN SUBMITTED BY CARRERE & HASTINGS, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK


PLATE 165

DESIGN SUBMITTED BY McKIM, MEAD & WHITE, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

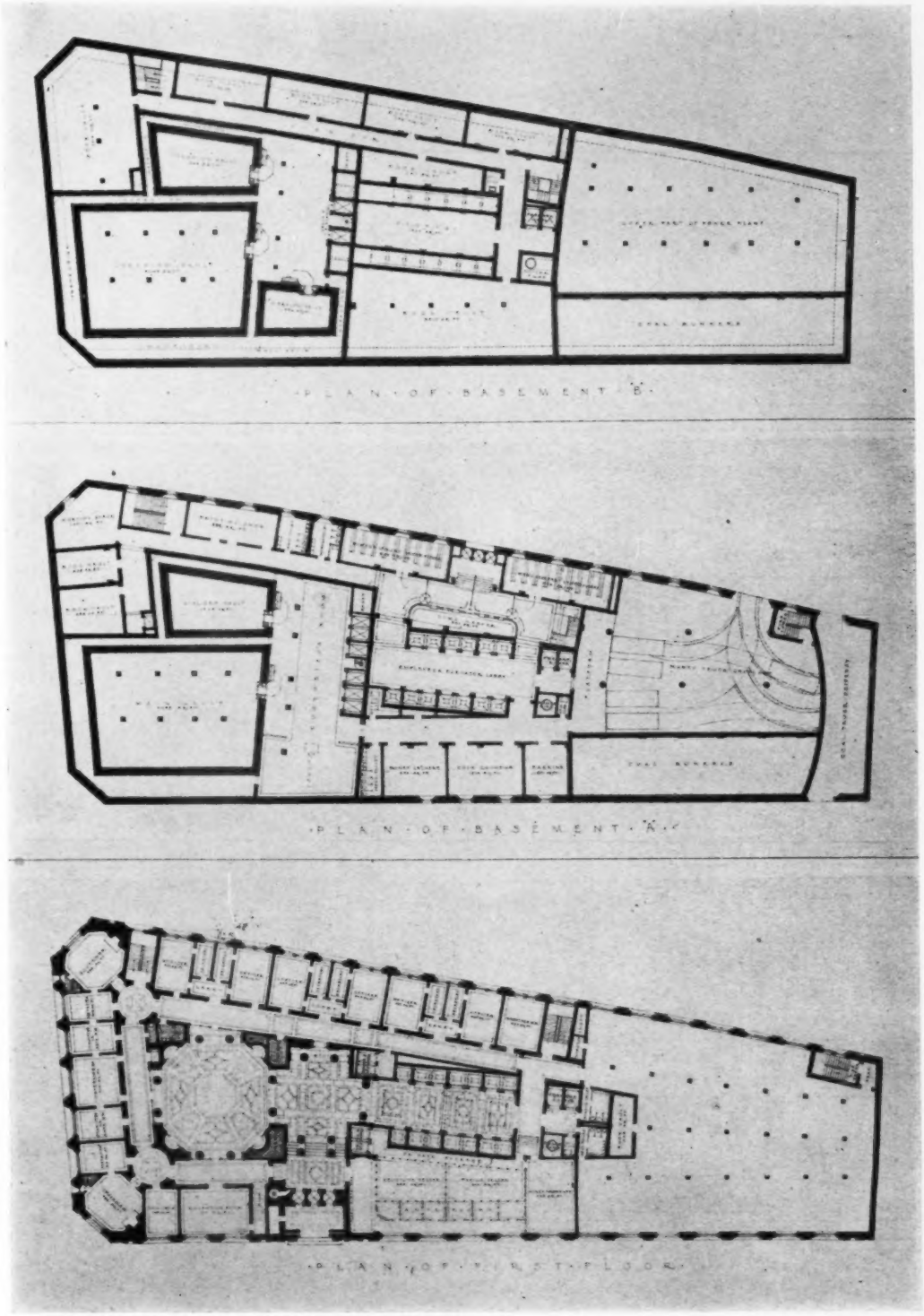


PLATE 166 DESIGN SUBMITTED BY McKIM, MEAD & WHITE, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

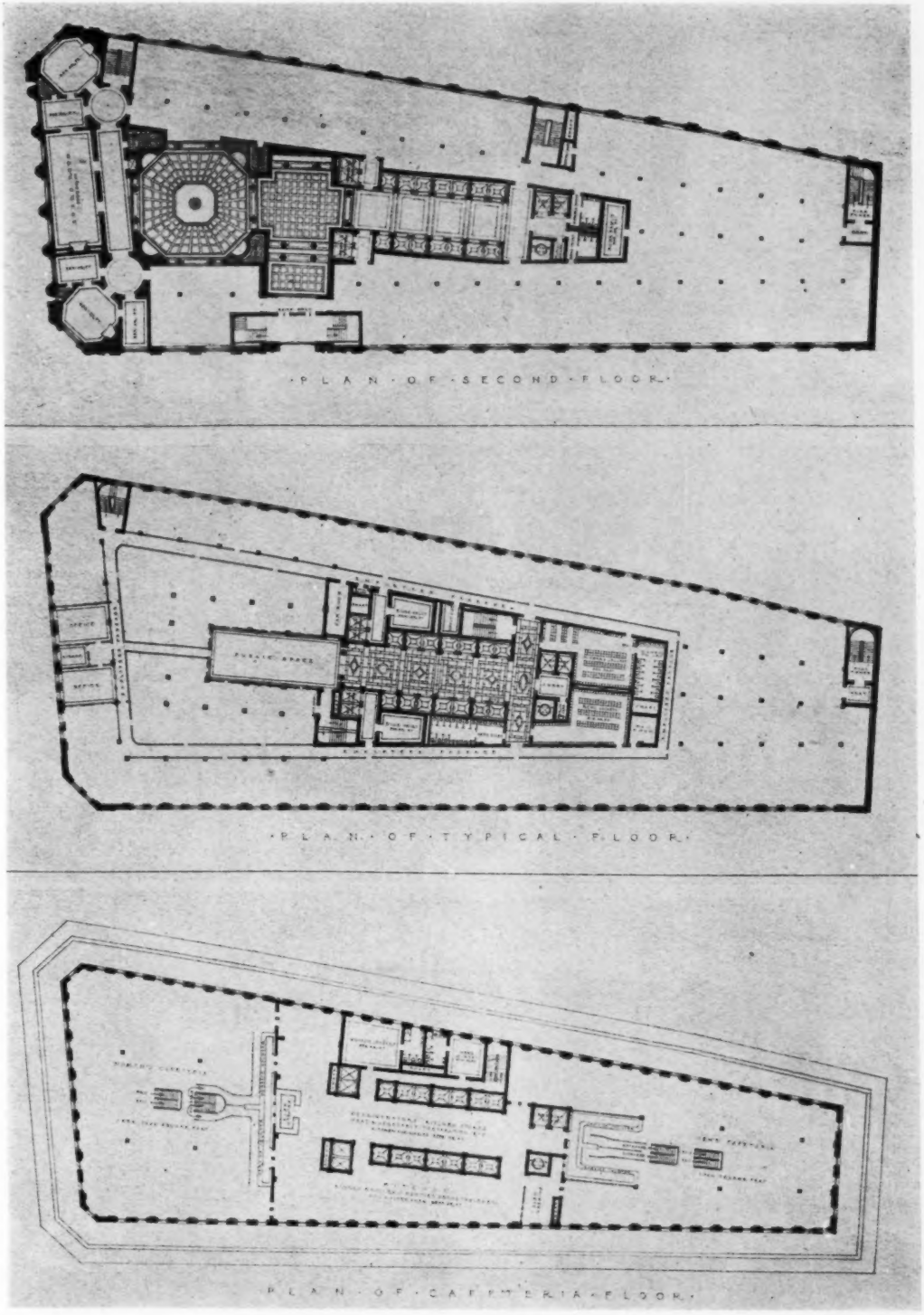


PLATE 167 DESIGN SUBMITTED BY McKIM, MEAD & WHITE, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

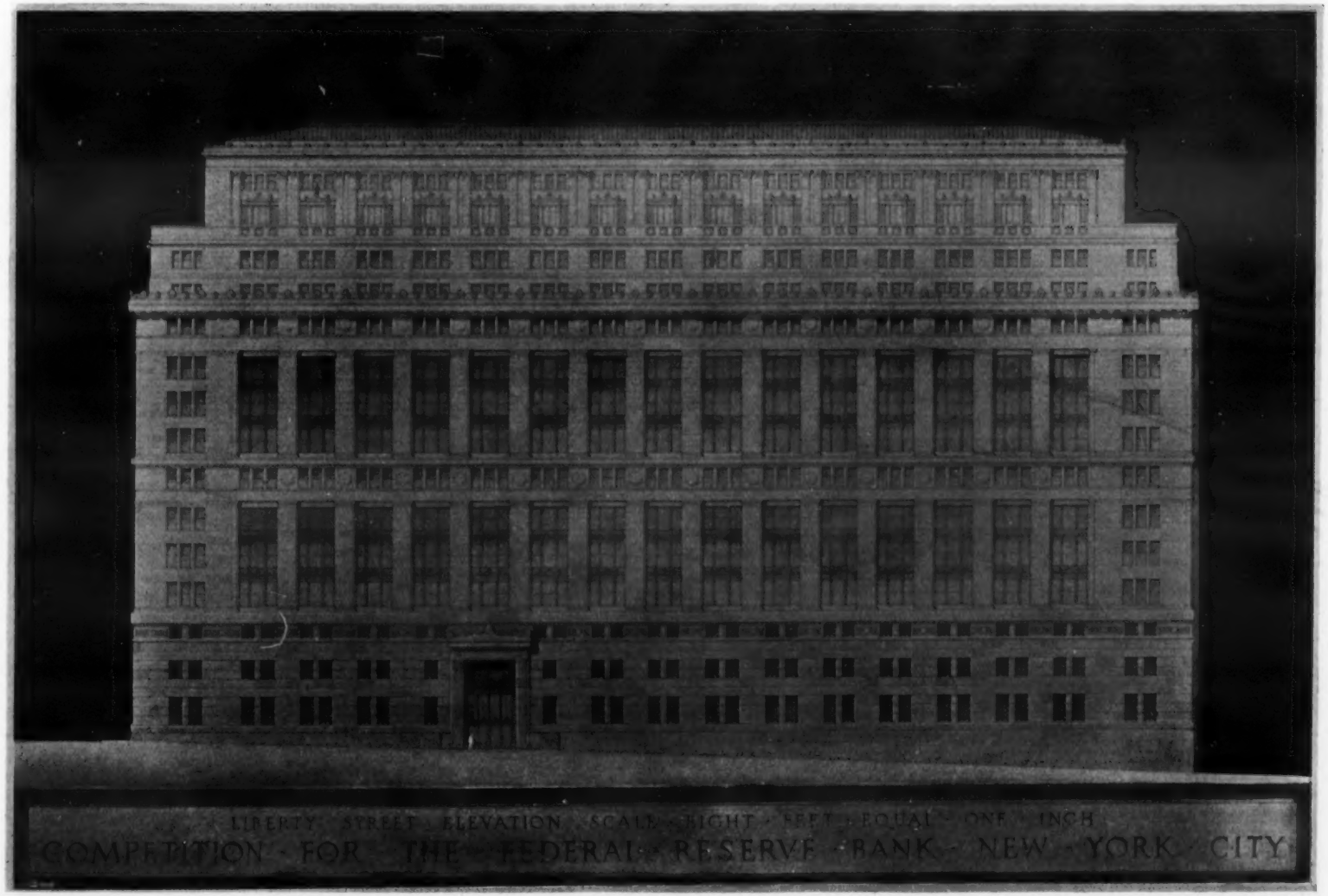


PLATE 168

DESIGN SUBMITTED BY TROWBRIDGE & LIVINGSTON, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

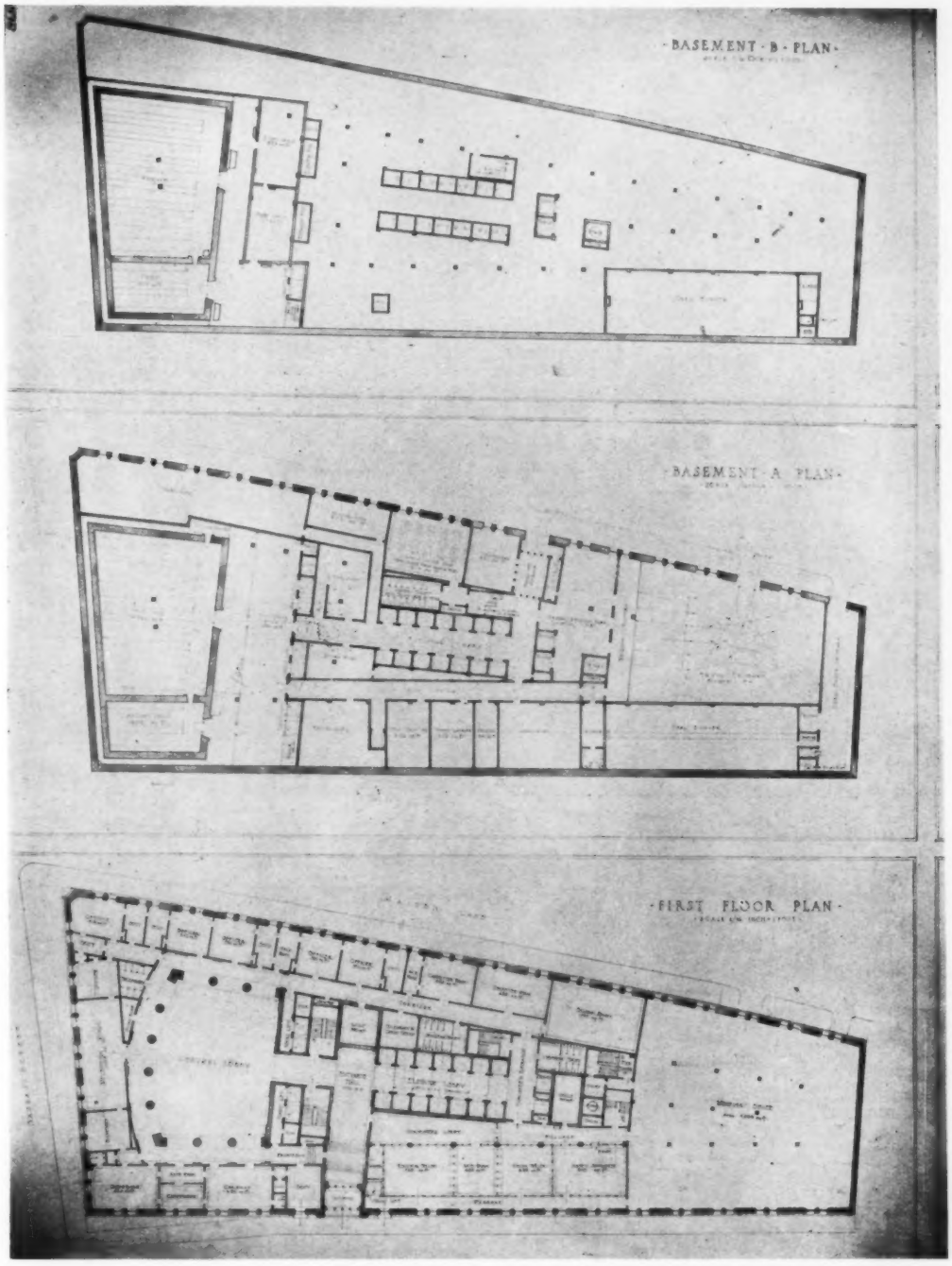


PLATE 169 DESIGN SUBMITTED BY TROWBRIDGE & LIVINGSTON, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

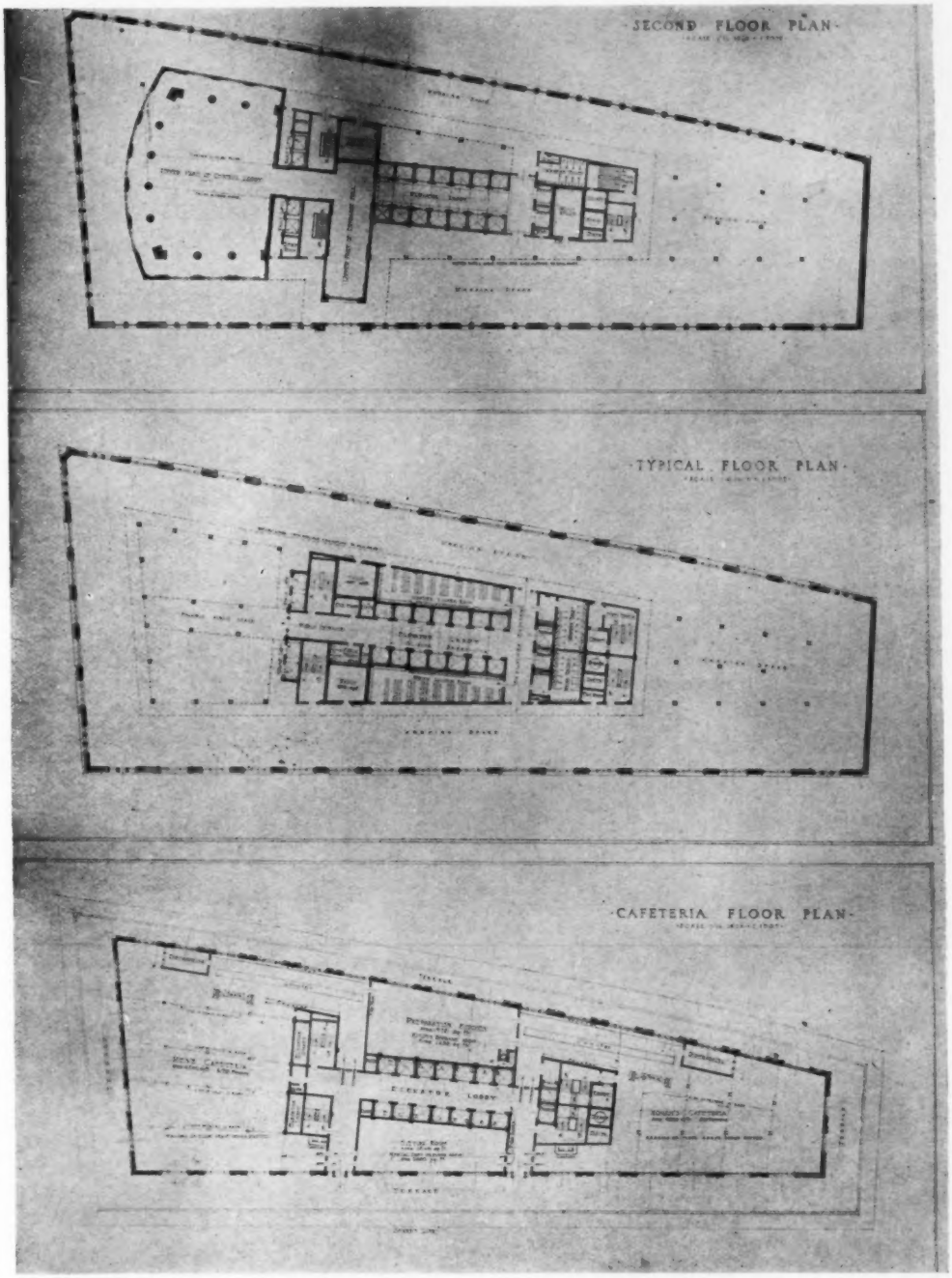


PLATE 170 DESIGN SUBMITTED BY TROWBRIDGE & LIVINGSTON, *ARCHITECTS*

COMPETITION FOR THE FEDERAL RESERVE BANK BUILDING IN NEW YORK

# Current News

## Late Happenings and Comments in the Fields of Architecture and the Allied Arts

### Architects Are Permitted to Join American Association of Engineers

The executive committee of the American Association of Engineers has rendered a decision that the constitution of the association does not prohibit the admission of architects, and announces that the applications of architects will be considered hereafter as in the same status as applications from engineers. Those architects who have previously applied for membership and whose applications could not be accepted on account of the apparent exclusion of architects by the constitution, may now re-enter their applications for membership.

### One Bath in 482 Families

A housing survey of a block in East 33rd Street in New York, made for the State Reconstruction Commission, shows one bathtub in forty-three tenement houses in which live 1,700 persons. The bathtub is the property of the saloonkeeper. It is for use by the owner and his family, and comparatively few of the other 481 families on the block have ever seen it.

The next approach to bathing facilities discovered by the investigators on that block was a stationary washtub with a partition which can be lifted out on Saturday nights.

### Germany's Acute Housing Shortage

Reports from Germany reveal that the shortage of homes in many of the larger towns is an acute problem calling for drastic measures in its solving. In some towns the lack of houses is such that the local authorities have had to take steps to prevent immigration.

According to the *Zeitschrift fur Wohnungswesen* and *Kommunale Rundschau*, the trouble is serious in towns so far apart as Konigsberg and Frankfort-on-Main. At Konigsberg the local authority refuses to let anyone come to live in the town, with the sole exception of sick persons who have medical certificates to prove that they cannot obtain adequate treatment in the neighboring towns. In Stuttgart notices have been published forbidding the entry of any new residents; no house-letting contracts are to be sanctioned by the Town Housing Office, and severe penalties are threatened in the case of persons who, having bought houses, intend to move into them.

At Frankfort-on-Main the State Housing commissioner has authorized the local authority to issue an order prohibiting for several months negotiations between landlords and tenants which have not the sanction of the Rent Arbitration Office. Negotiations with individuals outside the town are strictly forbidden. This order affects rooms of all sorts, including those in hotels and boarding houses. The local authority has also instructed the Housing Office to come to an arrangement with the Food Ministry with regard to the stopping of food supplies to any prospective residents from other neighborhoods.

The shortage in Erfurt (population 140,000) has been especially pronounced since the demobilization of the army, and in April it was estimated that 1,300 new dwellings would be required. Preparations were being made by the town, by building societies and by private builders, for the erection of 1,600 small and middle-sized dwellings. The local authority has allotted the sum of $400,000 towards the building expenses incurred, and a supplementary grant will be made from State funds.

At Dusseldorf (466,000) the local authority decided to make a loan of $750,000 towards the building of small dwellings.

At Bochum (158,000) up to April, two building grants had been made, amounting to a total of $295,000, and the public utility building society had made plans for erecting 300 dwellings and 30 small holdings with dwellings.

### Old House to Be Museum

A movement is on at Riverside, Cal., for the preservation of a number of the old landmarks of the vicinity, buildings and spots intimately connected with the early-day period of Southern California. The plan is being fostered by the local chapter of the Daughters of the Revolution and the Pioneer Society.

The first project to be undertaken is the restoration of the old Rubidoux home, an adobe structure, which was built by Indian labor three-quarters of a century ago. The Rubidoux family was one of the most prominent of the early Spanish residents, and the home was a social center for the interior section. Many of the notable events of history of the period just previous to the forty-niners are more or less intimately connected with this old building, which in recent years has been abandoned and has begun to crumble away.

After the work of restoration is completed, the building will serve as a nucleus for a pioneer museum for the housing of many relics of the early days.

### Car Shortage Situation Serious in the Pacific Northwest

SEATTLE, WASH., Nov. 8.—The car shortage in Western Oregon and Western Washington has not improved and manufacturers are unable to handle all their rail business. The situation is severe with little substantial relief in immediate prospect.

R. H. Aishton, regional director of the railroad administration, states that the early part of September showed an actual loss in the number of closed and open cars moving into the West Coast territory, but gave assurances that efforts now are being made to improve conditions.

## Houses Comprise But Small Percentage of Fire Losses

CHICAGO, ILL., Nov. 10.—Intelligent men at the head of municipal fire prevention bureaus—men with vision broad enough to see the necessity for proper building ordinances, are badly needed to-day, according to a statement by the Architectural and Building Code Service Bureau of the National Lumber Manufacturers' Association.

"Insurance men are still harping on the huge loss by conflagration in 1916," says the statement, "but they do not state that conflagrations in 1918-9 were practically nil. Quite as many conflagrations have burned 'fire-proof' cities as any other type of construction. What is needed is an extensive campaign against the defective flue and the careless individual. If laws are made to punish those responsible for starting fires, the spread of fire will be a negligible item."

The following table shows a marked decrease in the total fire losses in the United States and Canada during the months of June, July, August and September of this year:

| | | |
|---|---|---|
| Warehouses and Factories | 41.6% | $29,707,000 |
| Business Section | 12 | 8,972,000 |
| Oil Refineries, Mills and Tanks | 10.3 | 7,275,000 |
| Tornado | 8.6 | 6,000,000 |
| Saw Mills, Yards and Millwork | 7.2 | 5,135,000 |
| Grain Elevators and Crops | 3.5 | 2,786,000 |
| *Dwellings* | 3.5 | 2,776,000 |
| Wharves, Coal Sheds, Bridges and Boats | 3.4 | 2,665,000 |
| Hotels | 3.2 | 2,165,000 |
| Stables and Barns | 1.8 | 1,227,000 |
| Garages | 1.6 | 922,000 |
| Theatres, Schools and Churches | 1.4 | 662,000 |
| Timberland and Forests | .8 | 530,000 |
| Government Property | .1 | 75,000 |
| | 100% | $70,897,000 |

The report shows that dwellings comprise a surprisingly small percentage, especially in view of the fact the lumbermen are frequently confronted with forceful statements by insurance men that wooden dwellings and shingle roofs are the greatest menace to life and property. It also is apparent from the report that more than half the total loss has been sustained in congested and mercantile districts, which are largely left during the night without sufficient watchmen or fire alarm service.

## Selecting Tenants for Municipal Houses in Leeds, England

An interesting method of selecting tenants for the new municipal buildings of Leeds, England, is shown in the report of a sub-committee of the Leeds City Council. When the buildings are ready for occupancy they will be occupied, according to United States Consul Percival Gassett at Leeds, by tenants chosen in the following order:

(1) Men who have served in His Majesty's forces, wives and mothers of men who are serving, or widows or mothers and children of deceased soldiers or sailors; (2) families that have outgrown their accommodation, or are residing in apartments; (3) newly-married couples not at present occupying houses; (4) persons under notice to quit owing to property having been sold; (5) former Leeds residents who have had to give up houses during the war (other than service or ex-service men); (6) persons living out of Leeds but employed within the city; (7) people desiring a change; and (8) people desiring to live in the city but now residing outside.

The ministry of health has sanctioned a loan by the Leeds City Council of £1,000,000 (about $5,000,000) for housing purposes. A start has already been made with the scheme on the Hawksworth Wood estate, where there is sufficient land to accommodate hundreds of houses, and the public at large here is looking to the corporation to make a definite move in other parts of the city to cope with the serious congestion that prevails in every part of the Leeds district. No shortage of labor is anticipated in carrying on the work—at any rate not in the immediate future.

## Draughtsmen Form Architectural Guild

Fostered by the Washington State Chapter of the American Institute of Architects, twenty-two draughtsmen met to organize a guild, which has for its purpose the promotion of the objects and ideals of the American Institute of Architects, to bring about a closer relationship between architects and draughtsmen, and to provide educational facilities for its members.

The following officers were elected: J. D. Johnson, president: H. H. Jackson, first vice-president; M. Jones, second vice-president; F. Hanson, secretary, and H. A. Blogg, treasurer. An executive committee composed of Clyde Grainger, B. Waite and N. J. Morrison was also selected.

A meeting will soon be held to adopt a constitution and by-laws, discussed at the last meeting.

Plans are now under way for conducting an energetic membership campaign.

## New Art Society Formed in New York

As a result of growing differences between progressives and conservatives in the National Academy of Design, a new organization has been formed to be known as the Society of American Painters, Sculptors and Engravers. The first exhibition was opened in New York on Nov. 1, at the Gimpel & Wildenstein Galleries. The *Times* states that Randall Davey, Hayley Lever, Jerome Myers, Guy Pene du Bois, Samuel Halpert, Rockwell Kent, Leon Kroll, George Luke, Van Deering Perrine, Henry L. McFee, Maurice Prendergast, Boardman Robinson, and John Sloan will be members of the new society.

To this list of names there have already been added the following members of the Academy itself: Paul W. Bartlett, Chester Beach, Clifford Beal, George Bellows, Bryson Burroughs, A. Stirling Calder, Emil Carlson, Timothy Cole, Paul Dougherty, John Flanagan, James E. Fraser, William J. Glackens, Charles Grafley, Walter Griffin, Childe Hassam, Robert Henri, Ernest Lawson, Jonas Lie, Paul Manship, Gari Melchers, Andrew O'Conner, Joseph Pennell, Elmer Scofield, Eugene Speicher, Edmund Tarbell, J. Alden Weir, Irving R. Wiles and Mahonri Young. The society has thus far one woman member, Mrs. Harry Payne Whitney.

The first exhibition, after the close in New York, will be taken on a circuit of the leading cities of the country, such as Chicago, Detroit, Buffalo and Rochester.

## Tiffany Founds Art School

Announcement is made that Louis Comfort Tiffany has turned over his estate and collections at Cold Spring Harbor, N. Y., together with an endowment of more than a million dollars for the foundation of an institution where artists and art students of professional maturity may pursue studies and original work under the most favorable conditions. The institution will be known as the Louis Comfort Tiffany Foundation.

Work has already been started to convert the buildings on the estate into studios and dormitories and it is expected that the first dozen students, all men, may be installed in May.

In addition to the founder the following will constitute the board of trustees: Robert W. de Forest, Daniel Chester French, Francis C. Jones, George F. Kunz, Henry W. de Forest, and Charles L. Tiffany, with George F. Heydt as secretary and treasurer. An advisory art committee has been appointed with Cass Gilbert, Robert Vonnah, Harry W. Watrous and Mrs. W. A. W. Stewart as members.

Stanley Lothrop, formerly with the Boston Museum and more recently lecturer in fine arts in the American Academy in Rome, has been appointed director of the foundation and is already established at Laurelton Hall, the name of Mr. Tiffany's place at Cold Spring Harbor.

The foundation of this institution is understood to be the consummation of a long-cherished dream of Mr. Tiffany. He has worked in almost all the arts himself, being a painter and sculptor of skill and a designer of costumes, textiles and interior decoration, as well as the inventor and developer of the famous Tiffany glass. His collections at Cold Spring Harbor contain no great classic originals, but cover perhaps the widest field of any collection in this country, embracing well-chosen examples in both the fine and applied arts, Oriental as well as Occidental.

Mr. Tiffany's art library, which he has also turned over, is one of the largest and best selected in New York. He will continue to live on the place, but will not attempt to direct its work. It is understood that a small fee will be charged for the living expenses of students, but that in certain worthy cases even this will be remitted.

## Standardization Urged

Better standardization of construction materials is one of the essential problems to be solved by American industry if this country is to hold its present position in world commercial affairs and to capitalize on opportunities now offered her, and it must be given equal attention with two other great problems facing us today—finance and labor. This point was emphasized at a recent meeting of the Engineers' Club in New York.

The cry is heard everywhere for industrial development. Germany is said right now to be paying more attention to the elimination of odd sizes, unnecessary designs, superfluous finishes, and to standardization in general, than to any other one element in her industrial rehabilitation. It is not an overstatement to say that more reverses and actual failures have been caused through the lack of standards in business practice than through a similar lack in any other field.

Construction interests in America have been so busy supplying domestic demands that until recently small attention has been paid to foreign trade, but the time has about arrived when America will be in a position to enter the foreign construction market to a considerable extent.

The arguments for standardization pointed out are: Manufacture on a quantity basis, equalization of production over slack periods, reduction of maintenance costs, elimination of poor designs, reduction of labor and machine costs, closer co-operation and a uniform degree of safety and efficiency during and after construction. The only arguments against standardization, it has been stated, are the limitation of pleasing designs and of personal choice.

## Cities for Sale

Out of a war which has left France and Belgium in desolation and ruins and the rest of Europe but little better off, Uncle Sam has emerged to the good, by thirty-five new cities created by the United States Housing Corporation, the Emergency Fleet Corporation and its subsidiaries, and private industries for the accommodation of the great army of workers who formed the second line of defense in shipyards and munition factories.

Unlike the customary hastily built community these new dots on the map have been firmly constructed with a view to permanence. City planners, architects and sociologists have been allowed to let their imaginations run riot, resulting in thirty-five custom-made Utopias, valued in the neighborhood of $55,000,000, which are soon to be placed on the market. Bids from realty corporations and from private interests whose endeavors may result in exploitation are to be barred and the present tenants of the houses will be given first opportunities of purchase, offering one solution for the present housing problem.—*The Nation's Business for November.*

## Fund for Farm Development Bureau of Memphis Chamber of Commerce

One of the most important bureaus of the Memphis Chamber of Commerce is the Bureau of Farm Development, which raised a fund of $90,000 this spring for the purpose of increasing the agricultural prosperity of the surrounding territory. The Bureau anticipated its needs for the next three years in raising this sum of money, which provides it with a working capital of $30,000 for each of the years of 1919, 1920 and 1921.

The promoters of the movement realize the obvious fact, too often overlooked, that if the territory surrounding the city is made prosperous, the city itself will be prosperous, and while it is putting forth worthy efforts to make the farmer's life a happier one, it is also assisting to build a more prosperous Memphis. On account of the geographical location of Memphis, its trade territory stretches into the States of Arkansas and Mississippi, as well as Tennessee. The bankers and business men in every village and town in the district are co-operating in their home communities with the Farm Development Bureau, and this support is one of the principal reasons for the success of the movement. The agricultural colleges of Tennessee, Arkansas and Mississippi are also co-operating. One of the best agricultural experts in the United States is devoting all his time to directing the movement. The lines of agricultural work followed are varied to meet the conditions, needs and possibilities of each farm district in the territory.

It is generally conceded that the way to make any industry, any method or any thought a permanent and effective factor in national life is to introduce it into the

schools. The Farm Development Bureau is persuading the rural school authorities to have the courses of study and methods of teaching in the country schools adapted to the highest development of country life and increased farm production. All of this is in line with the campaign of THE AMERICAN ARCHITECT, stressing the importance of the farm and, hence, the farmer, in our national development. The work of the Memphis Chamber of Commerce is good work and something that may with advantage be emulated in other sections.

## High Cost of Building Affects Fire Insurance

A timely warning has been given to realty owners by Frank Bailey, vice-president of the Title Guarantee & Trust Company, to carefully examine their fire insurance policies to see whether in view of the high cost of building they would be completely covered in the event of a fire loss. Mr. Bailey's advice is as follows:

"In view of the present value of old buildings and their cost of reproduction, nearly every resident and flat owner is now underinsured. Take, for example, the case of a small dwelling worth $10,000 a few years ago, and insured for $8,000 or 80 per cent of its value. It would now be valued at $15,000 as its reproduction value.

"We will suppose, for example, that there is a fire with a resultant loss of 25 per cent; 25 per cent of $15,000 is $4,250, which would be the reproductive loss because of the fire. If the insurance was $8,000 only, and had not been increased by the owner to $12,000 or 80 per cent of the present value, the insured would be able to collect from the insurance company only three-fourths or $2,750. He would be considered by the insurance company as a co-insurer with it to the extent of the difference between the amount of insurance he previously carried, to wit: $8,000 (being 80 per cent of the old value) and $12,000 (80 per cent of the new value), to wit, $15,000. Of course, in case of total destruction, he would receive $8,000.

"This rule of contribution applies in case of smaller losses of even 10 per cent of the value, and is in the standard form of every fire insurance company doing business in the State of New York. It, therefore, is of extreme importance for every owner to see to his fire insurance and to have his insurance increased to 80 per cent of the present evaluation."

## Obituary

Nathan Franklin Barrett, 73, widely known landscape architect and a former president of the American Society of Landscape Architects, died recently at his home at Pelham. Mr. Barrett laid out the town of Pullman, Illinois, and designed the gardens of Ponce de Leon at St. Augustine, Florida.

Sir Ernest Albert Waterlow, late President of the Royal Society of Painters in Water Colors, died at Hampstead, London.

Sir Ernest Waterlow, born in 1850, was knighted in 1902. He was a noted landscape painter and received the Turner gold medal in 1873. He became a Royal Academician in 1903.

M. Zoll, well known as a painter and President of the National Society of Fine Arts, in Paris, France, died recently in that city.

## News From Various Sources

Announced from Berlin that Germany is engaged in negotiations with several countries with regard to establishment of air posts.

* * *

Announced from Salt Lake City that Delta, a city in Millard County, Utah, is to be made a model city through the work of Utah Agricultural College.

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C. F. Waltz, secretary of Building Construction Employers' Association, states that members of plasterers' union, now receiving 87½ cents an hour, have notified local contractors that they will demand $1 an hour, commencing Oct. 1.

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Wall Street *Journal* quotes cable to New York *Times* to effect that French plan society for erection of ten large hotels on site of famous battles for accommodation of tourists expected next spring. Government has been asked to grant subsidy of $6,000,000 for project.

* * *

Announced in Journal of Commerce that Japanese Home Office has arranged to furnish cities of Tokyo, Osaka, Kyoto, Yokohama, Kobe and Nagoya with capital at low rate of interest to construct dwellings. Authorities in Osaka plan to build 10,000 tenements to be under municipal management and to cost $10,000,000.

* * *

Announced from Albany, N. Y., that in opinion of Allen Beals, in address before New York and New England Brick Manufacturers, United States needs 1,300,000 homes, 450,000 factories, 5000 schools and institutions, 55,000 apartment houses, 20,000 theatres and churches, 120 freight terminals and 14,000 railroad stations and freight sheds.

* * *

New York *Tribune* states that daily average of strikes in United States was 364 during July and 308 during August, more than twice as large as during same period last year. Summary from available sources of information shows that production has slumped badly since mid-July, while shorter hours and higher wages have not brought increased output or efficiency A. F. of L. estimates that there are 2000 strikes actually in progress or imminent at present.

* * *

The organization of a home building company, with capital of $75,000 or $100,000, to relieve the acute housing situation in Sheboygan, Wis., has been decided upon at a meeting of the Sheboygan Association of Commerce. It is proposed to have the local building and loan company provide 75 per cent of the funds necessary for new homes, and the Home Building Company supply the additional 25 per cent to men of good character who wish to build homes, making a very small initial payment.

* * *

The registration law for architects passed at the last session of the legislature became effective June 11, 1919, and every architect practising in the State of Washington at the time of the passage of the act who wishes to become registered must file application with certified check for $2, made payable to the Washington State Board of Architect Examiners, with the secretary, A. J. Russell, National Realty Building, Tacoma, Wash., on or before Dec. 11, 1919, after which date all applicants will be required to take an examination. The law may be found on page 704, chapter 205 of the Session Laws of 1919. The law requires no notice to the architects of the State.

## Personal

Clyde W. Smith has opened an office for the practice of architecture at 528 Andrus Building, Minneapolis. Mr. Smith was formerly associated for several years with Tyrie & Chapman, and Kenyon & Maine, architects, of Minneapolis, and C. H. Johnston, architect, St. Paul.

John W. Kearney, architect, has just opened an office at Room 206, 921 15th Street, N. W., Washington, D. C.

Mr. Richard R. Neely, 1619 Chestnut Street, Philadelphia, has opened an office and desires manufacturers' samples and catalogues.

W. Albert Swasey, Inc., architects and engineers, announce removal of their offices to 741 Fifth Avenue, New York.

Glen F. Iliff, architect, has opened an office for the practice of architecture at Billings, Mont. He desires catalogs of all kinds of building materials and specialties, addressed to Mr. Iliff at Box 1121, Billings.

Architect Eugene Bradbury has just returned from France and is resuming the practice of architecture at Charlottesville, Va.

George D. Barnett, Sr., of the firm of Barnett, Haynes & Barnett, architects, St. Louis, has been chosen to design a cathedral for the Roman Catholic Church in Montevideo, Uruguay, and will depart in October.

Culbertson & Kelly have moved from 809 Ford Building, Detroit, Mich., to 212 Milwaukee West.

W. E. Standeven, 413 Bee Bldg., Omaha, Nebr., has moved to 619 Peters Trust Bldg.

Frank L. Lang, architect, formerly with Wight & Wight, architects, announces the opening of offices, 9th floor, Commerce Building, Kansas City, Mo.

Downs & Eads, architects, Minneapolis, for many years in the New York Life Bldg. have moved their offices to Rooms 801-804 Phoenix Building.

Wallace E. Haneo, architect, 204 W. 24th St., Wilmington, has opened a Philadelphia office at 1619 Chestnut St., Philadelphia, Pa. Mr. Richard R. Neely, in charge.

# Financial and Commercial Digest

### As Affecting the Practice of Architecture

## How a Large Corporation Anticipated Experience

When a large motor manufacturing company decided to invest an indefinite number of millions of dollars in Janesville, its first problem was housing conditions. People who work have to have abodes, and a company that expects to expand rapidly, its employees running into four figures, is interested in making sure that its helpers shall have decent homes at reasonable rentals.

When news of the company's big project got about in Janesville, the usual thing occurred. Rentals jumped. Building companies planned to push campaigns in which new housing would bear high sale prices and big rental income. It was the natural business instinct of men engaged in the business. It was perfectly all right from the business standpoint of these men, but it was bad for the company and for the public.

However, the company had aniticapted this experience. And so it had puchased 160 acres of land just across the city limits, next to its factory site. Its officers told the real estate people that if they would build suitable homes and fix reasonable sale prices and rentals upon them, it would itself refrain from going into the building business.

The alternative was that 160 acres of land. Buying it had served a double purpose. It had prevented the real estate people from buying residence land near the plant and outside the city, to escape taxes; it has also enabled the company to insist on decent houses at reasonable rent. The company had surrounded its plant on all sides excepting on the side upon which it was within the city, with a belt of property which it controlled as a lever to press down living expenses for its people. Had the realty men declined to do the right thing, the company would have proceeded to attend to its own housing. It has the land, and can do so at any time should there be an attempt to exploit its employees.

Any city that expects industrial development must have a look ahead at this housing proposition. Local industrial factors employing large numbers of hands have an interest in the subject. It is they who pay for high rental. They put the money in the pay envelope. Back of them is the public, who reimburse the employers, as the ultimate consumer always does.

## Banker Suggests Loans for Homes to Cure Radicals

Bankers and financiers can speedily check the spread of radicalism in the United States by making loans to home builders, Raymond R. Frazier of Seattle, Wash., asserted in an address before the convention of the American Bankers' Association, recently held in St. Louis.

"The home is the savior of the nation," Mr. Frazier declared, "and men who own their own homes do not think of Bolshevism, I. W. W.ism and kindred diseases which are spreading over the country. Many more men would own homes if their checkbook permitted, and it is up to the American bankers to make these advances."

Robert F. Maddox of Atlanta, president of the association, in a brief talk said that on the continuation of foreign exports rests the employment of labor, and that American industries, having been stimulated by the war, should make every effort to build up foreign trade.

The uncertainty of present rates of exchange between the United States and European countries constitutes a serious interference with trade relations, he pointed out.

"Trade cannot be expected to open up," he emphasized, "as long as exports are restricted by failure of our industries to make proper credit arrangements.

"If Congress can agree on some suitable basis of credit extension the United States will advance within the next three years to a pitch of prosperity of unprecedented proportions."

Ralph Ingalls of New York denounced as Socialistic the Mondell soldier land settlement bill, activities of the United States Housing Corporation, the Federal Farm Loan System and the United States Reclamation Service. He charged that the bill, if passed, would be detrimental to the country's interests.

"Foiled in their attempt to have the Government supply the one million new buildings said to be needed each year, Secretary of Labor Wilson and others hope to effect the same thing through the Federal building loan bill, recently introduced by Congressman John J. Nolan," declared the speaker.

Mr. Ingalls asserted that if the Housing Corporation ceased activities when the armistice was signed its expenditures would have been $20,000,000, whereas by continuing it has spent the entire $110,000,000 appropriated for it. Instead of being rented to Government employees the corporation is leasing homes to anybody, Mr. Ingalls accused.

The report of the savings bankers recommended amendments to State laws so as to empower savings banks to make long term loans on property, up to 70 per cent of its value, and urged savings banks to continue to encourage construction projects.

Other speakers warned against making investments for big returns.

# The Trend of Industry Demands More Production and Stoppage of Waste

## The Americanization of Labor Regarded as Highly Important Factor in Present Industrial Crisis

THAT if industry and business are to thrive steps must be taken before the danger point is passed, or labor, flushed with concessions already won, will press for demands which cannot be granted, was the opinion generally expressed this week by architects and builders. This further emphasizes the fundamental fact that the job can stand just so much before labor costs become too heavy and the conditions demanded become too burdensome to allow the continuation of enterprise. Labor can easily kill the job by which it can live, as was conclusively shown by the Boston police strike, when turbulence and dissipation of resources, caused a practical suspension of business.

There is but one way out of a situation that has today placed organized labor on trial before the bar of public opinion. More work, increased and systematic production and a stoppage of waste, are necessary. This is no time to strike. The harm of striking far overbalances any possible good. The strikers themselves, should they win their demands, can gain no lasting benefit, for they are certain to share in the widespread damage they cause. The present course is one of recklessness. Whether the grievances are real or fictitious, there can be no reason to warrant these proceedings now that we are in the midst of a world crisis.

Labor must, through wider co-operation with capital, learn that there is a limit to the demands it can make. This is certainly true under existing conditions of markets here and abroad, if the business in which it is interested is to live. Furthermore, it is true that the large portion of labor is absolutely uninformed as to the manner in which business is being conducted, and of which it is a part. Many employees see stacks of money on the cashier's desk on pay day and absorb the mistaken idea that every employer makes money. Unfortunately there are also many employers of labor who have been exploiting the theory that with labor costs kept down the larger would be the profits for themselves. They fail to realize that with a satisfactory wage scale their own market has been vastly improved as to character, quantity and quality, a condition which would have been impossible if the working men had been forced to live under circumstances that would impair their efficiency.

A victory over labor's course of desperation, restlessness and a spirit of class dictation, must be scored. The greater need of this country is productivity. It is the interest of all to hold out against all inciters to selfishness and violence, the prime factors to the retardance of production all over the world. We must emerge from the present period of unrest with a clearer vision and a deeper and a greater purpose. Industrial democracy must replace conditions that are proven to be inadequate to present needs. It means everything, not only to ourselves but to the whole world.

If labor continues its present course, thousands whose sympathies would ordinarily be on the side of labor will break what seems to be an undemocratic blockade which one element is attempting for its own purposes against the welfare of the community at large. Labor has gradually forced the course of public opinion against it and made everyone sick of the word "strike."

A factor that is also making itself evident, particularly in the steel situation, is shown in the drawing of a closer line between Americans and aliens by the employers. The unions are more and more realizing the disastrous results of cleavage and are doing their utmost to keep what Americans they have and gain more. Americanism seems to be the chief issue. Union leaders, it is said, are much perturbed by the great number of unruly foreigners lately taken into their organizations.

In fact, the question of the Americanization of the alien is today assuming in the minds of thoughtful men a position of such importance that there is a tendency to attribute much of the labor unrest to the lack of sympathy between alien and American labor.

# Department of Architectural Engineering

HOUSE OF M. W. ELLIOTT, MELWOOD STATION, PA.
F. H. SMART, *ARCHITECT*
STUCCO ON STANDARD WALL TILE. NOTE THE OVERHANGING ROOF GIVING PROTECTION TO THE STUCCO; ALSO THE RUBBLESTONE WALLS UP TO FIRST FLOOR BEAMS, PERMITTING STUCCO TO BE KEPT WELL ABOVE GRADE. THE ROOF IS OF SLATE.

## Successful Building in Stucco

### II. Hollow Wall Tile Construction

IN the period which has elapsed since the use of hewn timber, stone and sun-dried brick by the ancients, many meritorious building materials have been produced. Often, during their early development, defects arising in structures in which such materials were incorporated caused condemnations to be voiced against their further use. Years and sometimes centuries have been necessary to bring conviction that the material itself was not unsuitable, but that previous methods of manufacture or construction, or both, were at fault. Thus, instead of at once seeking corrective measures in these respects, the material itself was adjudged unsuitable for building purposes, and the public deprived of its use during that period.

Therefore, to the extent by which new materials can be investigated, the correct principles of manufacture and construction arrived at and placed before those upon whose shoulders the responsibility for correct building depends, and this knowledge put into practical use, to that extent is the entire public benefited, as well as those more intimately identified with building.

It would seem that in all such movements the architect should take a leading part, instructing the builder in these matters. His plans and specifications should be so explicit that there is no room to doubt their intent. The little things are often the important ones, and lack of correct construction details may cause an unsatisfactory building. The small home, though not so pretentious, is as important as the skyscraper, but in a different way. Correct and honest building must be the policy advocated by the architectural profession.

HOUSE OF C. F. MELLISH, DETROIT, MICHIGAN
MacFARLANE, MAUL AND LENTZ, *ARCHITECTS*
STUCCO ON INTERLOCKING TILE.

Within the past decade the use of hollow tile for wall construction has greatly increased. So far as dwellings and other buildings of moderate size are concerned, this, no doubt, has been to a large extent, due to the demand for buildings possessing greater fire resisting qualities. Structural hollow tile was originally introduced into modern building construction in the form of fireproof floor arches, replacing the older and heavier brick floor arch. The same fire resisting qualities which commended it to the architect and builder for that purpose apply equally well to wall construction. In addition hollow tile not only possesses fire resisting qualities, which recommend it as a desirable substitute for the all-wood building, but, due to its cellular construction, incorporating within itself an air space, it also possesses an advantage over the solid brick wall of moderate thickness because of its ability to keep out dampness and insulate against heat and cold equally well.

The fact remains that the wooden dwelling will often possess a warmth of tone and beauty of appearance hard to surpass with any other materials.

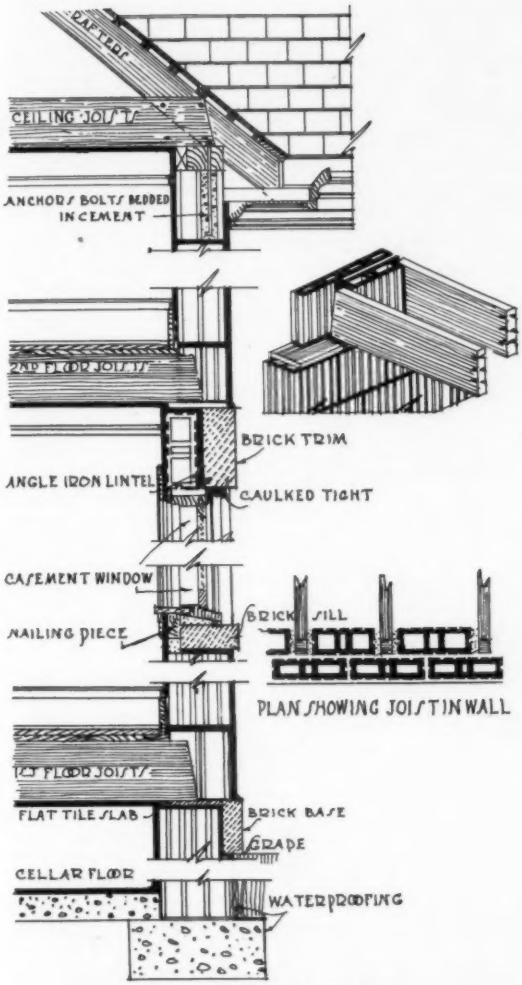
Hollow tile for wall construction, as at present largely manufactured with an exposed face six by twelve inches or twelve inches square and varying in color from a light to dark buff, does not present a finished or pleasing appearance, when left exposed. With a desire to take advantage of the desirable structural features mentioned, and at the same time to effect an artistic exterior, brick veneers have been often used in combination with hollow tile. This method is expensive and not entirely satisfactory, inasmuch as bonding brick and tile of the sizes mentioned does not work out satisfactorily in practice, although with the interlocking type of tile better bonding is possible. The efficiency of metal ties is doubtful, due to their limited life, owing to their liability to corrosion.

The application of stucco to the exterior face of the tile wall solves the problem of appearance in an entirely satisfactory way.

In the issue of October 15th photographs of two stucco houses in which interlocking tile was used as a backing were published. The artistic excellency of design and pleasing appearance of this work is evident. The houses illustrated in this article are constructed with walls of hollow tile having a thickness of six, eight and twelve inches from face to face, and of both the standard twelve by twelve inch and interlocking types. Certain distinctive features of design are pointed out in the case of each building.

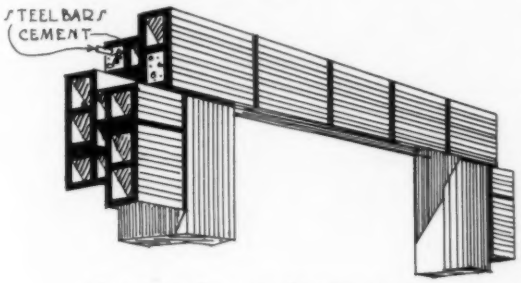
Tile for exterior walls should be hard burned with all faces scored with deep dovetail ragged scoring. Badly cracked tile should be rejected. The tile should be laid up in cement mortar, but the addition of a small proportion of hydrated lime is not an objectionable practice. A mixture composed of one part cement not more than one-fifth part hydrated lime and three parts of sand by volume will give good results. Mortar should be well mixed and only sufficient water added to give a stiff consistency. The blocks should be of uniform size, and any variations in thickness (face to face) should be adjusted on the inside. The outside faces should be set flush. Standard tile should be laid with the webs vertical, each vertical joint breaking with that below. By many it is believed that a coat of some type of waterproofing material should be applied to the tile walls prior to the application of the stucco.

HOUSE OF DR. J. G. B. FITZ-HUGH, McKEESPORT, PA.
THOMAS A. RUSSELL, *ARCHITECT*
STUCCO ON STANDARD WALL TILE. WALLS BELOW GRADE ARE OF CONCRETE. THE ROOF IS OF SLATE.



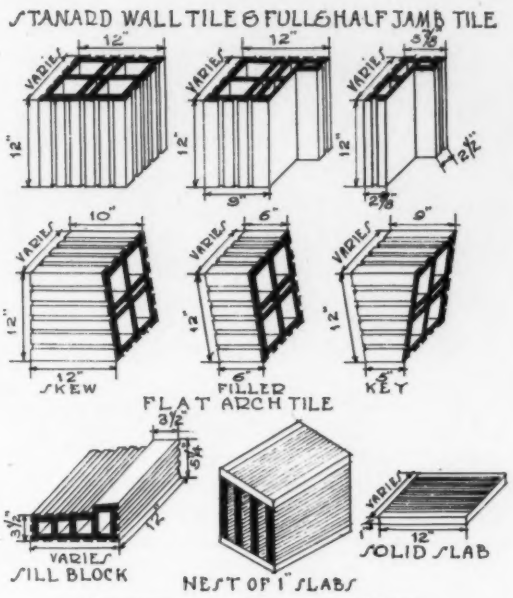

Typical Wall Section

Other materials may be substituted for the brick trim, here shown.



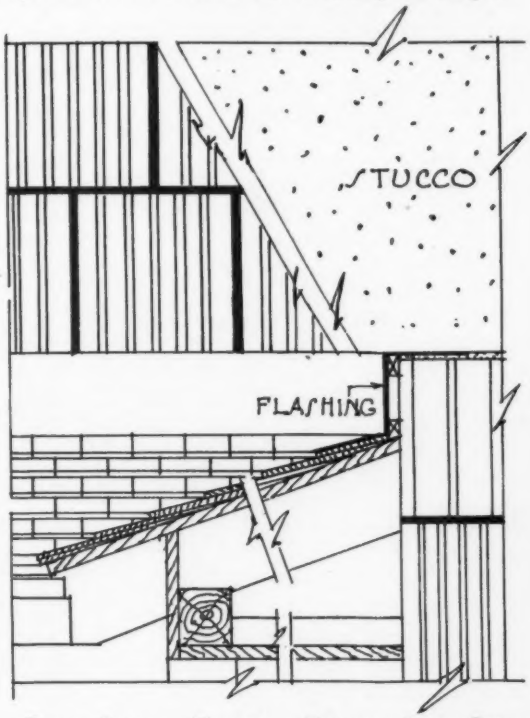

Composite Tile and Concrete Lintel.

Lintels may be formed of regular wall tile of either type by reinforcing with steel rods and filling with concrete. It is important that the concrete completely fill the spaces in the tile.




Standard and Special Tile Blocks

Each kind of special block should be made use of and specified for the locations for which they are designed.




Detail Showing Method of Flashing Porch Roof

If it is desired to conceal the flashing, metal lath can be run down over flashing and the stucco continued to roof surface.

## CONSTRUCTION DETAILS

HOUSE OF JOHN L. POWELL, WICHITA, KANSAS
HERMAN J. STROEH, *ARCHITECT*
STUCCO ON INTERLOCKING TILE.

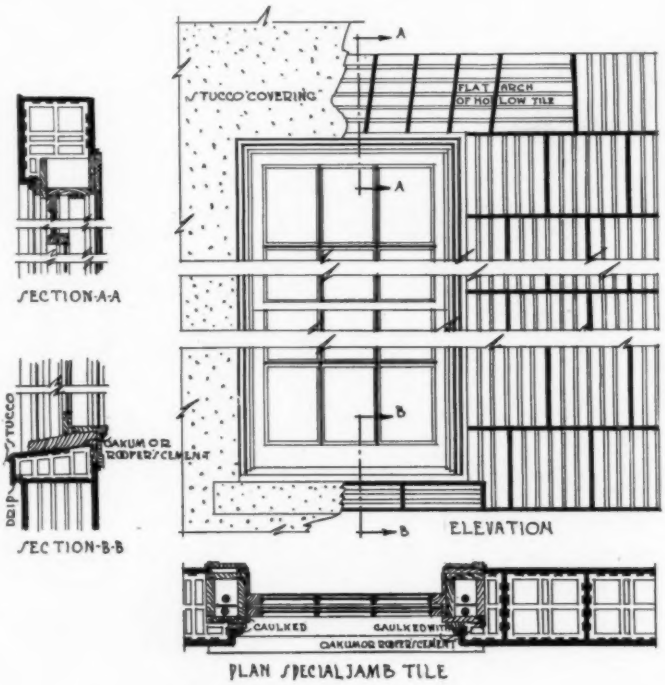
Experience has shown that this is not necessary, provided the blocks are of the proper quality and the mortar joints are well pointed. The blocks should be laid with a liberal air space in the joints.

The tile used for wall construction is somewhat porous, and therefore if dry, will absorb water from the plaster. For this reason tile walls should be slightly wetted before the stucco is applied. This wetting is often overdone, in which case it will harm rather than help the construction. Sufficient water only should be applied to prevent the tile robbing the plaster of moisture. Water left standing on the face of the tile after wetting indicates that an excess amount has been used.

Provided the foundations and wall construction are correctly designed and built, cracks and crazing in stucco on hollow tile may yet develop from several causes. Chief amongst these is the use of an excess amount of water in stucco coatings. This subject will be fully treated in a later article dealing with stucco finishes.

Accompanying this article are a number of construction details which should be carefully studied and followed. Where windows occur, it is important that a special jamb tile be used, rabetted so as to provide for the window frame. The joint between the window frame box and tile should be well filled with mortar to within one inch of the stop bead. The rest of the joint should be caulked preferably with oakum, after the cement has well set, although a good type of elastic or roofers cement will also serve the purpose. Unless this is carefully done the wall will leak air around the periphery of the window. In fact all joints between frames of either doors or windows and tile should be tightly caulked (with either oakum or roofers cement) at the head, sides and sill.

This is an important item, as all woodwork entering into the wall construction such as window and door frames etc., will shrink. The woodwork should be back painted before being set. This will help preserve the wood. Openings are an important consideration, and besides the points already mentioned care must be taken to provide proper lintels and sills. Special arch blocks of terra cotta are manufactured by some companies for this purpose, and if this material is to be used for the lintels, it should be distinctly mentioned in the specifications. Such construction as a piece of timber laid over the window head to reinforce the frame, with standard tile blocks built above should never be permitted. Either arch tile, reinforced concrete, brick arches, angle iron or similarly suitable material should be used for the lintels. A satisfactory lintel can be constructed by using the regular wall blocks, filling the hollow spaces with concrete and reinforcing with steel bars. Such lintels can be made up on



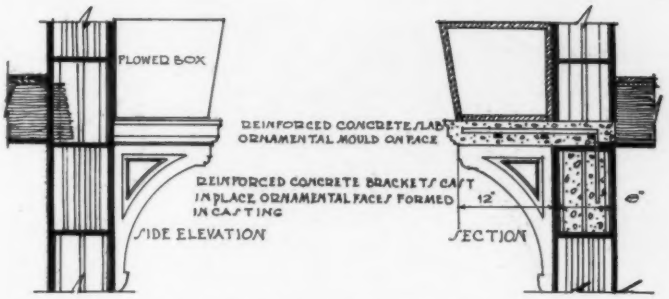

TYPICAL WINDOW CONSTRUCTION

TILE LINTEL AND SILL ARE HERE SHOWN. OTHER MATERIALS CAN OFTEN BE USED TO ADVANTAGE. GOOD JAMB CONSTRUCTION CAN BE OBTAINED BY THE USE OF BRICK TRIM AROUND THE EXTERIOR OF THE OPENING, FORMING A REBATE WITH THE TILE BACKING.

the ground and set in place—about four days to one week later.

The window sills can also be formed by special sill blocks of tile as shown. Irrespective of the nature of material used for the sill (tile stuccoed, concrete, brick, stone, etc.), proper drips should be provided on the underside. This is an important item.

Where the floor joists rest on the tile walls, they should be given as liberal a bearing as possible; usually 4 inches is adequate. For other than the interlocking type a course of flat tile about 1 inch thick should be laid over the standard wall blocks, well bedded in cement forming a flat horizontal surface on which the joists can rest. Instead of breaking stock blocks to fit around the joists, the outside of the wall should be built up with thinner blocks (3 inches or 4 inches) and the space between the joists on the inside filled in with blocks of a thickness sufficient to make up the full wall thickness. This is illustrated in one of the drawings of Construction Details on page 617.




BRACKET CONSTRUCTION

BRACKETS OF CONCRETE FOR SUPPORTING FLOWER BOXES ARE HERE SHOWN. THE CONCRETE SLAB MAY BE OMITTED, IF DESIRED, AND TOP OF BRACKET EXTENDED INTO WALL. WITH SLIGHT MODIFICATION THIS CONSTRUCTION IS SUITABLE FOR THE SUPPORT OF BAY WINDOWS OR OTHER PROJECTIONS.

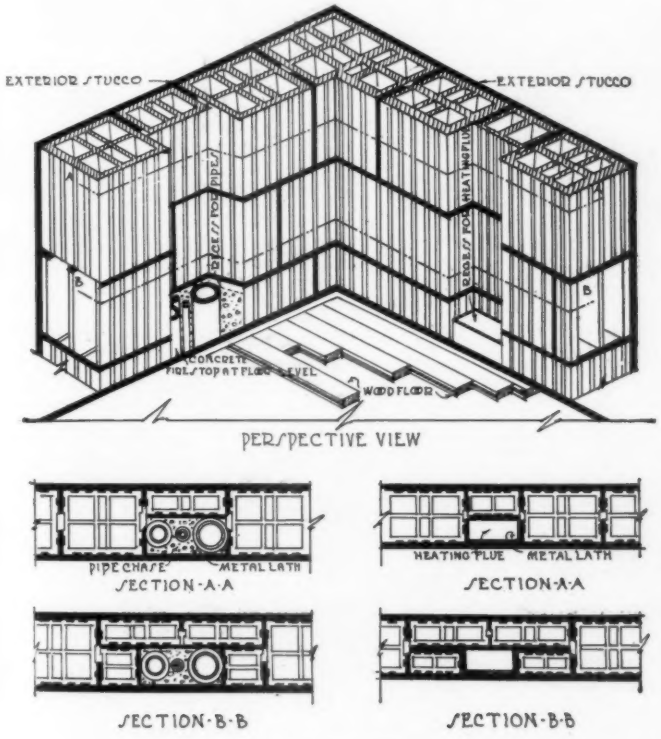
Where a pitched roof is used, a 2-inch by 4-inch cap plate, laid flat can be set on top of the wall, and anchored to the top course of blocks, the anchor bolts extending down into the cellular spaces which should be then filled with cement. This serves as a bearing for both the rafters and attic or ceiling beams.

The stucco overcoating should not be extended down to the ground surface if it is possible to avoid it. While this is more important when the backing is of frame than with tile, yet the provision of a base course of brick or stone is always a preferable feature.

The use of brick arches, sills, base and other trimmings in connection with stucco exteriors, if well worked out and not overdone, enhances the beauty of the structure, and breaks up the otherwise flat and often monotonous surface. When this is not desirable the use of a green or red tile insert in suitable locations gives a pleasing variation and should be used.

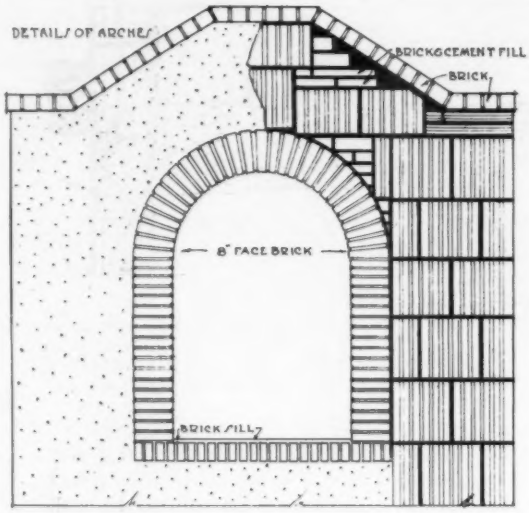
The use of flower boxes also is helpful in this respect and the brackets for these can be made an integral part of the construction as illustrated. One set of forms is sufficient, the brackets being made of reinforced concrete are cast at the premises.

The use of special blocks to form pipe chases should be insisted on. The importance of not permitting standard wall blocks to be broken for such purposes cannot be emphasized too often. There should always be at least three cell walls and two enclosed



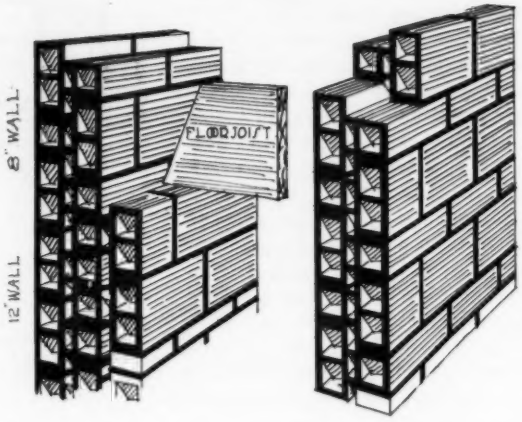

PIPE CHASES

CORRECT METHOD OF CONSTRUCTING PIPE AND SIMILAR RECESSES IN HOLLOW TILE WALLS.



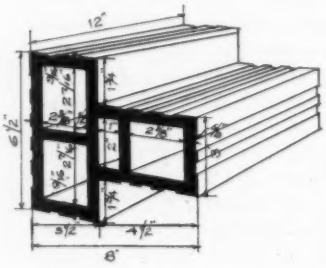

CONSTRUCTION OF OPENING IN A PORCH WALL

This illustrates the use of brick trim, which can often be used to advantage, thus adding a warmth of tone and touch of color to the sometimes otherwise hard and cold appearance.

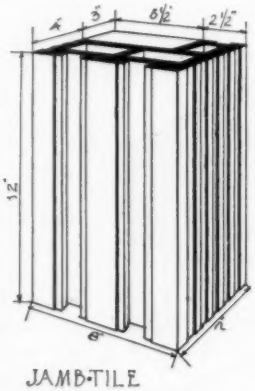



TYPICAL WALL CONSTRUCTION FOR INTERLOCKING TILE

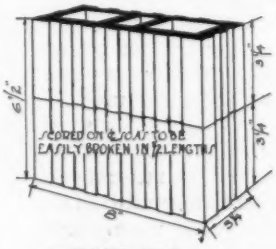
Note the method of offsetting the wall at the beam level to provide a solid bearing for the floor joists.



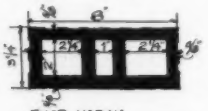

INTERLOCKING WALL TILE.



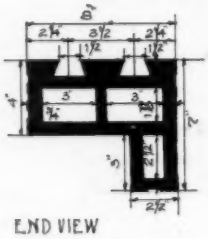

JAMB-TILE




CORNER TILE

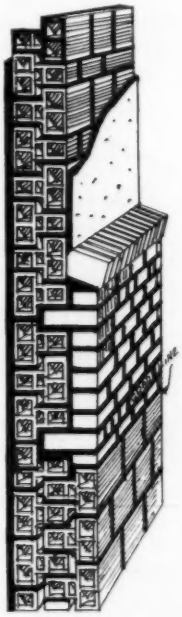



END VIEW




END VIEW

REGULAR INTERLOCKING WALL TILE AND SPECIAL BLOCKS USED IN CONNECTION THEREWITH



BRICK VENEER

The manner of bonding brick to Interlocking Tile, when used from grade to water table is here shown.

## CONSTRUCTION DETAILS

air spaces between, for every part of the wall. This cannot be accomplished when standard blocks have the inside cell broken to recess plumbing and other pipes. Insistence on this point will prevent damp spots appearing here and there on the inside of the finished building. Where such chases are plastered over on the inside, metal inserts should be built in the joints between the blocks to which wire lath can be fastened.

The requisites then for successfully built tile walls to serve as a backing for stucco may be summarized in the following seven points.

1—Well designed and constructed foundations.

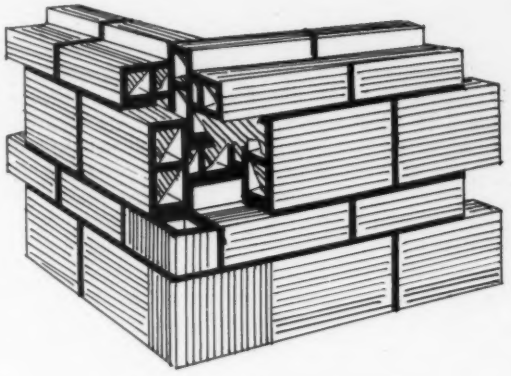
2—Good tile well laid in properly proportioned mortar.

3—Careful treatment of all wall openings with respect to jambs, lintels, sills, painting and caulking frames, etc.

4—Special treatment of the base course to prevent stucco skirting ground.

5—Proper wall construction at beam and rafter levels to provide adequate bearing for same.

6—Use of special blocks wherever necessary, as at beam levels, for pipe chases, etc., to prevent breaking standard tile to fit such places.

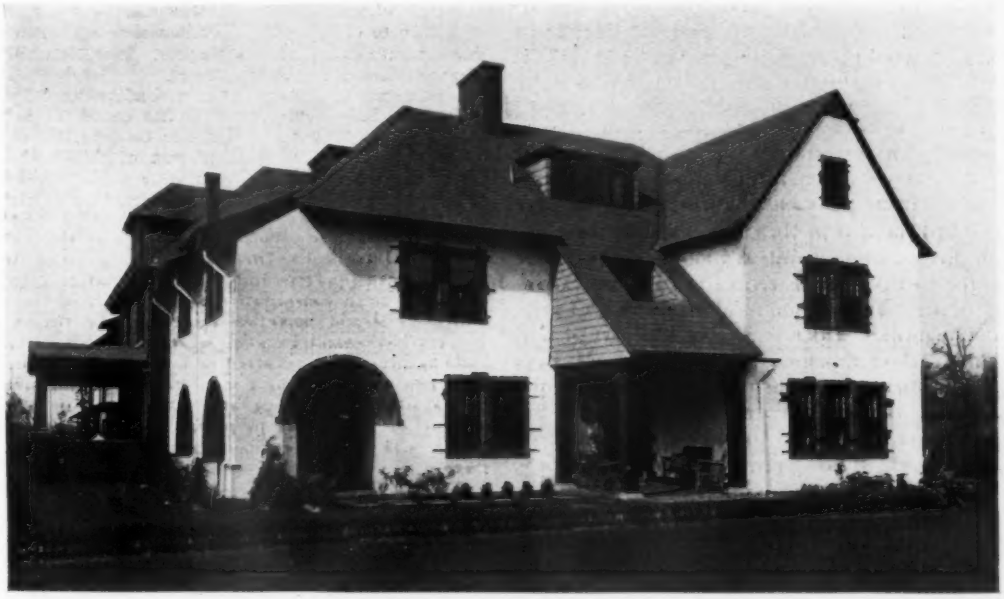


CORNER CONSTRUCTION

WHEN INTERLOCKING TILE ARE USED THE CORNERS SHOULD BE FORMED BY THE USE OF SPECIAL CORNER TILE, BUILT IN AS QUOINS.

7—The inclusion of definite directions for this work in the specifications, supplemented by adequate construction details in the plans.

*(To be continued)*



HOUSE OF MRS. R. G. PORTER, PITTSBURGH, PA.

LOUIS STEVENS, *ARCHITECT*

STUCCO ON STANDARD WALL TILE. NOTE THE PLEASING EFFECT CREATED BY THE BRICK TRIM. THE BRICK BASE COURSE KEEPS THE STUCCO FROM SKIRTING GROUND. ROOF IS OF GRAY SLATE.

## Corrosion to be Investigated

THE inroads which the effects of corrosion have made on the mechanical equipment of many large and important buildings are not very well known to the general public, and usually only those who have had to do with the actual work of replacement are familiar with their costliness. This matter should be seriously considered by every architect in designing and specifying piping systems such as plumbing, heating, etc.

While many investigations have been made, and much has been written on the subject of corrosion, nevertheless this enemy of steel and iron pipes is still a formidable factor. It is therefore of interest to note that an important engineering organization has been formed in New York City to take up, on a large scale, methods for the prevention of corrosion in steam, water and other piping. The president of the company is Dr. Charles V. Paterno. The company has opened offices in New York City.

## Estimating Cost Reduced

IT is interesting to note the attitude of the General Contractors Association of Milwaukee, affiliated with the Associated General Contractors of America, toward the quantity survey method. This association apparently not only believes in the preparation of uniform quantity surveys, but instead of leaving this to some outside agency maintains in the office of its secretary a very efficient staff of quantity surveyors who furnish quantities to members only. Each contractor figuring on a job pays his share of the cost of the survey, and as there are usually five or more members bidding on the same work, the cost per firm is reduced to a comparatively low figure. To this sum is added the cost of pricing the quantities, which is of course a part of bidding that each contractor must do for himself. Payment for estimating is then collected through the successful bidder, and the other contractors who bid on the job are reimbursed through the secretary of the association. When the work is not let, it is proposed to collect from the architect or owner.

Through the operation of this Bureau of Quantity Survey, the Milwaukee contractors have found that the cost of estimating has been reduced, and at the same time all bidders are enabled to bid on the same basis so far as quantities are concerned. Ridiculously varying bids have been eliminated, and no objection is raised if a high bidder is given the job so long as he gets the price he named.

This reduction in the cost of preparing estimates, really a reduction in the contractors "overhead" will undoubtedly be reflected in both lower and at the same time more reliable bids.

So long as fair competition between those receiving the quantities is maintained, it would seem that a method such as that adopted by the Milwaukee contractors is to be encouraged.

## Recommendations of Committee on Fireproofing, American Concrete Institute

IN connection with Mr. Hull's article on "The Behavior of Concrete Columns Under Fire Test," published in the issues of Oct. 29 and Nov. 5, it is interesting to note the 1919 report of the Committee of Fireproofing of the American Concrete Institute, which states in part:

In the interval since the last report of this committee was made a series of fire tests of more than one hundred full-size building columns, including all the important types of fire-resistive columns, has been conducted, jointly, by the National Board of Fire Underwriters, the Associated Factory Mutual Fire Insurance Companies and the Bureau of Standards. These tests will give a vast amount of much-needed information as to the relative efficiency and reliability of the different types of protection for steel columns and will also give important information as to the fire-resistive properties of several types of concrete columns. The report of the results of these tests has not been completed and it would be premature to undertake to draw on this storehouse of information for this committee's report for this year. It will undoubtedly be available for next year's report.

Supplementing the tests made at Underwriters' Laboratories, the Bureau of Standards has conducted a series of fire tests of over fifty full-size columns, all of concrete. The results of a large part of this work were presented in a report to the Institute at its meeting last year and the results of the remainder of the tests are available for use at this time. The information furnished by the reports on the Far Rockaway fire by the National Board of Fire Underwriters and a special committee of the American Concrete Institute contain information that should be given consideration in the report of this committee, as should important reports of the British Fire Prevention Committee on two large and disastrous factory building fires which occurred in London in 1917. Certain important conclusions have been drawn from the information available from these and other sources. It is the purpose of this report to present these conclusions, together with definite engineering recommendations based thereon.

The recommendations made at the conclusion of the report are:

1. That for fire-resistive construction, limestone, trap rock, blast furnace slag and burned clay be given a preference over highly silicious gravels.

2. That in cases where gravel aggregate is to be used with no additional protective material over the concrete, round columns be given preference over rectangular.

3. That where gravel aggregate is used, all columns, but especially rectangular columns and round columns with spiral reinforcement, be given the additional protection of approximately one inch of portland cement plaster either on metal lath or reinforced by light expanded metal.