THE AMERICAN ARCHITECT
The ARCHITECTURAL REVIEW

VOL. CXXII WEDNESDAY, NOVEMBER 22, 1922 NUMBER 2407

Bringing out Mahogany Logs, San Lorenzo, Yucatan

MAHOGANY—ITS ORIGIN AND USES

BY H. L. HARRIS

Every nation, in every clime, in every stage of civilization has spent time and effort in an attempt to make home more beautiful, and the progress of a race can be traced by the artistry expressed upon its walls.

IF we except the traditional story of the palace of Essarhaddon with its "carven ceilings and beams of cedar," which history appears to place somewhere in the neighborhood of 1000 B. C., we shall find the earliest and most authentic evidence of interior wood trim in the Bible story of the building of King Solomon's temple in 993 B. C. with its side walls covered with carved olive and cedar, done in the Assyrian style, for it will be remembered architects and interior decorators were borrowed from Hiram, King of Tyre, the Semetic monarch whose principality lay upon the coast.

This, however, was a temple. It was not until the thirteenth century A. D. that the walls of houses began to be wainscoted and joining was of such a primitive character that the walls were hung with tapestries to check drafts. In 1400 the lower floor of dwelling houses was a combination dining room and bed room. The furniture consisted of a "dossier," a long bench with a canopy, seating four persons, a large cupboard, a bed with heavy curtains at the foot, a table for holding toilet articles, a few stools, a buffet and the ever present "prie-dieu." If the owner was well-to-do, the floor was covered with an Eastern carpet; if poor, rushes were used.

In 1500 wainscoting was on a more pretentious scale. The large hall of the house was the general sitting room, reception room and dining room combined. Screens, benches and settees with an occasional individual chair, buffet, side tables and one or more cupboards completed the furnishings. The fashion of the great hall remained in vogue for nearly three hundred years.

During Plantagenet and Tudor times, fireplaces were enlarged and decorated with wonderful carvings, usually in the heraldic style. Much of this heavily carved ornate decoration was of oak, oiled and waxed until increasing years turned it as black as ebony. In fact, it may be accepted that woods had their appointed historic ages, just as did metals.

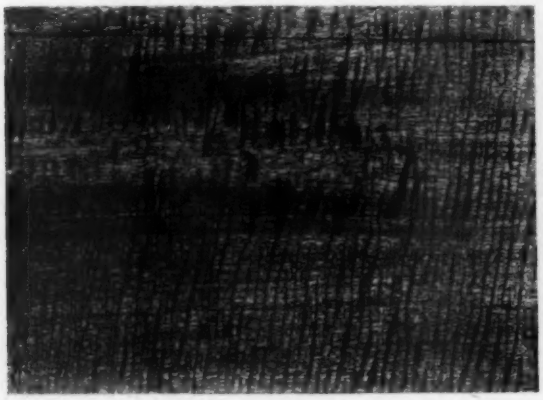
A native Mahogany Camp at San Lorenzo, Yucatan

The age of oak extended from about 1500 to 1660, the age of walnut extended to 1700, Mahogany came in in 1720 and has since been a prized wood for interiors and for furniture.

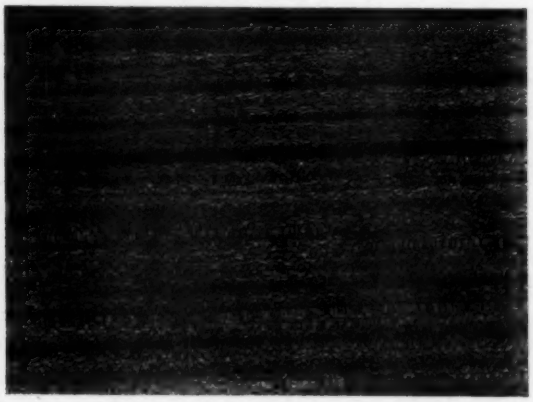
The introduction of Mahogany into Europe is interesting. Cortez unquestionably used the wood to build ships with after his conquest of Mexico. Sir Walter Raleigh, in 1597, entertained Queen Elizabeth aboard ship upon his return from the Spanish Main. The Queen admired certain planks which had been used to repair a part of the deck and Raleigh, always the courtier, had a table built of the wood and presented it to his royal mistress.

Although history records that the Queen was pleased with the gift, we hear nothing further about Mahogany for over a hundred years. Then logs began to reach England from Santo Domingo and Cuba and for a time the wood was used for an occasional rare panel in fine furniture. Then came the First George and within a very few years feudal England changed and became the more intimate, hospitable England of today. A better class of dwelling house began to be built, the great hall was done away with; smaller rooms and better furnished rooms became the vogue.

In 1721 Mahogany was given its first introduction into polite society by the action of Robert Walpole, later the first Earl of Orford, then at the height of his power, having been elevated to be first Lord of the Treasury and Chancellor of the Exchequer because of his successful attack upon the South Sea Bubble. Walpole commissioned William Kent, the architect, to build for him a country place at Houghton, in Norfolk County and it was in this stately pile that Mahogany was first used for doors and interior trim. Indicative of Walpole's wealth, it was stated at the time that the outer doors of carven Mahogany cost £1,000 apiece. In any event, Houghton Hall became one of the show places of England, and Mahogany became so popular that in order to gain votes for his candidate for a contested seat in Parliament, Walpole in 1733 removed the duty on Mahogany logs at the request of the Cabinet Makers and Joiners Guild, then an important and influential political body.



You have seen old Cremona and Amati violins which on their backs show the curious effect indicated in this panel. It is this close cross figure which naturally suggests the trade name of "Fiddle-back." It is the most extreme figured pattern which genuine Mahogany assumes



Stripe-figure Mahogany—a fine example of the straight grain usually found, showing not only the beautiful well-ordered pattern but the tiny black grain convolutions as well. The kind of Mahogany that is always available for interior trim

For a hundred years Mahogany was practically the only wood used in the construction of fine furniture in England. A group of master furniture builders arose. Chippendale, Hepplewhite, Sheraton, Inch, Mayhew, produced new styles and new books dealing with their designs in Mahogany. Their influence was felt not only in England but in this country as well, where the "Colonial Furniture" in Massachusetts Bay Plantations, in the Dutch settlements in Manhattan, and in the colonies of Maryland, the Virginias and the Carolinas, was built in modified form, from the designs of English masters.

Rain Drop is a much sought for variety of Mahogany on account of the lovely pattern it gives to high class veneers. It is occasionally seen in door panels and in buffets, high-boys, etc. The fibres of the wood break into myriad patterns, all of which are different, in this extremely interesting variety

A Chippendale Secretary-Bookcase of Honduras Mahogany

Mahogany was also extensively used for interior trim. Stair treads, spindles, bannister rails, baseboards, plate rails and window trim, appeared in many of the finer examples of Colonial mansions and built-in bookcases, mantels and cupboards were also constructed of choice Santo Domingan wood, which today is as hard as flint and as colorful as a rare old painting.

Those were the days when swift sailing schooners brought wonderful logs from Santo Domingo and the other islands of the Spanish Main and we read of Duncan Phyfe, foremost among American furniture builders, paying $800 for a rarely figured log which he desired for a wealthy patron.

Santo Domingo has long since ceased to be an important source of supply. According to the import figures supplied for the year 1921, something like 50,000,000 feet of Mahogany were imported into the United States. Approximately half of this supply came from Central America and half from the Gold Coast of Africa, where logs of wonderful size and figure are obtained.

The Mahogany tree is a magnificent specimen towering above his fellows in the forest. The proportion of Mahogany to other woods is not large in comparison with trees of other kinds. The roots of the Mahogany tree swell out in gigantic buttresses, reaching ten or fifteen feet above the ground, something like the familiar cypress tree of our Southern states.

"Pie Crust" table made by Chippendale of Santo Domingo Mahogany

In cutting the timber, stages are erected and the tree is sawn through just above the swell of the gigantic roots. From where the tree is cut to where the first branch springs from the main trunk, a height of 50 feet is sometimes found. After being trimmed, the tree is rolled to the nearest water course and floated down stream to where a log dam keeps the logs well out of brackish

Crotch, with its interesting "feather pattern" is wood taken from either the base of the tree where the big tap-roots swell into the main trunk or from the "horqueta," the main crotch. The fibres of the wood have two directions in which to grow, and their struggle for self expression produces the magnificent figure and grain as shown in this small panel

water. The concentration of logs back of this dam is a serious problem as, if the freshly hewn logs were permitted to get into brackish or salt water, the teredo worm, scourge of tropical waters, would so perforate the logs as to make them valueless.

Mexican and Central American logs are brought to this country with the bark and sap wood on. In the African logging camps it is the practice to strip the trees of their bark and sap wood so that the log is placed aboard ship in a roughly squared condition.

Upon arrival in this country the logs are usually placed in a log pond as Mahogany cuts much better when wet than it does when dry and the danger of checking is obviated.

The logs showing the greatest amount of figure are usually cut into veneers for, in actual practice, a good veneer, particularly in doors and in large panels, gives better results and lasts longer than solid wood.

Mahogany, when freshly sawn, is of a light salmon color. The African Mahogany is slightly darker than the Central American or Mexican wood, but it has the same relative distinctive coloration. It darkens rapidly when exposed to the air and light and, with proper care, assumes a deep, rich hue, something like the color of rare old Sherry wine. It is this wonderful color and the inter-related grain which indicate genuine Mahogany. In recent years a great abuse has sprung up in the disguising by dye and stain of common woods under the name of "Mahogany Finish." The identifying marks of Mahogany are grain, figure and color and each is so distinctive that once seen, it cannot be forgotten.

The idea seems to be more or less prevalent that Mahogany is an expensive wood. In order to decide just how accurate this impression was, figures were obtained from the architect of the "Bungalow Beautiful" recently constructed at Atlantic City as a show place. Living room, den and dining room were finished in genuine figured Mahogany taken from stock. This included built-in bookcases, window trim, baseboards, mouldings, mantels, etc.

The cost was $880.00. Figures were also taken on four other cabinet woods. The least expensive of these was $80.00 less than the price paid for Mahogany.

Architects are already familiar with the arguments pro and con concerning the various woods used for interior finish, among which are appearance, effect of aging, relative hardness, wearing qualities and permanent value to the home in which it may be used.

DESIGN AND CONSTRUCTION OF THEATERS

BY ROI L. MORIN

Part II—The Stage

THE standard type of stage of the commercial theater is a very simple affair, and one which every architect is either familiar with, or can familiarize himself with, by the expedient of inspecting several theaters. Theater design in the scientific and modern sense, however, is one of the most intricate and fascinating problems in modern architecture. To design a theater properly an architect must not only be familiar with all the various devices for manipulating scenery, but must also know how this scenery is built up from the artist's sketches, what the functions of a stage carpenter, electrician and property-man are, how the play is cast, rehearsed and finally played. He must know the stock sizes of the pieces, how sets are built to go on the road (or to the storehouse), and he should be able to distinguish between the operation of the ordinary commercial theater which puts on plays hoping for a long run, and a repertory theater which is always changing its plays. Last, and foremost, he should be a student, or active participant, in the "modern" stagecraft movement, and understand the concentration and diffusion of light, *the most important agency, next to human presence, to animate the stage.**

Fig. 1. Grand Foyer, The New (Century) Theater, New York
Carrere & Hastings, Architects

The workshop of the theater, i.e., that part which is on the stage side of the proscenium wall, may be divided into three parts, (1) the stage proper, (2) the shops, (Electrician's, Carpenter's, Scene-painter's, Smith's, and Costumer's), the scene dock and property rooms, and (3) the actor's quarters, (Dressing rooms, Green room, rehearsal rooms, etc.). Each of these three divisions should be in separate buildings, cut off by fire walls.

The stage proper should be built like a great vault, and kept entirely clear. When the scenery is built and set and the great mass of ropes, drops, and lighting equipment is introduced, there will

*From Irving Pichel's "On Building a Theater," the cleverest and most practical textbook ever written on the subject of small theater design.

remain but little space for stairs, ladders, standpipes (on open wall space), balconies, extra galleries, doors and ramps, for which architects who lay out stages seem to have such a great fondness. All stairs to dressing rooms, trap room, sink, fly-galleries, rigging-loft, shops, etc., should be on the dressing room side of the stage walls. All standpipes and hose racks (a hose rack should be installed on both sides of the stage at every level) should be installed in corners, thereby insuring that they will be kept free. Above the fly-gallery level the stairs or ladders to the loft may go up on the stage side of the walls. The coils of heating pipes should be kept flat against the walls and covered by a fencing of heavy wire mesh so that the "flats," or any of the movables on the stage, will not be leaned against them and ruined.

The layout of the stage wings, dressing rooms, shops, entrances, exits, and stairs, etc., will depend greatly upon the best location for the "loading" door. (This applies only to interior lots.) The "prompt" side of the stage is usually opposite the side of the loading door. The word "prompt," like the terms "tormentors," olios, etc., are relics of the 18th century theater, and are not used today in the sense they were originally. The "prompt" side of the stage today is the side from which the switchboard and ropes are manipulated on the right (facing the audience) if this is possible. *In the latest and most scientific types of German theaters the "prompt" side has lost all significance, as ropes are not used and the switchboard is under the stage, directly in the center.*

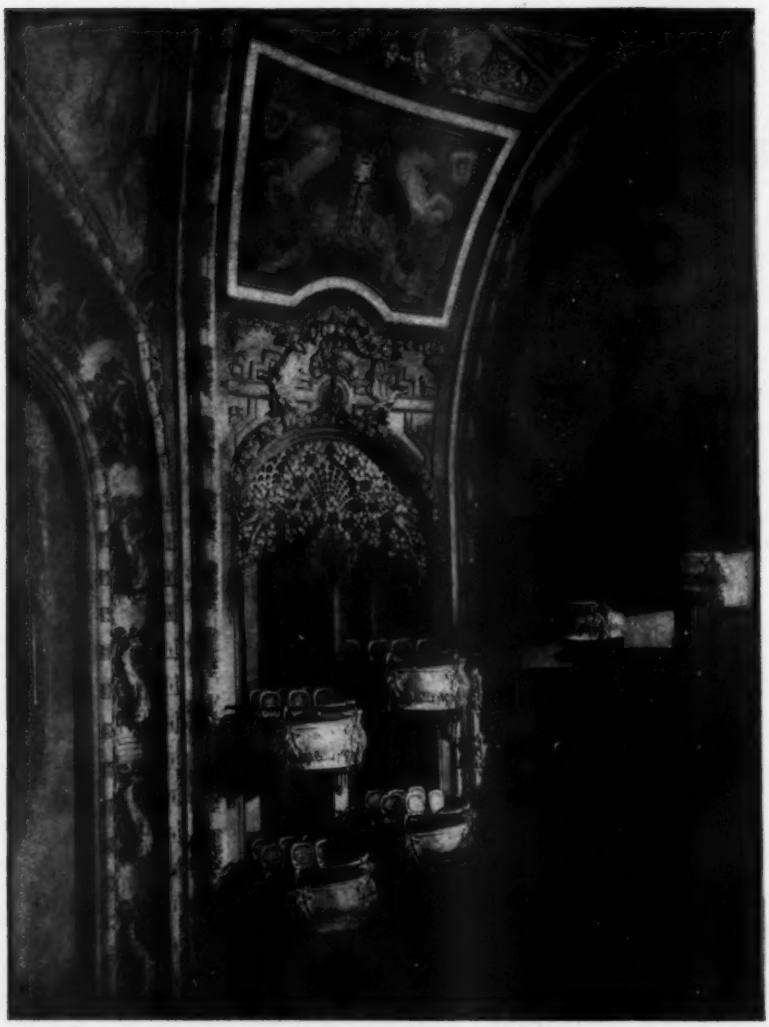


Fig. 2. Section of Auditorium, New Amsterdam Theater, New York

Herts & Tallant, Architects

The loading door, for any combination house, should be as large as a box-car door (as the flats are transported in box-cars), approximately 7′-6″ by 8′-6″. For production houses, opera houses, etc., the loading door should be much larger; in a production house a door 12′-0″ by 18′-0″ should prove sufficient and in an opera house 15′-0″ by 30′-0″. A separate stage entrance door should be provided, in an inconspicuous place, for the actors and stage personnel. Just inside this door should be a vestibule, with a small office for the doorman, a timeclock, receiving window, etc.

All doors leading to and from the stage, on all levels, should be equipped with two 3″ thick, Underwriter's label, tin-clad doors, one on each side of the opening, one sliding and one swinging, and both equipped with counterweights and fusible links, so as to close automatically in case of fire. *When detailing these doors an architect should be careful to allow enough room for this door-closing apparatus. In the majority of theaters built in this country it is necessary to change the lo-*

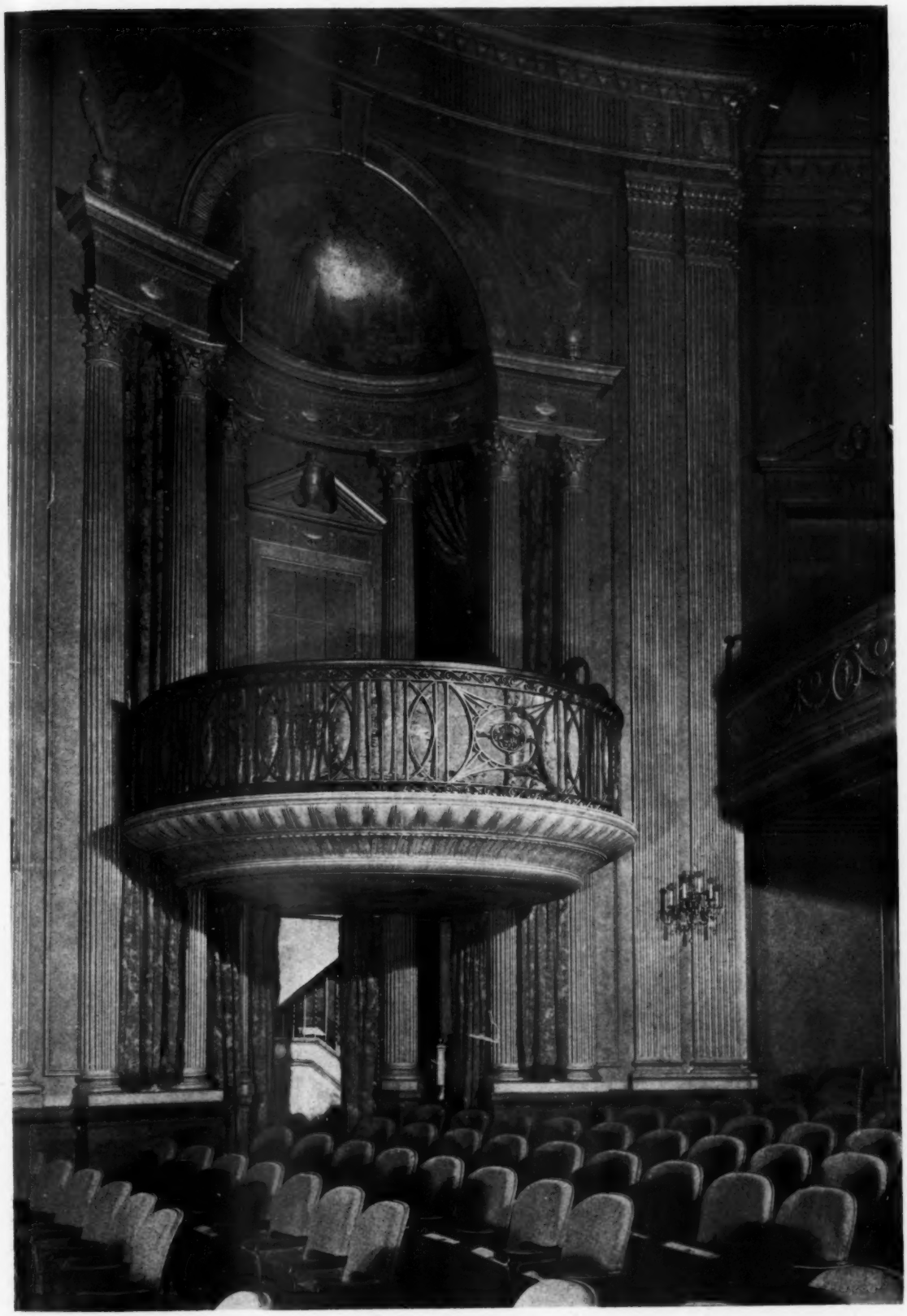


Fig. 4. The Music Box Theater, New York
C. Howard Crane, Architect

cation of some doors, or a floor level, because this detail has been overlooked.

On each side of the stage there should be stairs down to the trap room, stairs up to the dressing rooms, shops, etc., and exits, leading through fireproof or open courts to a street. All exposed stairs, iron ramps, platforms, etc., on the stage, should be built of, or covered with, some soundproof material, in order that the stage hands will make little noise moving about.

LET us take up the design of the stage, level by level, starting with the lowest, the sink. The depth of the sink depends upon the type of equipment of the stage for manipulating sets. If the stage is equipped with hydraulic or electric

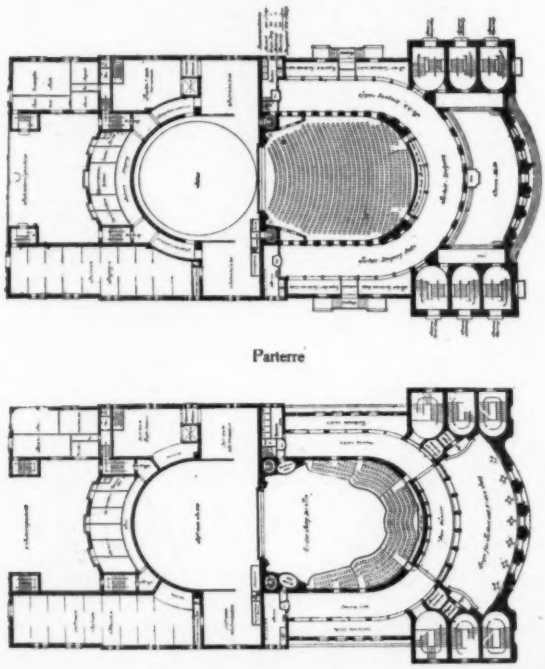


Fig. 3. Parquet and Balcony Plans, The Free Folk Stage, Berlin
Oskar Kaufmann, Architect

bridges, or elevators, the sink will need to be from 20 to 36 feet below the stage level. If equipped with a simple revolving stage (some revolving stages will function also as bridges—the stage at the Century Theater was designed to move up or down, backwards and forwards, or turn), 10 or 15 feet will suffice. If a stage is equipped with ordinary traps the finished floor may be only -9′-6″.

If the stage is equipped with a sliding or wagon device, the wings must be very deep, each wing at least as deep as the width of the proscenium opening, and the sink may be quite shallow. If the stage is equipped with sliding and raising machinery, as in the Dresden Court Theater (see sections), *probably the finest and most practical stage in existence,* most of the shops, lockers for stage personnel, etc., will be placed below the stage level, as most of the building and setting-up will be done there. Otherwise the shops are best located on the stage level or above it. Occasionally the electrician's shop is placed some 30′ above the stage (just below the fly-gallery level) and a spotlight bridge is placed directly in front of it. This serves as an excellent observation platform.

Revolving stages are supported either on a large vertical shaft, with a collar around the outside circumference of the table, taking some of the load, if the stage is large; or simply with the outside collar, if the stage is small, and rotated by a rack and pinion arrangement. These stages

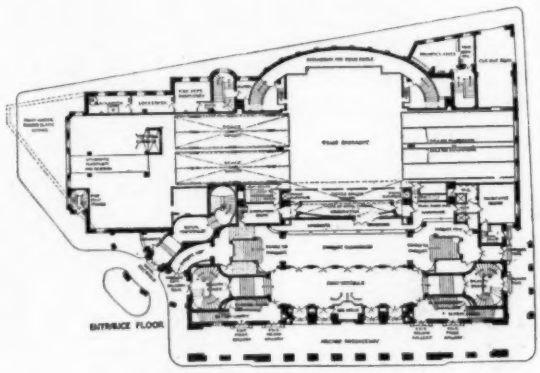


Fig. 5B. Entrance Floor Plan
Dresden Court Theater

are built on a steel framing, so designed as to allow for the conventional stage traps. The finished stage floor is constructed of 1⅜″ or 1⅝″ combed-grain N. C. pine, matched, with no under-

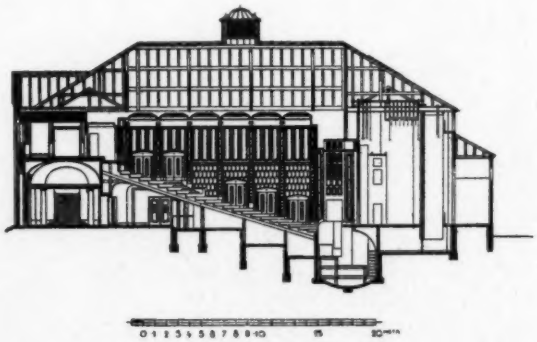


Fig. 6. Section, Munich Art Theater
Max Littman, Architect

flooring. The floor of both wings, from a line 2 feet beyond the proscenium opening, should be of fireproof construction, with a finished wooden floor on sleepers. The finished floor should *never* be of a soft wood like white pine, as the wear and

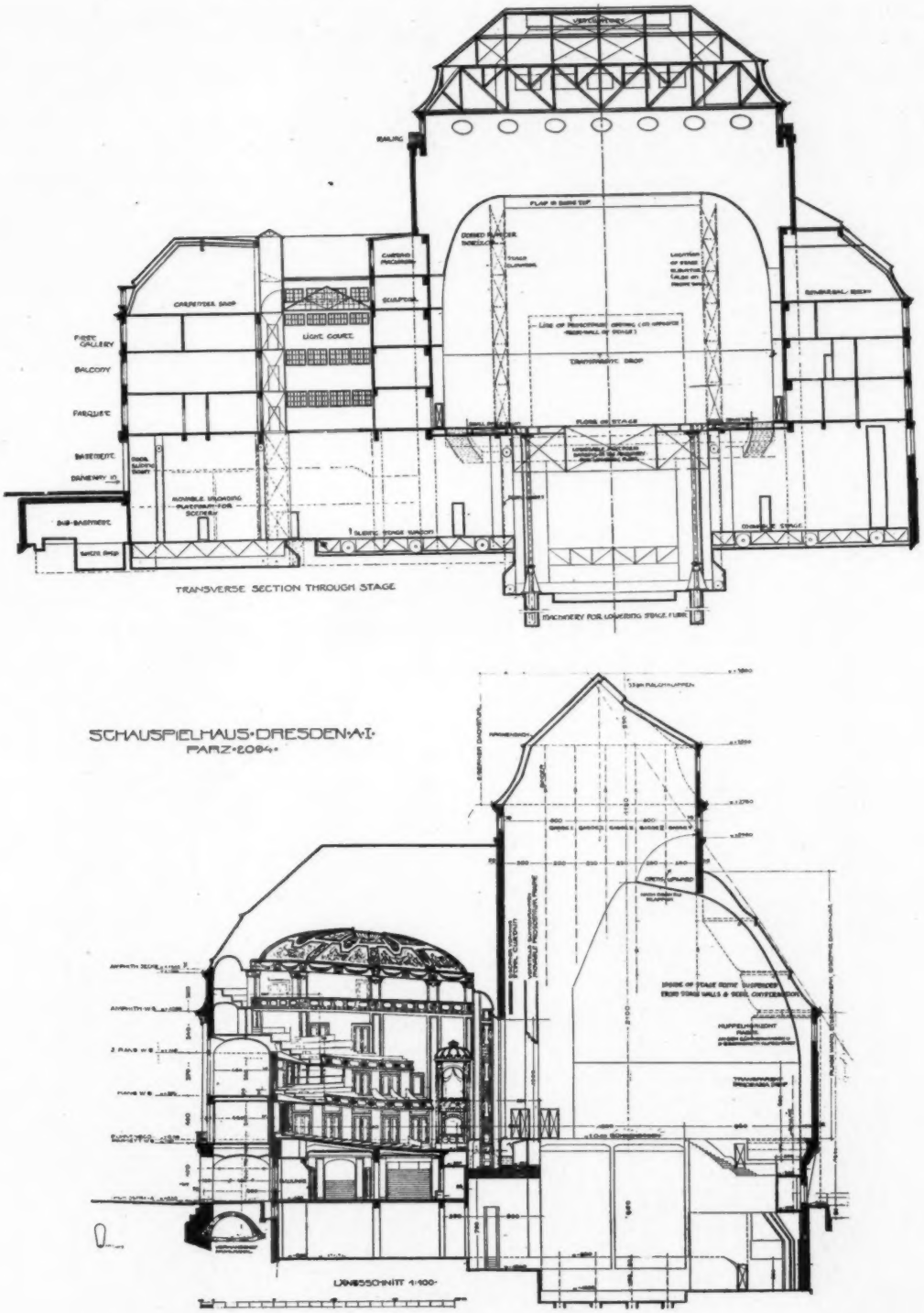


Fig. 5A. Sections, Dresden Court Theater

Wm. Lossow & Max Hans Kuhne, Architects

tear on a stage floor is so great that the best of them last but a few years; nor of hard wood like maple, oak or chestnut, as the floor must be soft enough to allow stage screws to be driven in by hand.

The trap room should always be kept clear directly below the playing stage, i.e., in "full," and all rooms, shops, etc., below the stage level should be under the wings. There is always located, on the trap room level, a musician's waiting room, with store for their instruments, lockers and a small toilet.

The following is a list of rooms which are necessary in a well equipped production, or even "combination" house:

1. Carpenter's shop, 18′ by 35′. With small office
2. Electrician's shop, 15′ by 30′. With small office
3. Scene-painter's room, 12′ by 20′, with an artist's studio adjoining
4. Property room, 20′ by 30′ (18′ high) small office adjoining
5. Smithy, 10′ by 15′, with small forge, drill, etc.

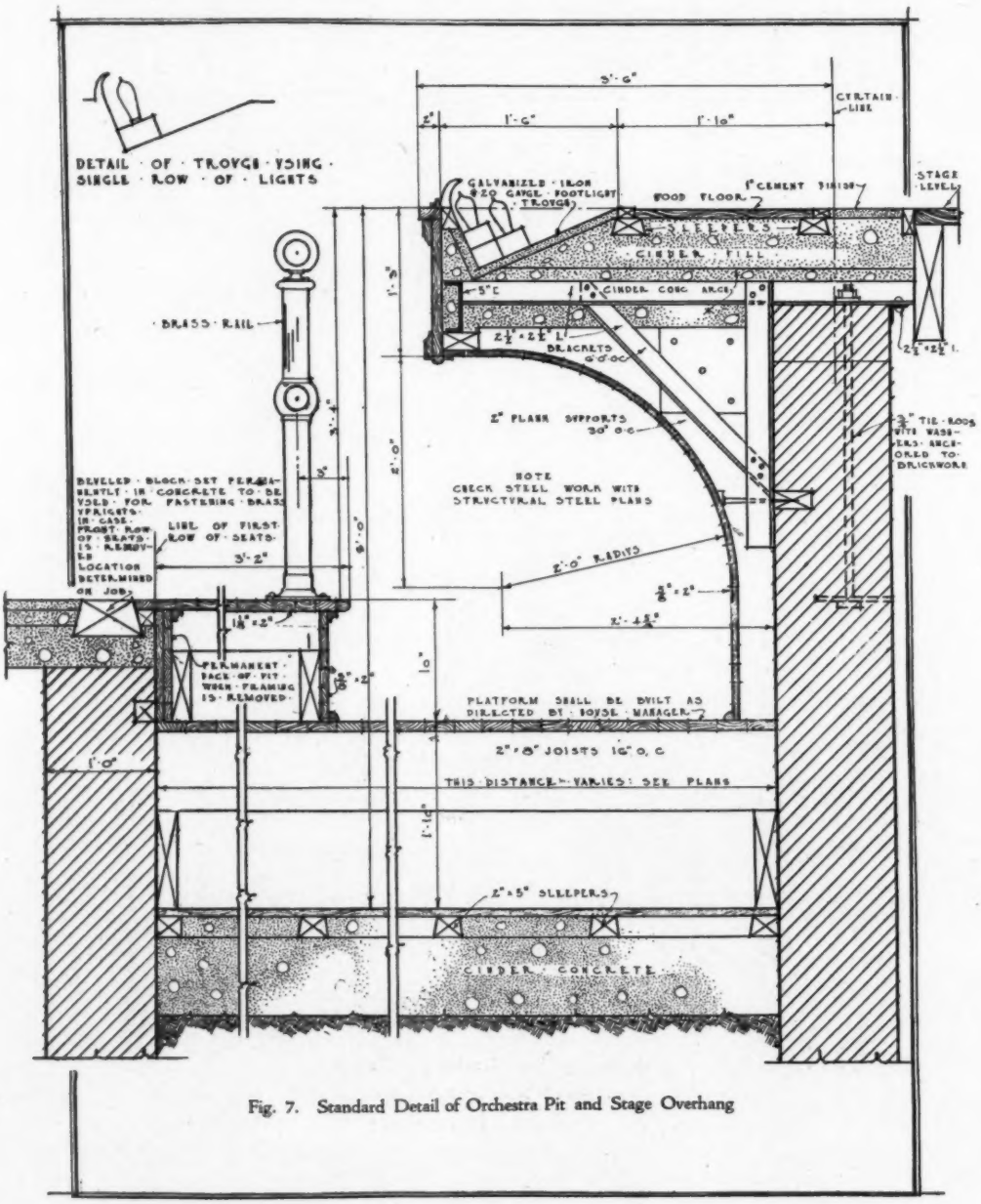


Fig. 7. Standard Detail of Orchestra Pit and Stage Overhang

6. Costumer's room 15′ by 25′
7. Wardrobe room, 15′ by 25′, with wardrobe closets on all sides, equipped with shelves, rods, drawers and shoe racks
8. Hairdresser's room, 10′ by 15′
9. Musician's room, 15′ by 20′ (See above)
10. Stage manager's office
11. Stage-hands toilet and locker room
12. Dressing rooms—15 minimum
    20 average
    40 maximum
    With make-up tables for two actors, mirrors (one full-length), wardrobe locker, drawers, wash basin, etc.
13. Male and female chorus rooms, each 20′ by 30′, with make-up equipment for twenty actors each. An opera house should have chorus dressing rooms and lockers for 300
14. Toilet rooms on every level. (Men and women are usually segregated to opposite sides of the stage)
15. Small toilets on the fly-gallery working levels
16. Green room (actor's waiting or rest room) 15′ by 25′, at stage level
17. Elevators, each side of the stage, where there are more than three tiers of dressing rooms
18. Scene dock, 20′ by 30′, 30′ high, on the stage level, adjoining stage, with an entrance door 12′ wide, extending to the ceiling. This is a room which seems to have been abandoned in modern theater design, in spite of the fact that it is more necessary now than ever. The alleys and courts around theaters without scene docks are choked with flats, borders, trunks, cases, lamps, furniture and other paraphernalia familiar to stageland, in direct defiance of law, and imperilling public safety. A good sized scene dock and property room in a production house would save the exorbitant cost of storing a delayed or suspended production. At the Metropolitan Opera House, one set is often placed in the street while another is playing, on account of inadequate storage facilities.
19. A small restaurant or cafeteria from which sandwiches, tea, etc., may be served during the long rehearsal periods
20. A rehearsal room
    This is a luxury, though necessary in some of the large production houses, where often one or more plays may be in rehearsal while one is playing. The writer has often seen the stage cleared after the final curtain, at an evening performance, only to set up the props of a new play to rehearse from 12 to 3 A. M.

The above list is only a summary of the requirements of a well equipped house. It is by no means complete, nor does it pretend to be, but it contains far more facilities than the average theater owner would ever consider necessary. Theaters as well or better equipped are to be found in most cities in Germany. The Century (New) Theater in New York has all these conveniences. The New Amsterdam (the Erlanger home house) and the Lyceum (the Frohman home) have most of them.

At the stage level should be the most necessary conveniences, the property room, the scene dock, dressing rooms for quick-change acts, and a centrified control of the lighting equipment (the latest scheme is to have the chief electrician observe the performance from the old prompter hole in the stage, located just behind the footlight trough, and from this vantage point control all the subtleties of stage lighting). The fire curtain is operated from the stage level, as are all fire fighting and controlling facilities.

Every modern theater which is worthy of the name, should be equipped with a sky-dome or Kuppelhorizont. This is a great circular or oval dome in the depths of the stage, (see plans and sections of the Dresden Court Theater), usually made of concrete and given a hard plaster finish. With this dome all sorts of strange and beautiful things may be done. Skies, landscapes, mountains and different panoramas may be painted thereon. Effects of great distance may be obtained or clouds portrayed by means of stereopticons playing from bridges above the proscenium opening. But foremost, it is of greatest service with the Fortuny lighting system (which will be explained in the subsequent article), for diffuse lighting. The lower part of the dome is built into the back wall of the stage and bulges out in the rear, whereas the upper part, which projects up into the working space in the flies (see longitudinal section of the Dresden Court Theater) may be built on a wood or steel framing, and hinged so that it may be swung back out of the way. Some theaters have a cyclorama, a canvas scene which is wound around vertical shafts on each side of the stage and moved slowly by in sight of the audience. Other theaters have great drops which extend vertically across the back and sides of the stage. Both of these improvisations are out of date and cannot be compared with the horizont.

The fly-galleries are on both sides of the proscenium opening with the floor level at least 6′ above the top of the opening. It was formerly a custom to build two and sometimes three fly-galleries on each side, in tiers, as it was thought necessary to have this many to control the ropes

properly. The galleries other than the main working gallery (the lowest one on the prompt side) are rarely used, however, and two galleries, one on each side, should prove sufficient. The main fly-gallery should have two pin-rails, one on the outside, facing the stage, and one on the inside; the former is for the live lines (those which are carrying drops, borders, etc.,) and the latter for the dead lines (those with loose battens). The fly-galleries should be of steel and concrete, or other fireproof material. The outside pin-rail, and consequently the edge of the fly-gallery, should not be any nearer than 7′-6″ from the edge of the proscenium opening. The fly floor should be cut 18″ away from the side wall to allow space for the counterweight system. Even if a rope system is used, the border lights, act drops, olios, etc., will be counterweighted, and a slot should be

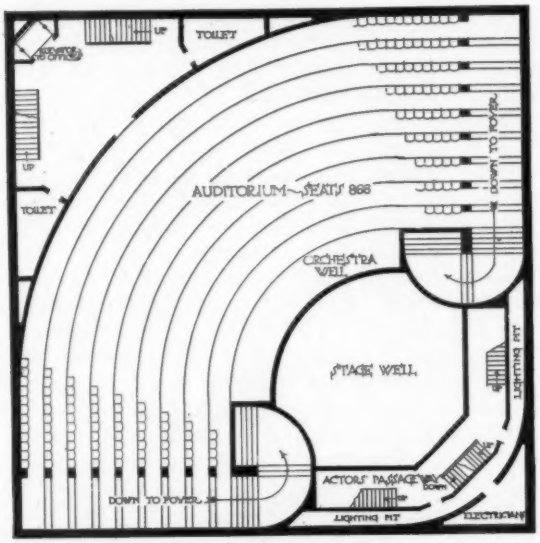


Fig. 8C. A Proposed New Theater
By Norman-Bel Geddes

left to accommodate a complete counterweight system. The steel framing of the fly floor should be heavy and well anchored into the front, side and rear stage walls.

The pin-rails should be constructed of 5″ or 6″ heavy wrought iron pipe, securely fastened to heavy steel uprights (channels), 5′ on centers, firmly bolted or riveted to the floor framing. A pin-rail has to carry very heavy loads and there is a tendency today to build them weak. Pins should be 1⅛″ iron belaying pins, 21 to 24″ long. Directly below the pin rail and two feet below the floor level should be a rope box, extending the entire length of the fly-gallery, so that the ropes may coil up therein instead of encumbering the fly floor. Occasionally a bridge is placed before and

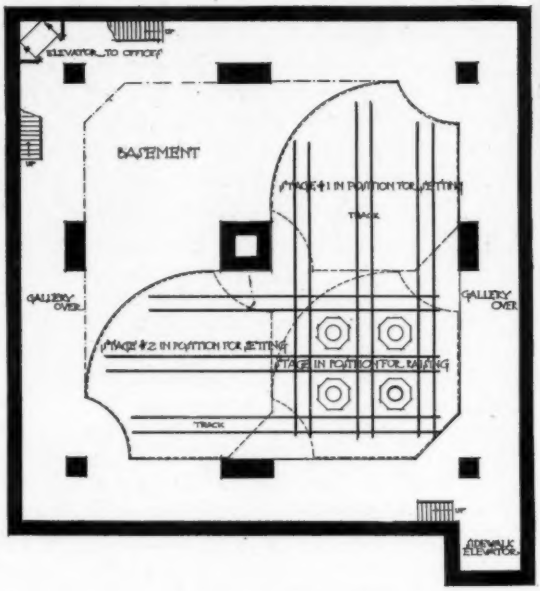


Fig. 8A. A Proposed New Theater
By Norman-Bel Geddes

above the fly floor so that the head fly-man may direct the operations. This is also serviceable to clear the ropes when they get fouled.

Some old theaters are equipped with a paint bridge running along the rear of the stage, from one fly-gallery to the other. This bridge was used to paint the large drops and borders, but has gone into discard as large drops are old fashioned since

(Continued on Page 453)

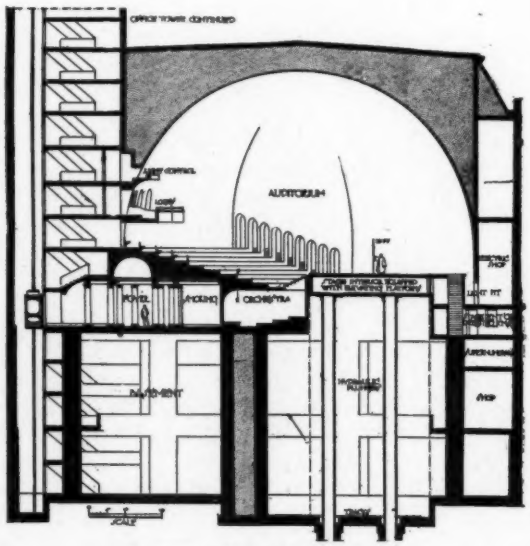


Fig. 8B. A Proposed New Theater
By Norman-Bel Geddes

·EDITORIAL·COMMENT·

LEONARD P. AYRES, vice-president of the Cleveland Trust Company, has prepared, and his company has issued, a somewhat unusual pamphlet discussing the prospects for building construction in American cities. It is the work of a foresighted and finely trained financier. The perusal of this important pamphlet by architects would result in the formation of a sound appreciation of building conditions based on an absolutely unassailable premise.

The accumulated shortage of buildings since 1914 is enormous. Mr. Ayres set out first to ascertain as accurately as possible the amount of that shortage.

There are no official statistics filed in this country to show the amount of building in progress. Inasmuch as the building industry is the second largest in the United States, these conditions are as deplorable as they are remarkable. While building permit figures are only relatively trustworthy indications of the amount of building going forward, such figures probably understate the cost of buildings actually completed; yet, in the long run, they bear an approximately steady and reliable relationship to actual costs. As a basis for calculation, Mr. Ayres has compiled the amounts of the building permits granted in fifty cities during the past 22 years. Using these figures, an attempt is made to estimate what the volume of new construction would probably have been if the war had not occurred.

Reviewing the field of new construction, that is, work actually undertaken in the six years covering the war period from 1916 through to 1921, and the amount that probably would have been begun if the war had not intervened, Mr. Ayres comments that the total is so great that it is equal to 2.44 times the estimated normal construction in 1921. The existing building shortage in the fifty cities whose building permits were taken as a basis for these calculations, is so large that the writer estimates that building could continue at about 25 per cent above its normal activity for a period of at least ten years before it would entirely make up this deficit. Further, it is learned from careful compilations that to make up the deficit in these fifty cities would apparently require the enormous number of 1,256,000 building operations, of which 703,000 would call for the erection of new structures, and the remaining 553,000 for additions and alterations.

Mr. Ayres' research into the annual cost of building construction since 1840 leads him to an expression of the belief that the relative increase and succeeding drop in building costs at the time of the Civil War, were similar to the corresponding price movements during and after the World War, but that the latter was somewhat more violent.

An interesting table of shortages in the individual cities is set down and the years of shortage have been accurately tabulated. For example, we learn that in Chicago, Denver, Louisville, New Haven, Portland, Rochester, Seattle and Syracuse, the years of shortage exceed three, while in but three cities have building operations kept pace with the necessities of the community, and the shortage in those cities has been found to be less than one year.

In concluding this somewhat remarkable summary of building conditions, Mr. Ayres states as follows:

"It is certain that the building industry will not operate steadily during the coming decade at a rate that is 25 per cent above its normal, for that is not the way in which new construction comes into existence. It will have its periods of great activity, as it is now having one in 1922, and it will have dull periods at times when building costs are too high, and at times when business is depressed. It is highly probable, however, that the industry will feel the stimulus of the accumulated shortage for several years to come, and perhaps for as much as ten years.

"If we accept it as reasonably well demonstrated that there existed in these fifty cities at the end of 1921 a shortage of building construction approximately equal to the amount that would have been normally completed in about two and a half years, we can estimate from the records of actual construction about how many and what sorts of buildings would have to be erected to wipe out the deficit.

"From the building records of these cities for 1920 and 1921 figures have been compiled showing the different kinds of buildings constructed in these years. By using these figures and assuming that to make up the existing shortage would require more building of substantially the same sort, a rough estimate of the amount of construction still needed becomes possible.

"There are two comments that may well be added concerning the material that has been discussed in this report. The first is that not all of any shortage such as those now existing in building construction in our cities, has to be made up. Part of these shortages has already been made up through using old buildings longer than they would have been used if there had been no war. Such use is like the extra use that we may have given a pair of shoes or a suit of clothes during the war period. After we had made these garments last a year longer than was normal, we had taken from them a certain amount of service that was a permanent gain and that did not have to be made up.

On the other hand, the fact that we had worn them for more than the regular length of time brought us into the market after the war with an insistent demand that could not well be longer postponed. It seems probable that if due allowance were made for the extended use of buildings that would under ordinary circumstances have been replaced some years ago, the estimates of this report would not be greatly changed."

During the past eighteen months the Cleveland Trust Company has published a series of economic reports of most unusual value. None of them, however, will be of greater value to the architect than this present one on the Prospects for Building Construction in American Cities, and we strongly urge the architectural reader to familiarize himself with the reliable arguments, backed up by equally reliable figures, set down in this publication.

* * *

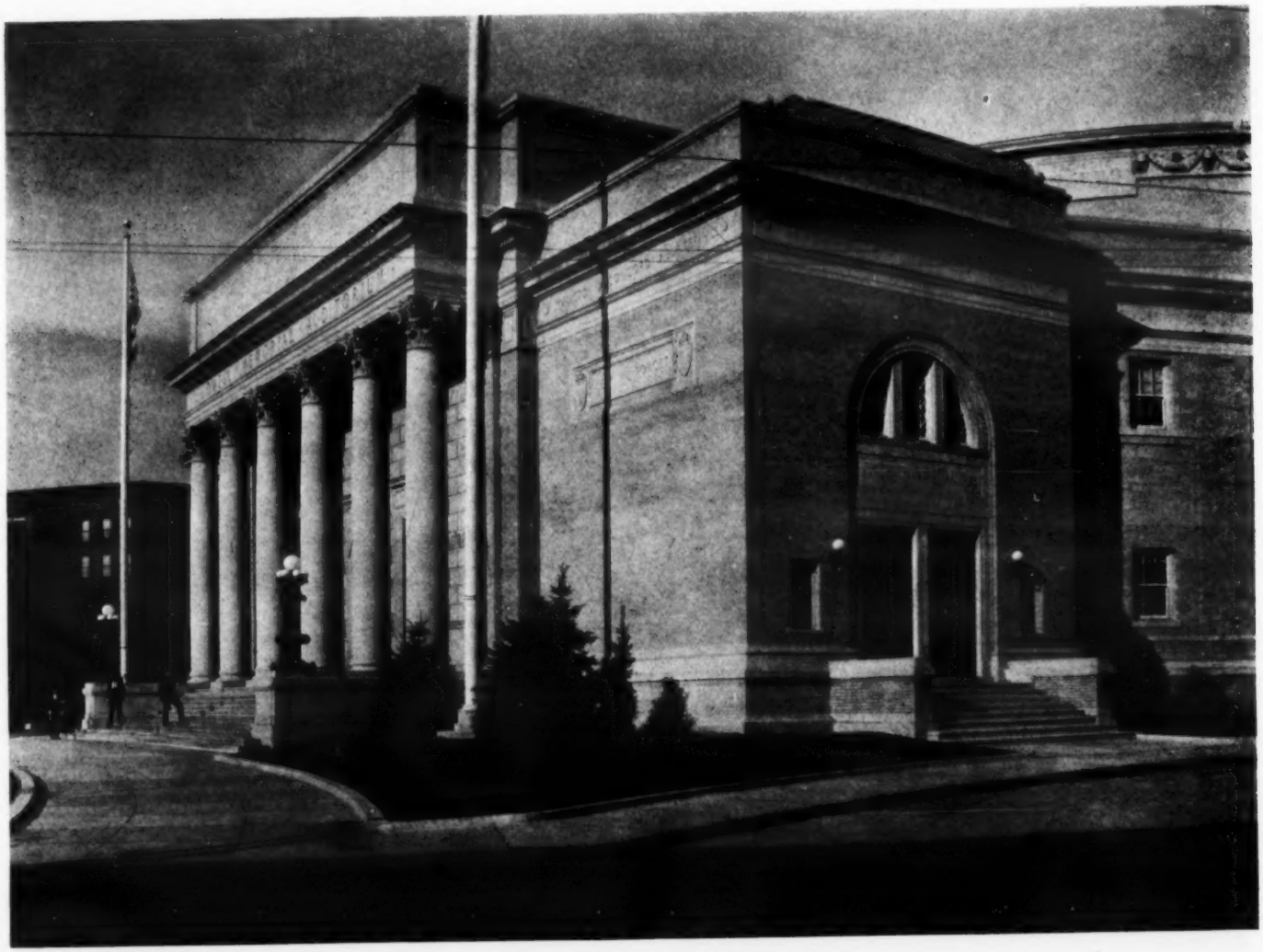
IN DISCUSSING the problems of the day with a friend who contemplated building, an architect touched upon the shortage of skilled building artizans and the serious situation developed because of lack of apprentices. His friend was surprised because in his line of work, the making of robes for wealthy people, there was experienced the same trouble. Work today is done so rapidly that foremen cannot afford to give time to train apprentices. Special training courses with free tuition do not attract students, who have a feeling that such generosity on the part of an employer is more apparent than real and that he must be receiving present benefit from the work they do while learning.

Consequently the students demand pay equal to that of ordinary unskilled labor. A lamentably small number complete the course of training, the shortage of skilled workers leading other men in the same line of work to offer them good pay when they have barely shown their fitness for the work. The untrained and partly trained worker today receives far too much pay compared with that received by fully trained workers. The words "skilled" and "unskilled" should no longer be used, for in these days of machinery much of the work done by poorly trained workers requires a great deal of skill. This condition obtains throughout the United States in every line of industry and shortly will result in the almost complete disappearance of adequately trained workers unless proper remedial steps are taken.

The key is found in the desire to earn and the unwillingness of young people of the classes from which industrial workers are drawn, to give up to learning the time they can give to earning. There exists an insatiable demand for workers who can perform simple tasks. The young entrants are sacrificed to this demand and, awakening later to the knowledge of lost opportunities, become discontented protestants against the established order of things in general. The time to train for skilled avocations is during the school years embraced in the two upper grades of grammar school and the first and second year of high school. Every child in the public schools should be compelled to study some trade for a period of four years, regardless of the ambitions or financial status of the parents. In these years all underlying principles may be taught and tasks well within the limit of strength of the students be undertaken. Such training will not limit the opportunities to succeed, as has been stated by unwise opponents of compulsory trade instruction. It will, on the contrary reduce the number of helpless, untrained victims of the greed for gain and wonderfully widen the horizon of those whose home environment is narrow and sordid. Since the old style apprentice has no place in modern industrial organization, the public schools must supply all trades with beginners possessing a basic knowledge of the work and so much dexterity that they will require not instruction, but a minimum of friendly supervision on the part of older and experienced workers in the trades they elect to enter. Opportunity, after all, is one-half of life.

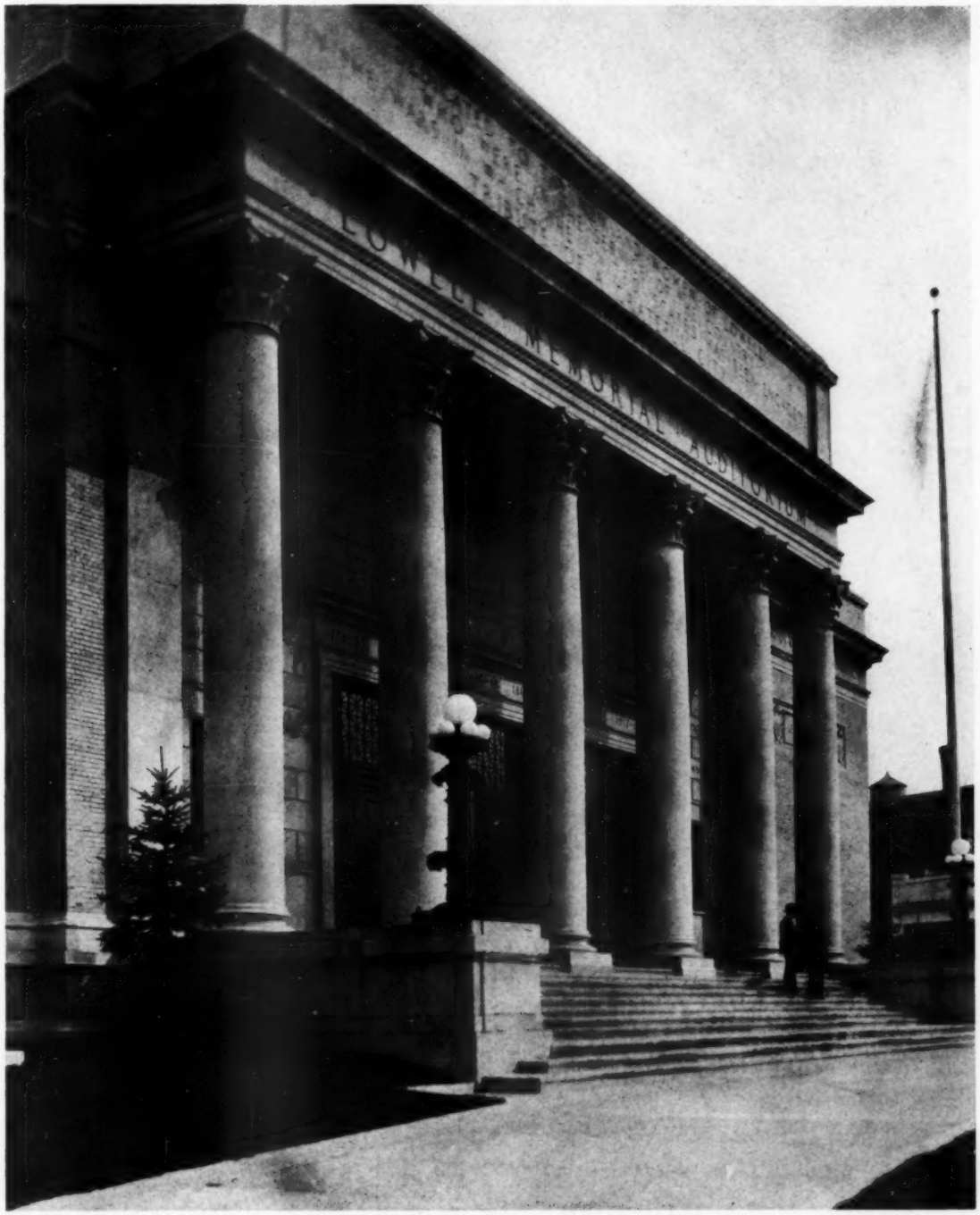
MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS



MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

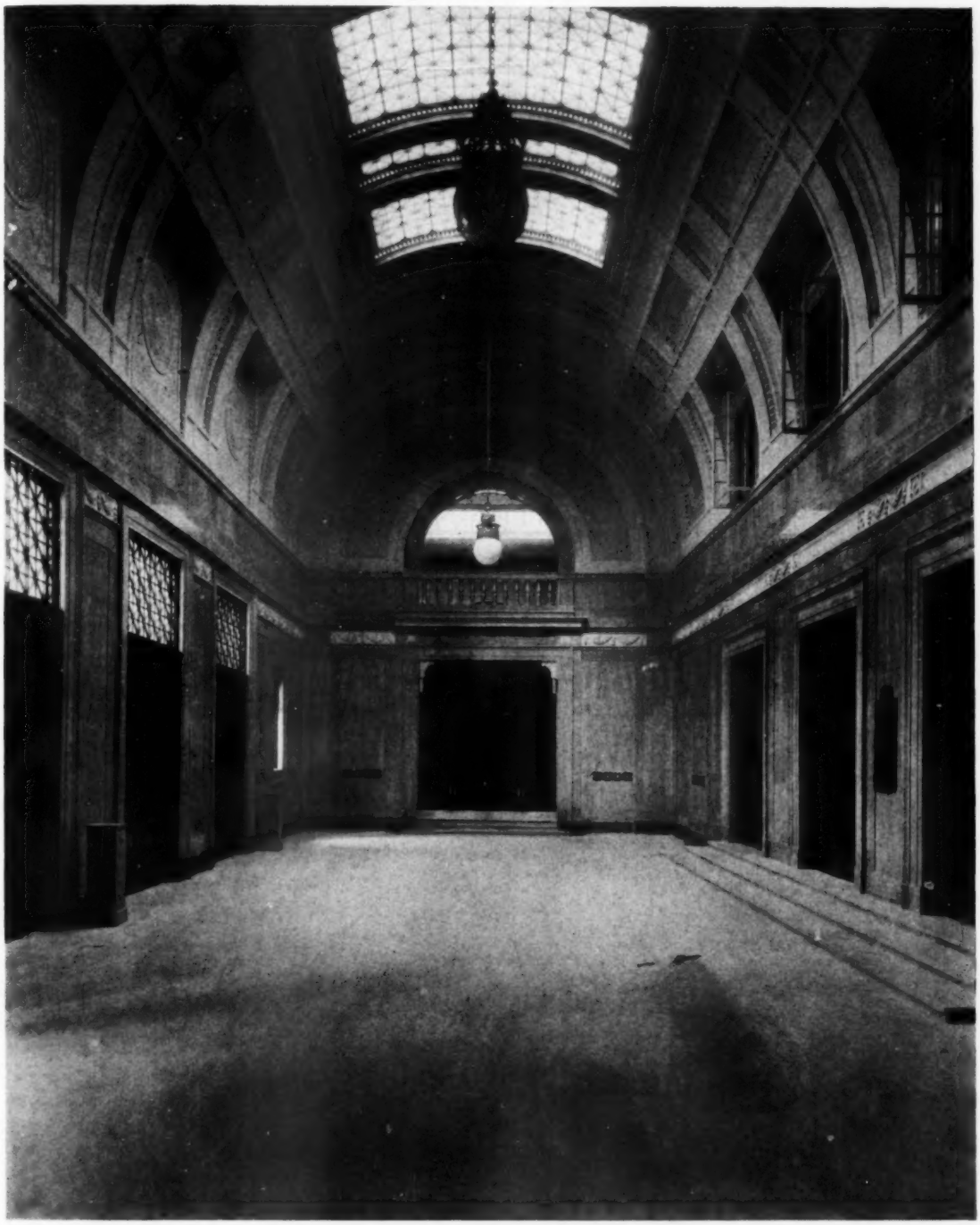


MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

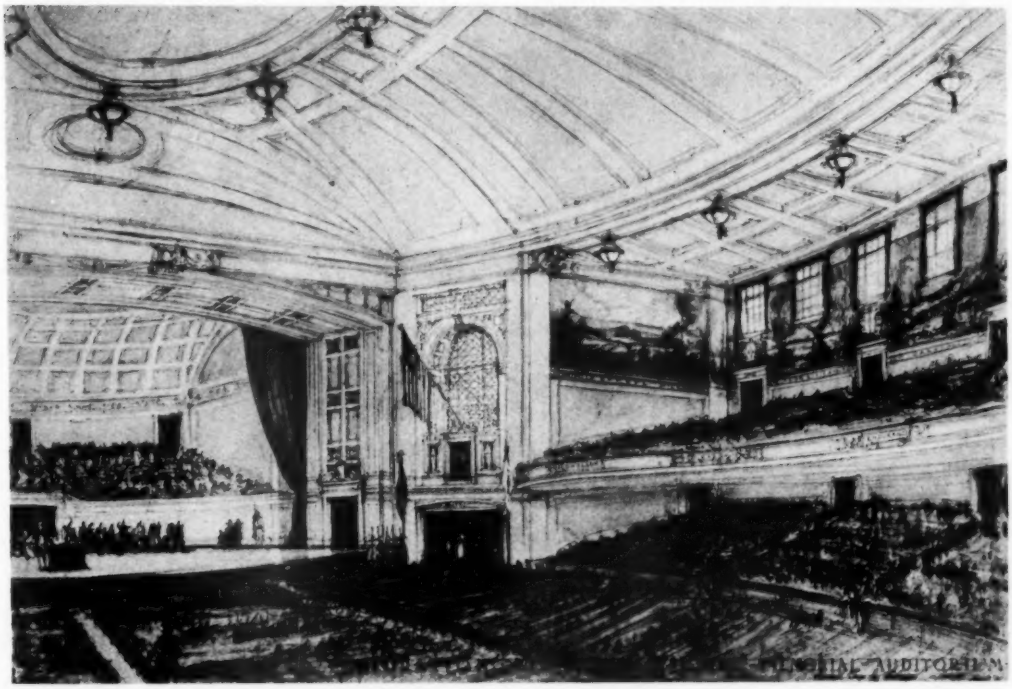


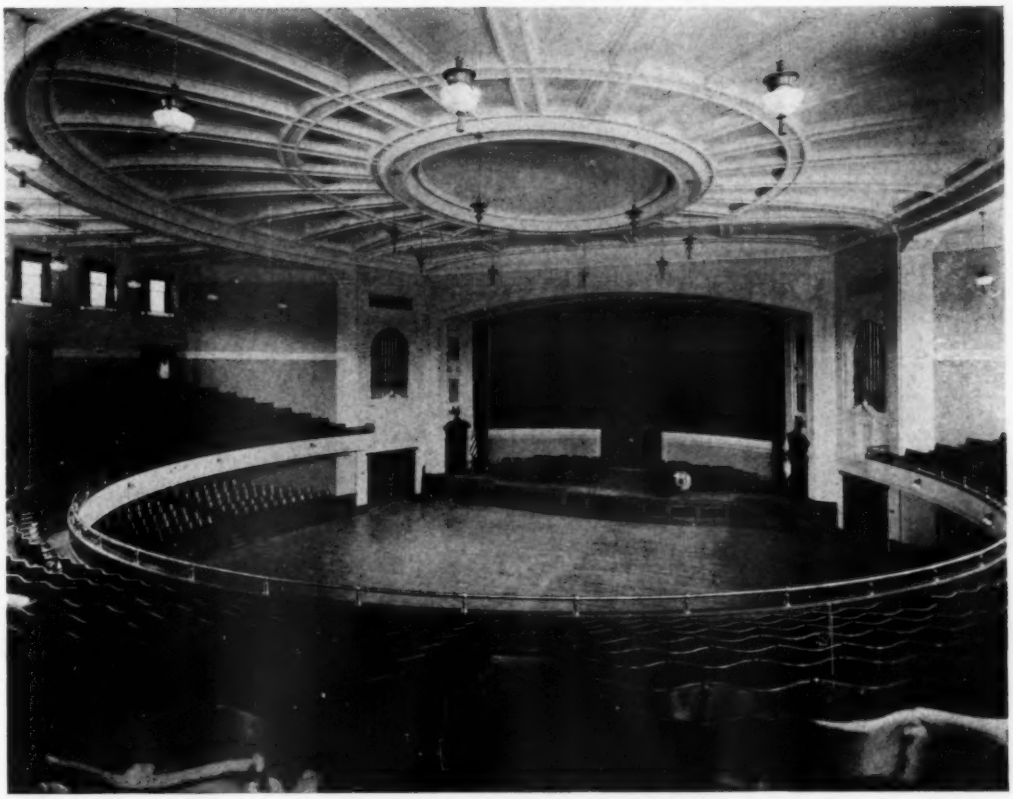
MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

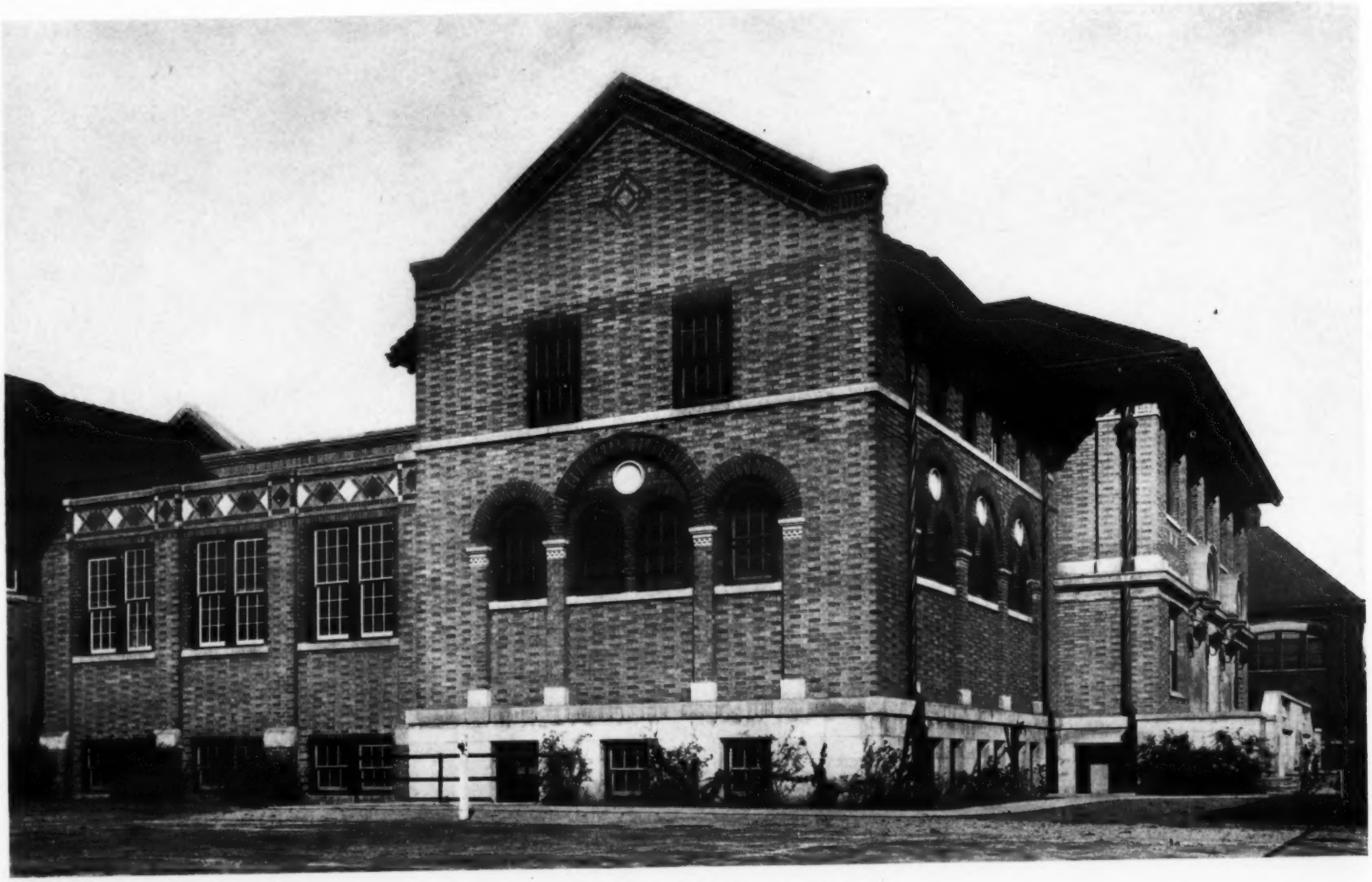




Above: Architects' Study of the Interior, Showing Proposed decorative treatment, which Includes a Battle Frieze carried entirely around the Building above the gallery doors and between the windows
Below: The auditorium with seats removed to provide danc ing space

MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS



PROCTOR RECREATION CENTER, PEORIA, ILL.

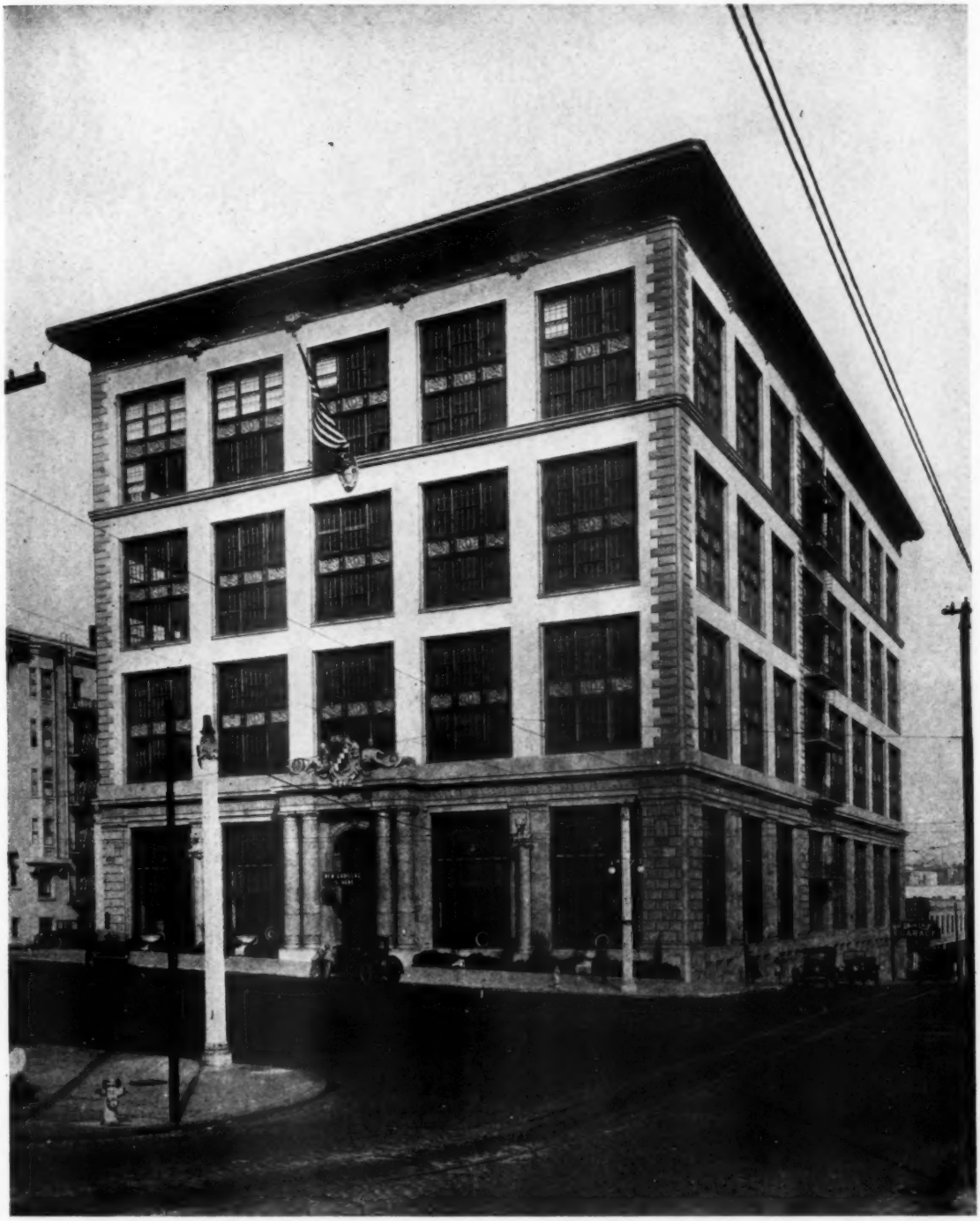
HEWITT & EMERSON, ARCHITECTS

PROCTOR RECREATION CENTER, PEORIA, ILL.

HEWITT & EMERSON, ARCHITECTS

LAURA NELSON JOBST MEMORIAL PLAYGROUND, PEORIA, ILL.

HEWITT & EMERSON, ARCHITECTS

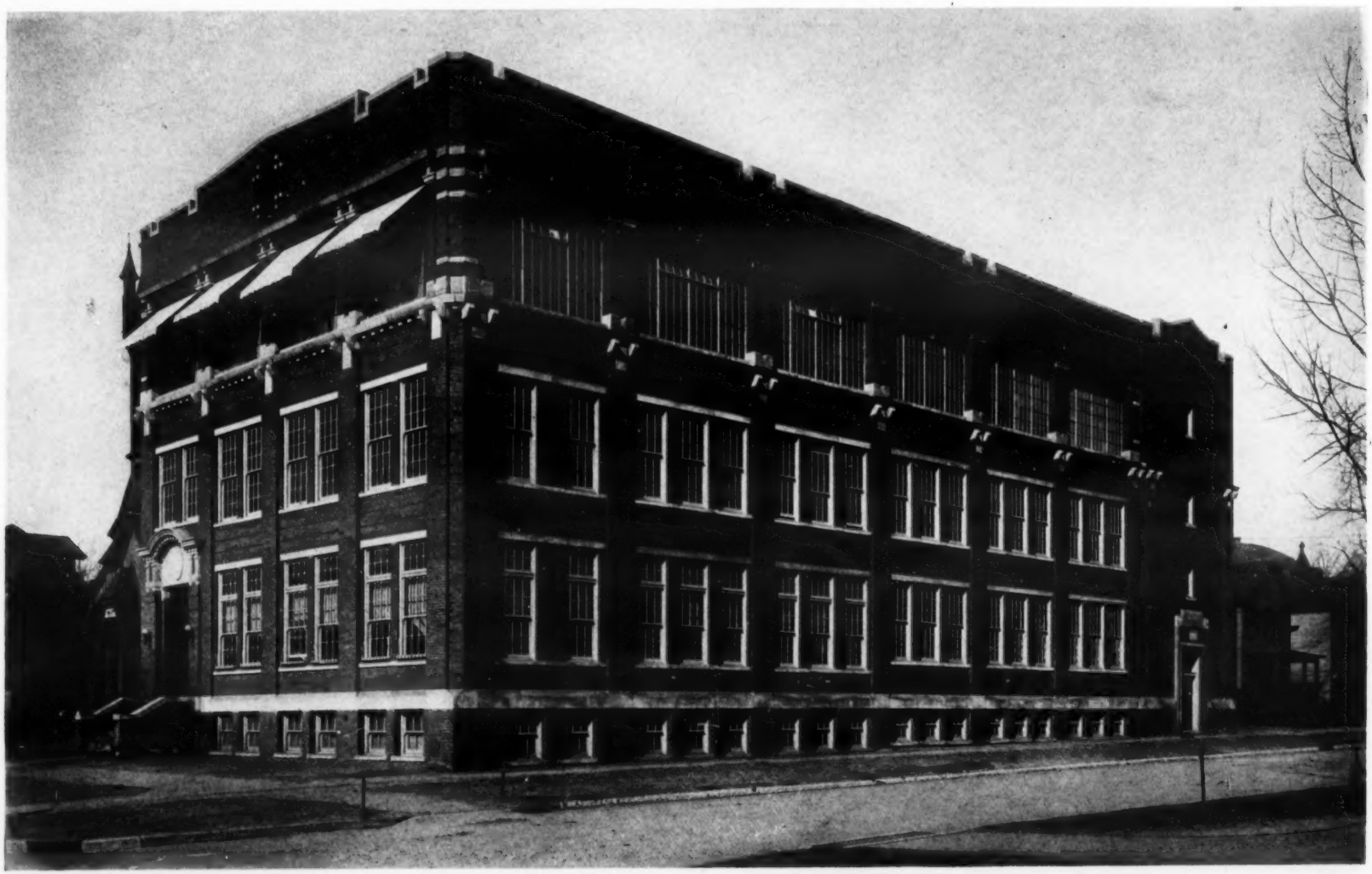


DON LEE MOTOR SALESROOM, SAN FRANCISCO, CAL.

CHARLES PETER WEEKS, ARCHITECT

DON LEE MOTOR SALESROOM, SAN FRANCISCO, CAL.

CHARLES PETER WEEKS, ARCHITECT

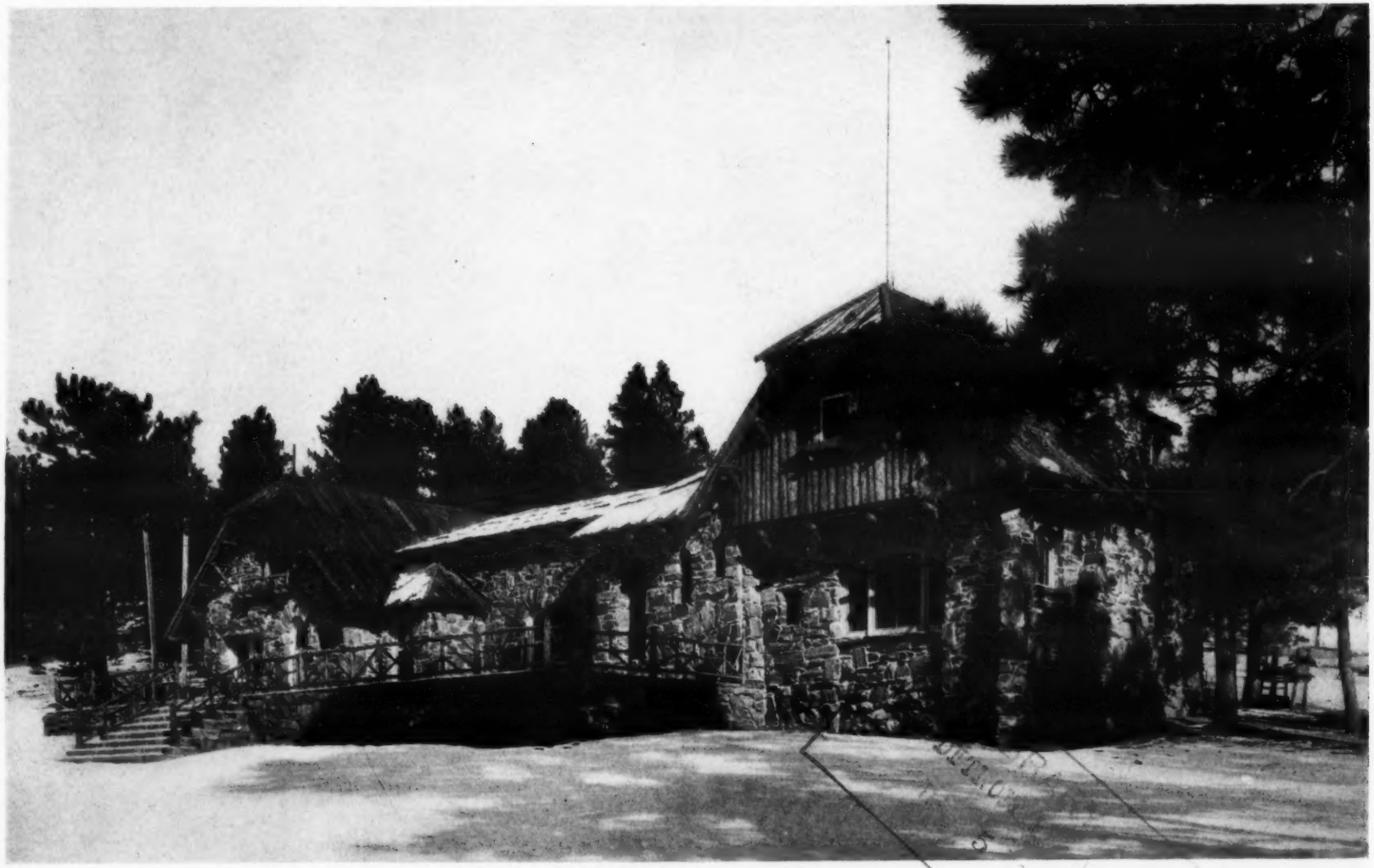


BUILDING FOR FRANK P. LEWIS CIGAR CO., PEORIA, ILL.

HEWITT & EMERSON, ARCHITECTS

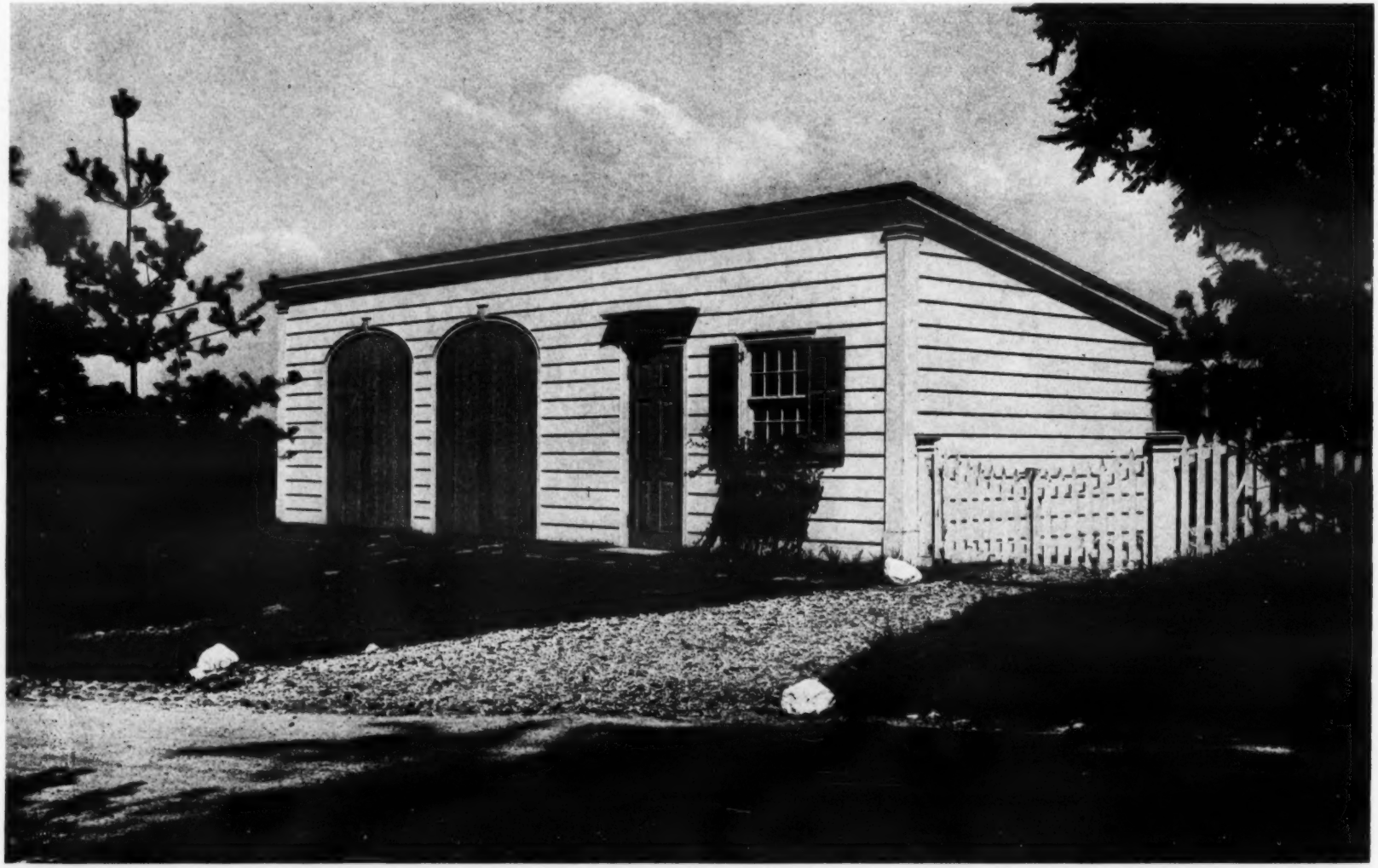
MOUNTAIN LODGE FOR MRS. A. B. PHELAN, ROCKY MOUNTAINS, COL.

J. B. BENEDICT, ARCHITECT



HOSA LODGE, DENVER MOUNTAIN PARKS, ROCKY MOUNTAINS, COL.

J. B. BENEDICT, ARCHITECT



SERVICE BUILDING ON ESTATE OF RICHARD ROWLAND, ESQ., RYE, N. Y.

DWIGHT JAMES BAUM, ARCHITECT

Design and Construction of Theaters

(Continued from Page 450)

the introduction of the horizont and the architectural sets. What few drops are painted may be done in the scene dock, on the floor, or in some professional scene-painter's shop. The stage bridge remains only as an encumbrance. Smaller bridges were sometimes installed in the larger theaters, directly behind the proscenium wall and through the ropes. These bridges were used to clear fouled lines and to mount spot, flood or border lights. The tendency today is to clear the loft of these encumbrances.

The *gridiron,* or rigging-loft in stage parlance, is a platform of steel grating fastened to a 6″ or 8″ channel or I-beam framing which is hung from the roof framing, and anchored into the rear wall. This floor should be more than twice the height of the proscenium opening above the stage (6′ more is sufficient). Over the playing portion of the stage, in "full," there are slots in the gridiron 10″ wide (the width depends on the type of loft-block), running the entire depth of the stage perpendicular to the curtain line. These slots are usually 7′ apart and the number of ropes (3, 4 or more rope system) depends upon the width of the proscenium opening and the size of the stage.

The loft-blocks which contain the sheaves over which these ropes pass are bolted, either to the gridiron, or to the roof above. The latter is the better scheme as the floor of the gridiron is then clear enough to enable the stage hands to walk around, whereas when the loft-blocks are bolted to the floor the gridiron is completely covered with a mass of ropes.

The head-block, situated directly above the pin-rail, guides the sets of ropes from the loft-blocks to the pin-rail. It is usually framed of two 18″ I-beams. (See detail)

In some of the newer vaudeville theaters here in America the head-block is placed back against the side wall, the fly-galleries are eliminated altogether and the pin-rail is situated down on the stage, a few feet from the wall. This is possible because vaudeville theaters rarely require anything more than the standard olios or conventional drops, and never have the box sets. The rope system is then reduced to its simplest operation, merely of raising or lowering flat drops. Of

Fig. 9. Foyer, Little Theater, New York
H. C. Ingalls and F. Burrall Hoffman, Jr., Architects

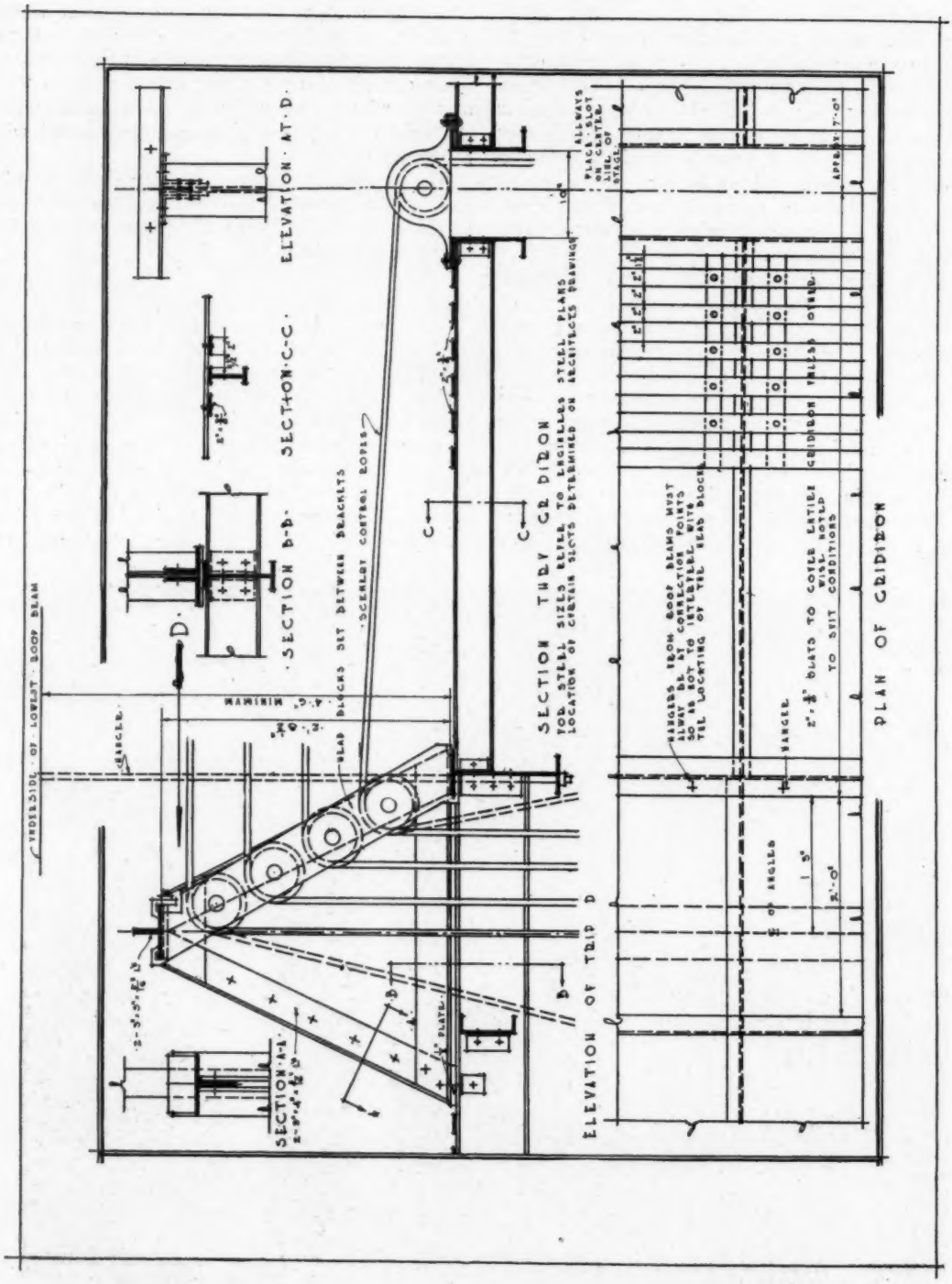


Fig. 10. Detail of Head Block and Rope Slots

course, this has no connection with the theater, especially with the new stagecraft. The author, in fact, finds himself in the position of explaining and describing mechanics and methods which he considers out of date. To expand upon the design and usage of the fly-gallery, pin-rail, rigging-loft and everything else related to the rope system of manipulating scenery from above is akin to growing warmly eloquent on the virtuosity of the kerosene lamp or the novels of Mrs. Humphrey Ward. The fact remains, however, that all the theaters today are built in this manner and most of the theaters in the future will be. When one first rate theater is built on Broadway the death knell of the old stage mechanics will be sounded in these United States. If a theater as well equipped backstage as the Dresden Court Theater, and provided with a wide auditorium, with no aisles and no balconies, but with a strongly raked floor, and accommodations for a thousand people, with an interior as beautiful as either Henry Miller's Theater or the Music Box, were built on Longacre Square and put into the hands of the Theater Guild—with their present ability to make money on the most artistic plays in the worst possible theaters—the commercial theater in America would receive a lasting shock. The Broadway stage, as we know it today, would fall into the dusty limbo which envelopes gas lighting and histrionic acting.

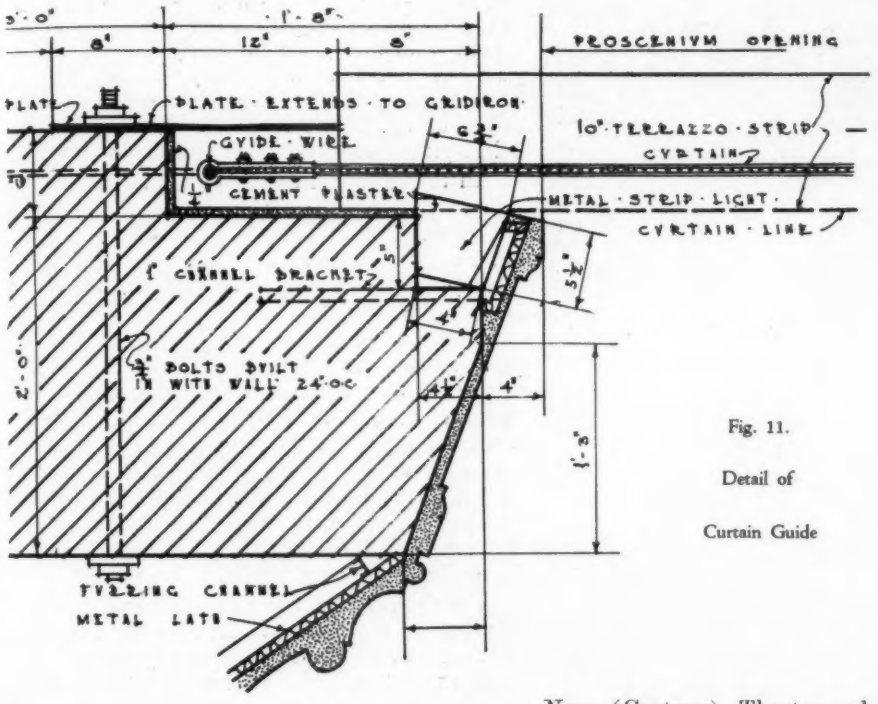


Fig. 11. Detail of Curtain Guide

The fire curtain is made of asbestos or steel. If of the former it is built on strong wire mesh. The latter curtain is better and stronger, but more expensive. The curtain is operated on either side of the stage, from the stage level or the flies, independently from the ropes or pin-rail. It is equipped with guide wires, a tension pulley to take up atmospheric changes, and fusible links so that it will drop automatically in case of fire. It was once law to build a strip of fireproof floor directly below the curtain but today the custom is to build the stage apron of fireproof construction and to finish the floor of wood. (See curtain guide detail)

The typical counterweight is like that of an elevator, a counterweight running down a slot built up of angle-irons, and operated either by hand or electric power. An ingenious device was invented by Claude Hagen, a well known American stage expert, for the New (Century) Theater, whereby the weights were buckets automatically fed or emptied from or into reservoirs, by lead shot. One reservoir was located in the loft and the other below the stage and any piece was automatically counterweighted by the mere manipulation of a lever. With the simple rope system the pieces are counterweighted by means of sandbags which the stagehands splice to the ropes.

The roof is built just high enough above the gridiron to allow ample working space, about 7′ clear. The gridiron is supported from the roof framing. The roof is pierced directly over the center of the stage to admit a large skylight (a misnomer in this case as light is not desirable on a stage, and the glass should either not be translucent, or should be painted black), at least one-tenth of the total floor area of the stage. This skylight must be equipped with wire glass which will easily shatter in case of fire. The skylight should be equipped with vents operated from the stage level and equipped with fusible links. Fully one-half of the appalling theater disasters might have been avoided, or at least materially lessened, if the stages had been equipped with these

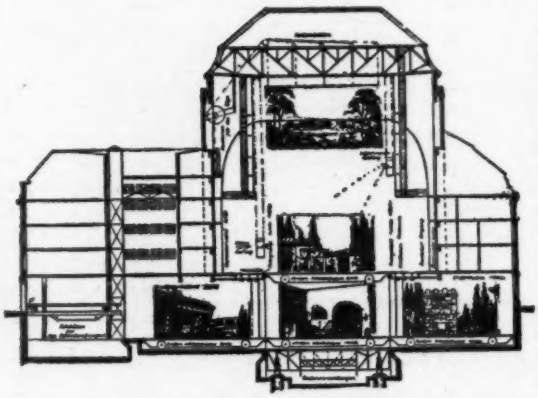


Fig. 12. A. The Sliding and Sinking Stage

A section through the Royal Court Theater in Dresden. The drawing shows at the top a backdrop suspended from the gridiron in the ordinary fashion. In the basement are three other settings waiting for the stage to be lowered, the used scene slid off, and one of three moved into its place, and raised to the stage level, occupied in the drawing by an exterior setting. The front edge of the dome is indicated by the curving line

(From The Theater of Tomorrow, by Kenneth Macgowan)

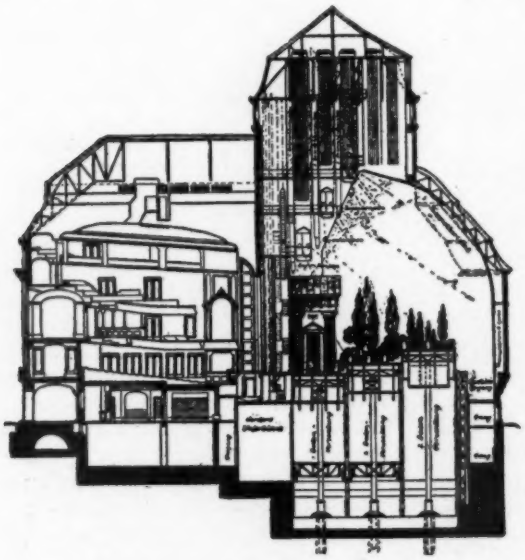


Fig. 12. B. The Sliding and Sinking Stage

A section through the Royal Court Theater showing the three lengthwise divisions of the stage raised to different levels to represent terraces

(From The Theater of Tomorrow, by Kenneth Macgowan)

skylights in working order. Every stage should be equipped with an excellent sprinkler system as more than fifty per cent of theater fires originate on the stage.

(To be Continued)

New York Leads as "Hotel City"

DESPITE the importance of New York's hotels in the life of the city, it is announced that a census of their capacity has been only recently made. It is often difficult to draw a line of distinction between hotels and residential apartment hotels and even boarding houses. The figures prepared are conservative and doubtless understate New York's equipment in this respect. It is estimated that there are 284 hotels in New York which may be definitely classed as such. This does not include many hotels or lodging houses along the waterfronts, nor a considerable class of apartment houses, accommodating transient guests, and no boarding houses of any kind.

In this group of hotels 60,000 rooms are available. Combined accommodations are estimated at 110,000. The next city in point of hotel accommodations is San Francisco, with one-half this capacity. The third city is Chicago, with but 40 per cent of the hotel accommodations of New York.

New York, as might be expected, has by far the greatest number of large hotels. Of the 284 listed 18 have 450 rooms and up. There are 64 hotels with from 200 to 450 rooms each. The most common type of hotel is of the class containing from 50 to 200 rooms, of which there are 120. There are 43 hotels with from 25 to 50 rooms each. No account has been taken of hotels with less than 25 rooms. There are many of these hotels, and their combined capacity is considerable.

The demand for hotels of different types varies throughout the country. In San Francisco there are but four hotels of the largest type, having 450 rooms or more. The hotel with from 50 to 200 rooms apparently is the most popular there, the total in that class being 99, which compares favorably with New York's 120. Chicago, although below the Pacific Coast city in the number of its hotels, has twice as many large hotels and less than one-half as many of the smaller type. Los Angeles, with a population greater than San Francisco, has but 89 hotels of all classes. After New York, San Francisco and Chicago come Los Angeles, Kansas City, Seattle and Denver. One looks in vain for the cities of the East near the head of the column. Next in turn come Detroit, St. Louis and Washington; after these Boston with 59 hotels of all kinds and Philadelphia with 53.

The largest hotels are widely scattered. There are upward of 100 hotels with more than 450 rooms. New York easily leads in the number of residential apartment hotels, having 41 to Chicago's 14 and Kansas City's 12.

MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, Architects

See Plate Section for Illustrations

THE Lowell Memorial Auditorium was created by an act of legislature authorizing the City of Lowell to borrow $1,000,000 for a building to be erected in memory of the men and women who had served the country in the various wars of the Union. It is located on a triangular site, with the Concord River on one side, a broad street on the other and a large parking space and street in the rear. The central feature is the large audience hall which seats 4,000 people. It has rather unusual facilities for a great variety of purposes, as it was intended that this building should be a social center as well as affording halls of audience, consequently the main floor of the auditorium is level and is placed directly on the ground, so that this level space when cleared of seats can be used for dances or other social purposes, or for exhibitions of heavy machinery, or for banquets, the service of food being from an ample kitchen and service suite in the basement at the rear, access to the hall being from either side of the proscenium through large doors immediately in front of the stage. Also it was intended that this hall should be suitable for reviews of military bodies. A large door at the rear gives access to the encircling corridor, and it was planned that a body of troops could march in at the rear door in columns of four, entering the hall at the left of the stage, passing in front of the stage and out the door at the right, passing out of the building through one side of the large rear archway. Also it was intended to make possible large concerts of choral societies, and in the portion of the hall behind the stage is a large amphitheatre containing several hundred seats with separate entrances and exits from the rear, but all connected to the encircling corridors, this gallery being designed for choruses, and also being suitable for graduation exercises from the public schools. On the parquet there is a dress circle surrounding the level portion of the floor. These dress circle seats are on an incline and above them is a circular gallery carried out to the line of the level part of the parquet so the hall has a very open, ample effect while accommodating a large audience.

Inasmuch as most of the functions of this hall would be of a semi-public nature, it was easy to arrange ample exits in every direction, and also to give a degree of openness in the encircling corridors which would permit of emptying the hall in about one minute. The aisles are numerous and broad, there are no sharp gradients anywhere, and the comfort and safety in handling a crowd have been chiefly considered. Two large reception rooms with ante-rooms are provided at the rear of the stage under the gallery so that distinguished guests can be readily received and receptions held, as desired, previous to appearing on the stage. To provide a certain amount of possibility for concerts, or even for cantatas, etc., a certain number of dressing rooms are provided at the rear but it was not found expedient nor desirable to attempt anything like a stage setting. The stage itself is quite large, being nearly 30 feet deep in the center, but it is quite flexible by reason of two curtains, one of which draws straight across midway the depth of the stage, leaving ample room in front for lectures or for a few assistants only on the platform, while another curtain can be drawn across the front of the rear balcony so as to leave the whole stage uncovered but to cut off the seats at the rear in case they are not required. This latter curtain works on a curved track following the line of the rear seats.

The triangular lot lent itself to corners at each level which were utilized for very commodious check rooms, there being something like 2000 hooks available for public purposes.

The auditorium is preceded by what is designated as a Hall of Trophies. This is built with walls of Napoleon gray marble carried the full height and supporting an arched ceiling. It is the intention to hang this with flags on all sides in the style of Henry VII chapel in Westminster.

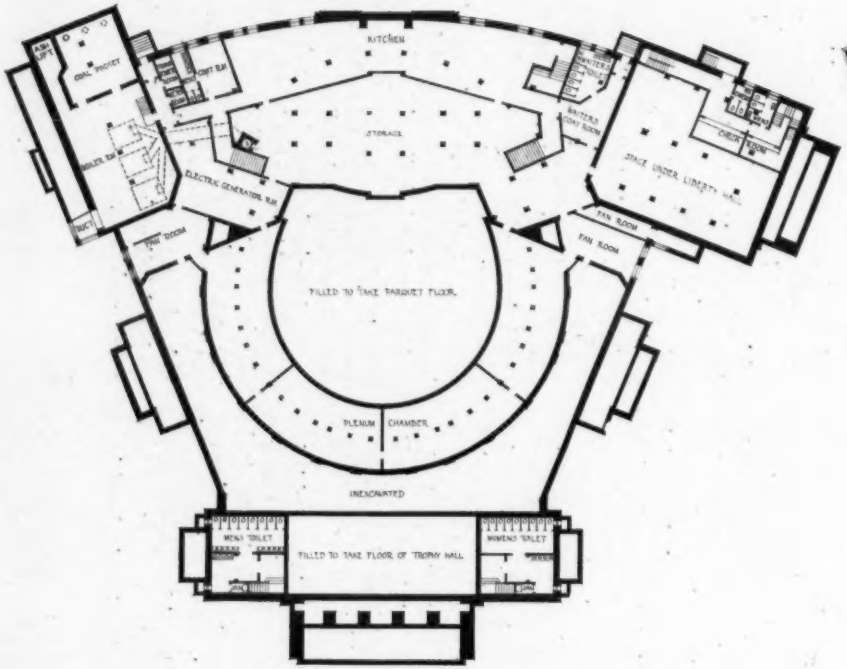
A small hall known as Liberty Hall has been provided at the rear with an entrance from the main street. This hall seats about 800 and has one balcony. On the opposite side facing the river is a wing in three stories in which are housed the veteran associations, the small hall seating about 200 being used by the American Legion in the upper story.

Both of the halls are equipped with a full moving picture apparatus and curtains.

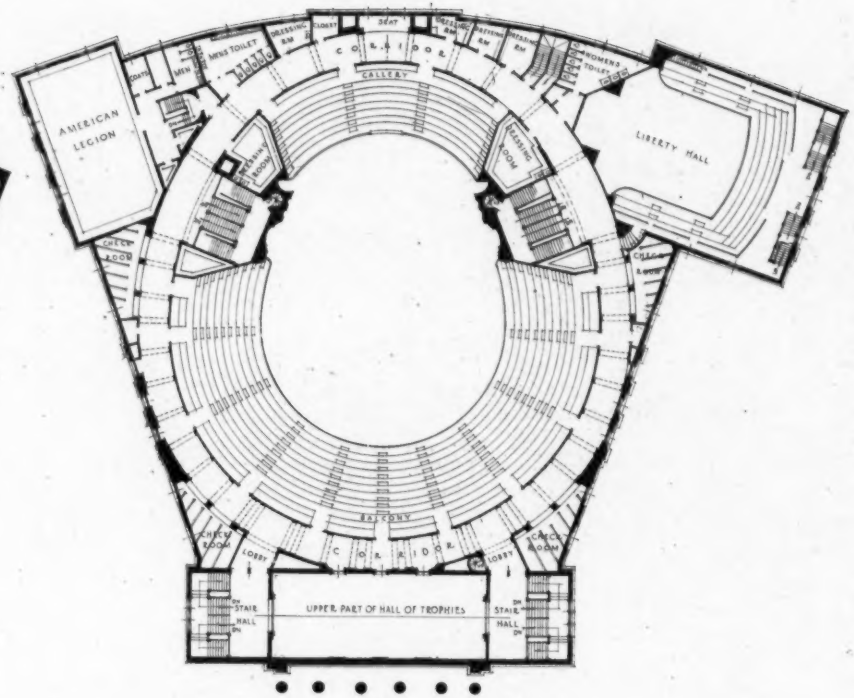
The exterior is built with a base of granite, the main walls of pale buff brick and the cornices, columns, trimmings, etc., of cast stone of about the texture and color of Indiana limestone.

The interior is treated very simply, as the funds available did not permit of anything but the simplest treatment. The total cost of the building was a trifle under $1,000,000.

The building was erected by William Drapeau, a local contractor and the work was carried out under the direction of Blackall, Clapp & Whittemore, architects.



·BASEMENT · FLOOR · PLAN·

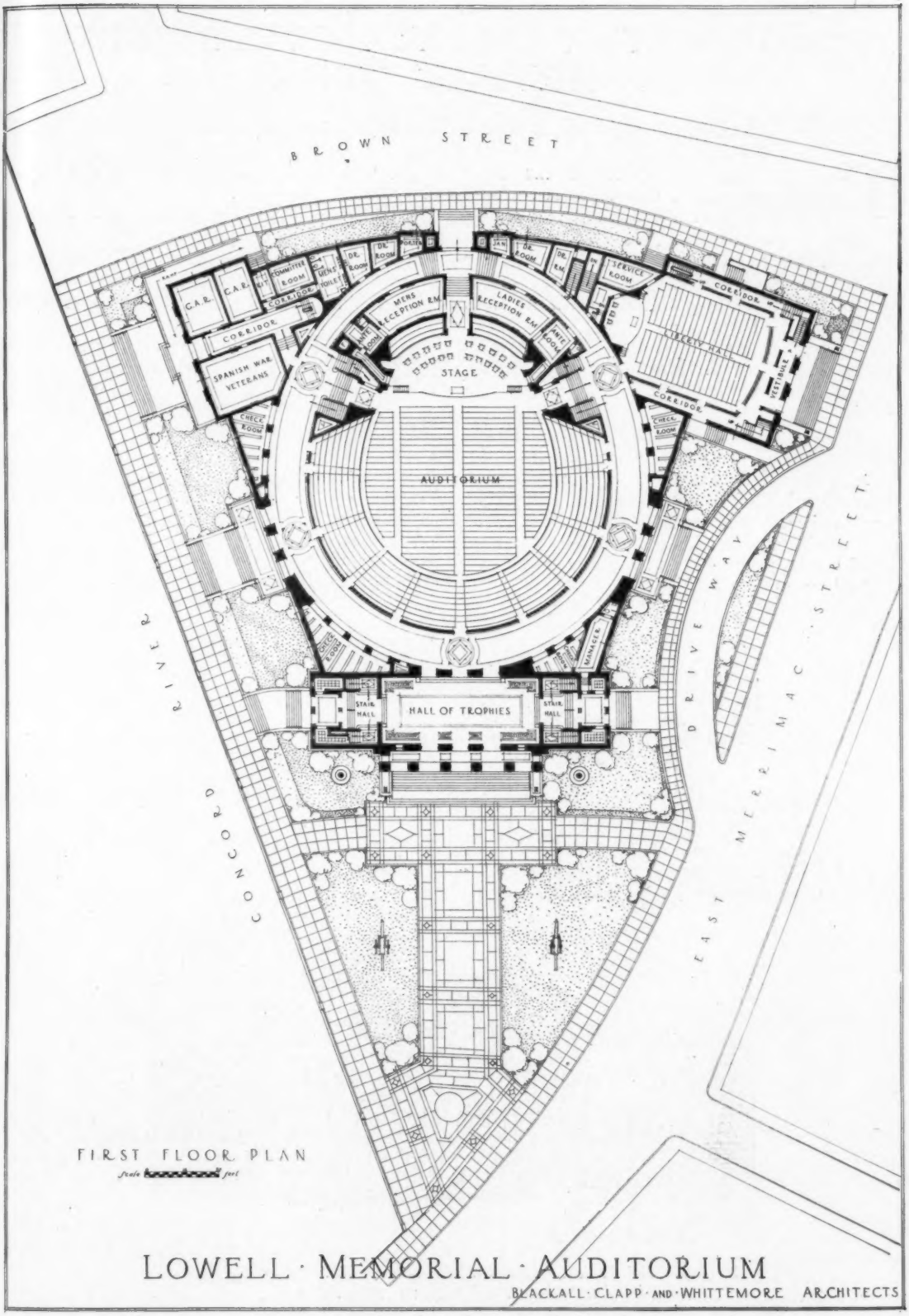


·BALCONY FLOOR PLAN·

MEMORIAL AUDITORIUM, LOWELL, MASS.

BLACKALL, CLAPP & WHITTEMORE, ARCHITECTS

(See Plate Section for other illustrations)



(See Plate Section for other Illustrations)

FIRST BAPTIST CHURCH COMPETITION, NASHVILLE, TENN.

BY P. E. BURROUGHS, Architectural Secretary, Baptist Sunday School Board

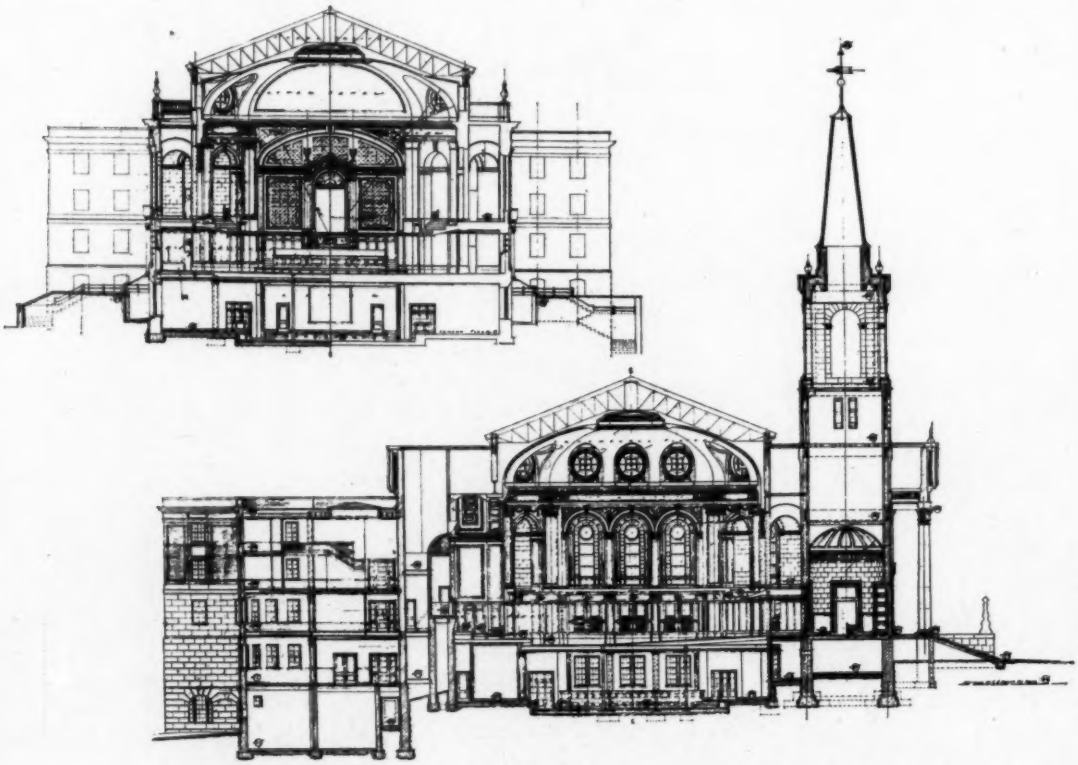
THE Building Committee of the First Baptist Church of Knoxville, Tenn., realizing their responsibilities and the many technical difficulties that beset them decided to hold a carefully regulated competition as the only safe method of securing a suitable design for their church, and the selection of a competent architect. Dr. Warren P. Laird, head of the Department of Architecture at the University of Pennsylvania was thereupon invited to act as architectural adviser to the Committee and to conduct the competition.

The Architectural Secretary of the Sunday School Board in co-operation with Professor Laird, prepared the program. Five architectural firms were invited to enter the competition. A jury of award, composed of disinterested architects were judges of this competition. They selected the designs presented by Messrs. Dougherty & Gardner, architects, Nashville, Tenn.

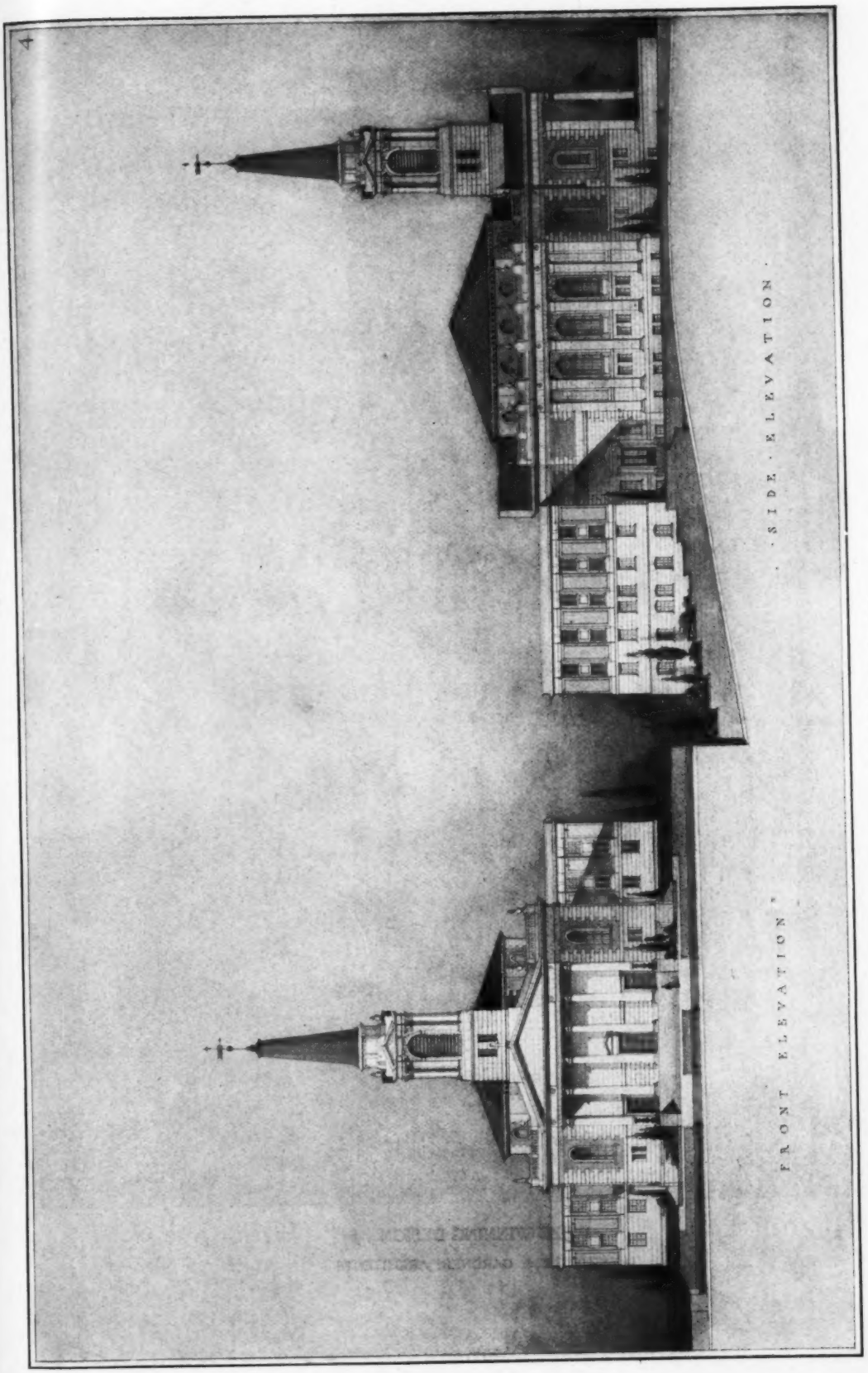
The building seeks to provide fully and impartially for the following:

Preaching and Congregational Worship
The Mid-week Prayer Service
Lectures, Musicales and other Entertainments
Training, as Sought in the Young People's Societies
Teaching, as Conducted in the Sunday School
Social Life in its Various Phases
Recreational Life
Executive Offices for Employed Workers

The octagonal auditorium is designed with the utmost care. It seeks to bring the audience as closely as possible about the speaker's platform. Features worthy of special note are: (1) The passages around the auditorium below and in the balcony, assuring good ventilation and a free circulation; (2) The spacious balcony extending in unbroken line around three sides of the auditor-



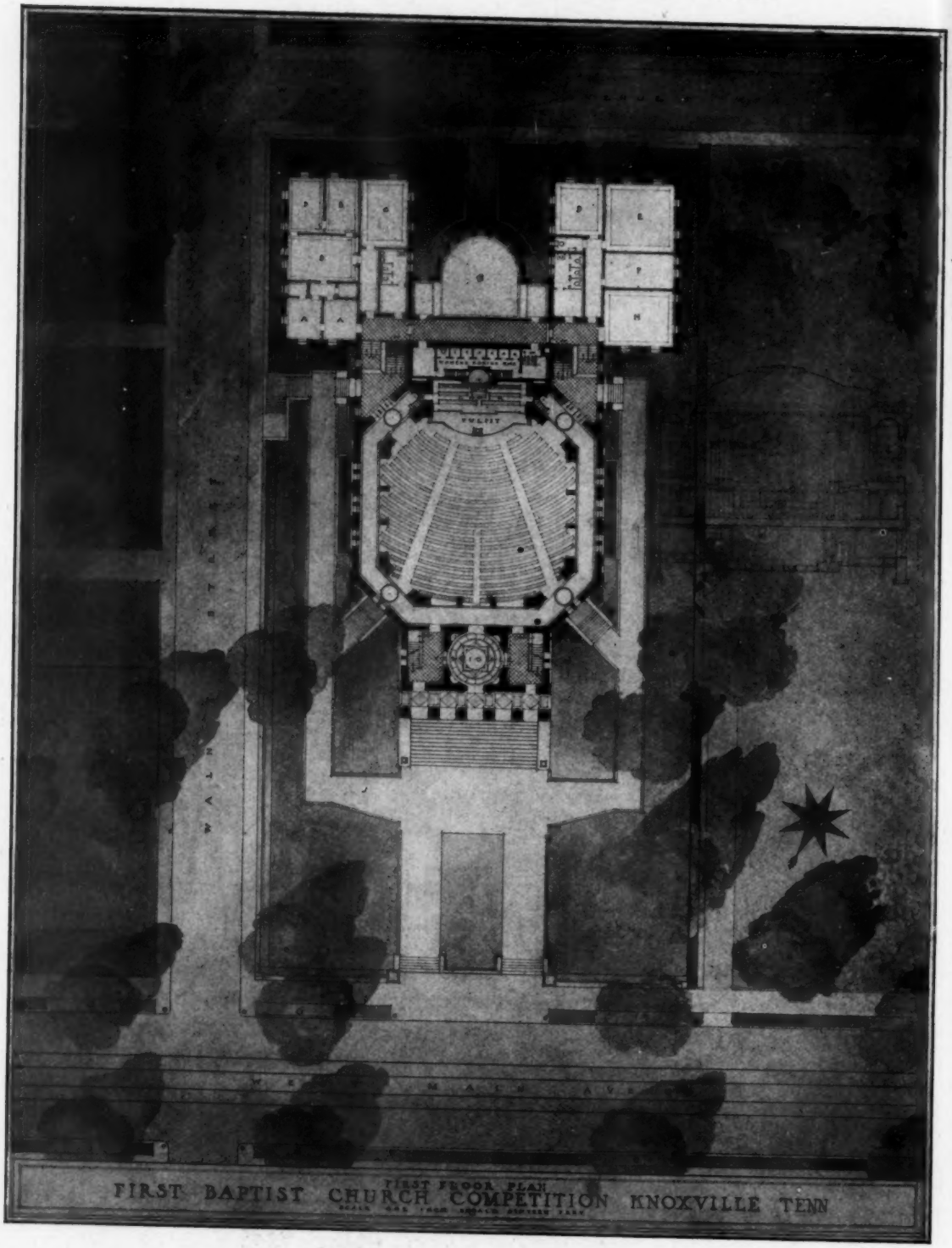
LONGITUDINAL AND CROSS SECTIONS, PRIZE WINNING DESIGN
DOUGHERTY & GARDNER, ARCHITECTS



PRIZE WINNING DESIGN

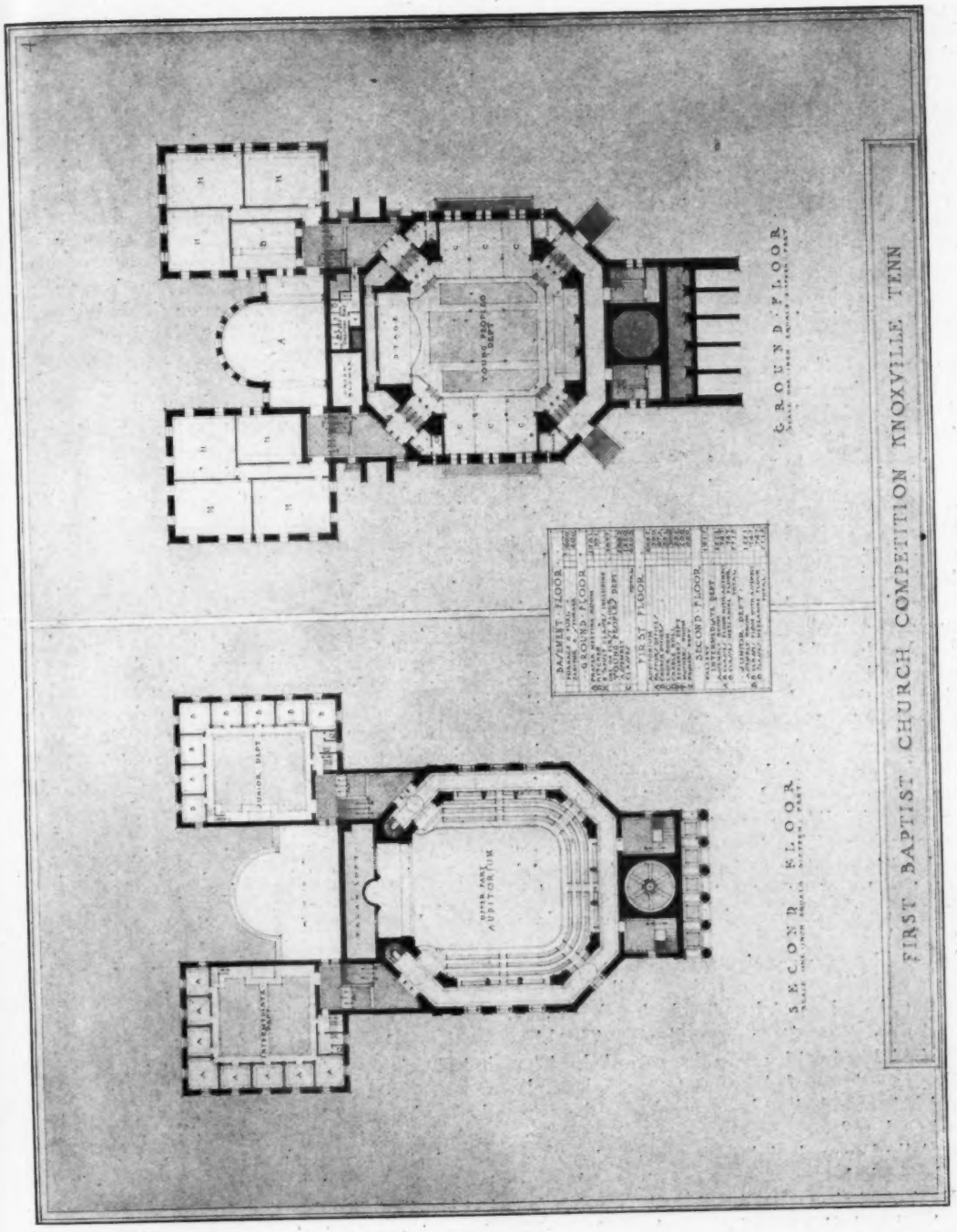
FIRST BAPTIST CHURCH COMPETITION, NASHVILLE, TENN.

DOUGHERTY & GARDNER, ARCHITECTS



PRIZE WINNING DESIGN

DOUGHERTY & GARDNER, ARCHITECTS



PRIZE WINNING DESIGN

DOUGHERTY & GARDNER, ARCHITECTS

ium; (3) The balcony stairs descending near the pulpit for evangelistic and other practical ends; (4) Provision for a chorus choir with baptistry elevated above in accordance with the most approved custom.

The building is designed to provide for a wide variety of social life. In the University of Tennessee, located only a few blocks away, are large numbers of young men and women. For these, as well as for the young people of its own community, the church plans to minister largely to social needs. The Adult Class rooms on the ground floor and the large class room on the main floor above will be fitted as parlors for use during week days. It will be observed that four of these large rooms are adjacent to the kitchen. The great room designed for the Young People's Department will seat in banquet fashion 400 people. The Boy Scouts will meet in the Intermediate Department, and the Elementary Departments will find various rooms for play and recreation.

The slope of the lot downward in the rear is especially fortunate; this makes possible the giving of a complete floor to recreational provisions. The gymnasium and the swimming pool are directly accessible from two streets. This section of the building can easily be separated from other sections by locking the gates to the stairs which lead to the floor above.

The entire floor of one wing of the building is set apart for the housing of the executive forces of the church. This section is on the first floor, near the auditorium, and is easily accessible to the public. In the conduct of such activities as the church plans in the new building, a staff of employed helpers may be required, such as an assistant to the pastor, a church secretary, a stenographer, one or more educational directors, a director of social life, a supervisor of recreations and a caretaker. The Deacons' Room is to have a beamed ceiling and is to be treated with special care; it is to be suitably furnished, somewhat after the fashion of a Directors' Room in a modern bank building.

The architects were instructed to waste no money on needless ornamentation. All construction was to be substantial and enduring, but there was to be no unnecessary expenditure. The kindred principle of utility was also regarded. The building was first and foremost to serve the ends for which it was designed—a temple for the worship of God and a center for community service. So carefully have principles, economy and utility, been observed that we have a building of beauty and dignity offering provision for all essential elements in church life on a large scale, and yet the cost will probably not exceed $300,000.

Hawthorne Court
Jackson Heights Garden Apartments

THE Hawthorne Court group of Jackson Heights apartments consists of two units, each containing seven five-story buildings. There are two five-room and two six-room apartments on each floor. The group was built from the plans of G. H. Wells, Architect, by Dwight P. Robinson & Co., Inc.

The front of each group is of Colonial design and is faced with "tapestry" type of brick, trimmed with limestone and terra cotta. For the rear, which faces the gardens, there has been selected Connecticut brick, trimmed with tapestry brick and terra cotta.

The buildings are set back from the street line and the terraced space between the buildings and sidewalk is planted with shrubs and seeded.

The space between groups of buildings at the rear is planted and has walks and open plazas with seats. The open space between rear of buildings is wider than an average street and the rear view is as attractive as the street view.

The entrance to each building is through a stone trimmed vestibule, to a fireproof stair hall floored and wainscoted with marble. The stairs are of steel with marble and terrazzo treads.

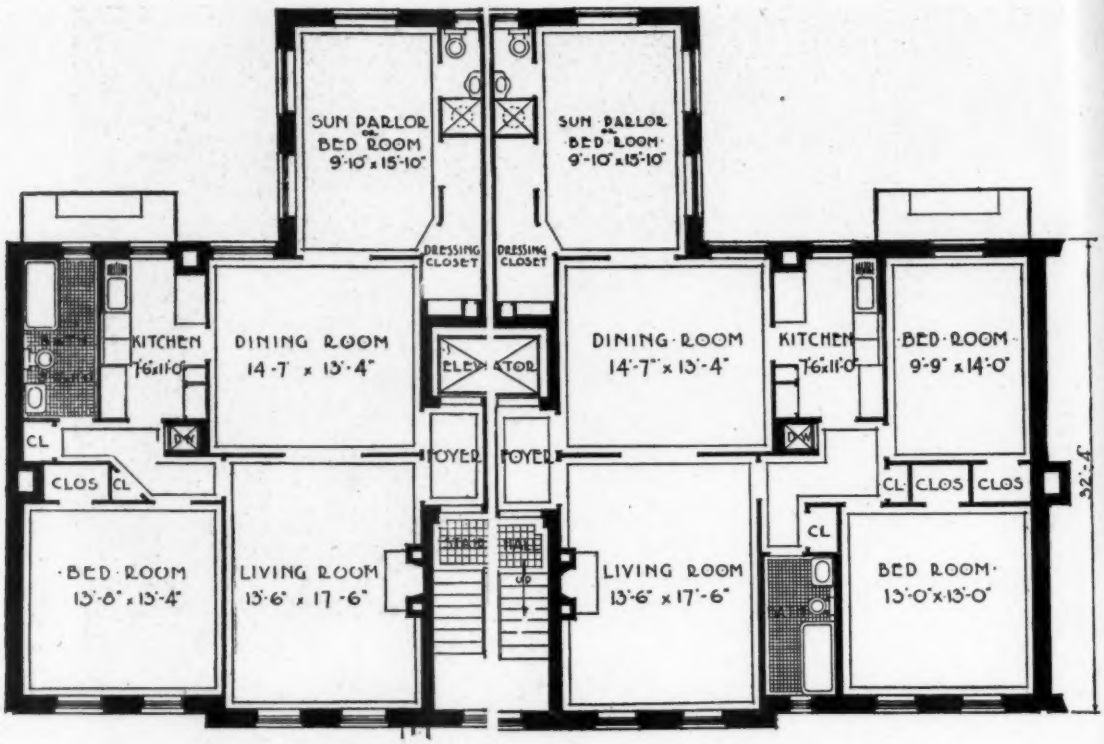
Apartments above the first floor are reached by stairs and also by elevators having push-button automatic control, arranged for safe and easy operation. Elevator gates and doors are equipped with easy-moving devices and the elevator can be safely used by everyone. A telephone and bell signal from the vestibule communicates to each apartment, and electrical devices are installed by which the elevator may be used by visitors. The resident gains access to the elevator by use of the key to his own apartment entrance door.

The large living room, dining room and sun room are connected with wide openings, and there is abundance of light and air. The building is steam-heated and has dumb-waiter service. The rooms have painted wood trim, mahogany finish doors with glass knobs, tinted ceilings and walls. There are oak floors of parquet design in the main rooms, and plain clear oak elsewhere, except in kitchens.

The bedroom and bath portion of the main building is cut off by doors from living and dining rooms. The rear room, in the extension toward the garden, may be used during the day as a sun parlor or sitting room. At night, it is available as a bedroom. A disappearing bed is provided in the closet adjoining. The large dressing closet has ventilated clothes hanging space. Nothing in the main room during the day need suggest its use for bedroom purposes at any time.

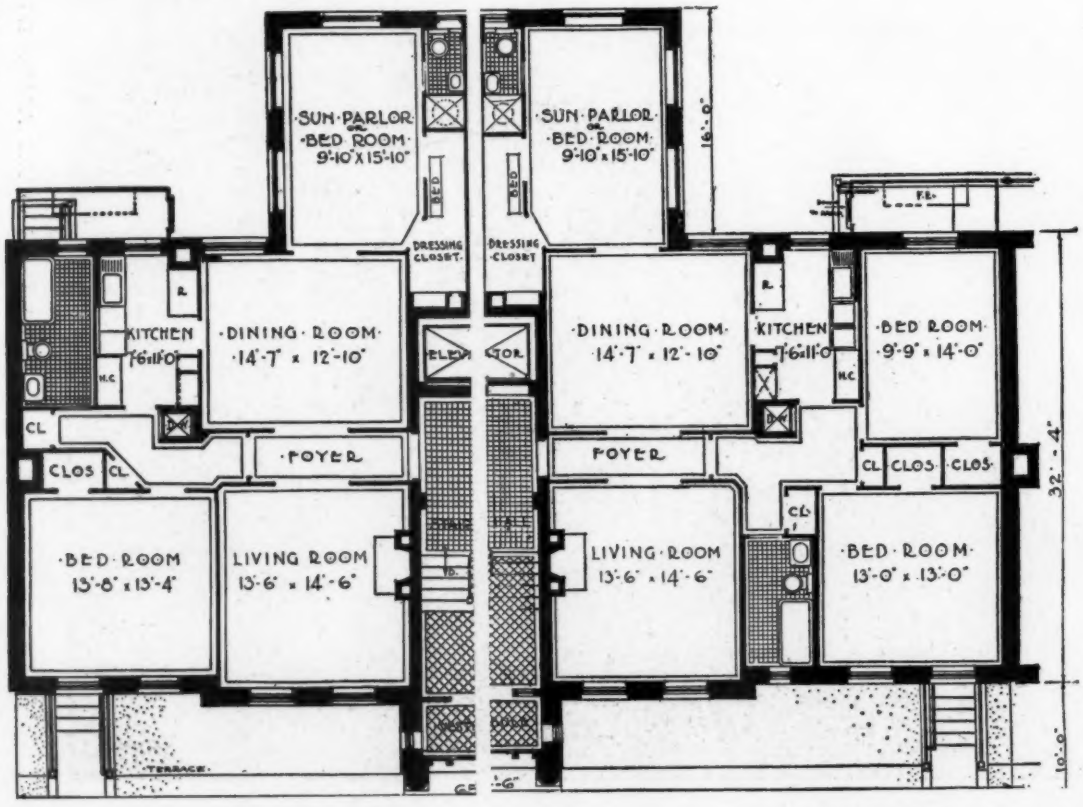
HAWTHORNE COURT APARTMENTS, QUEENSBORO, NEW YORK CITY

G. H. WELLS, ARCHITECT



FIVE ROOM APARTMENT — SIX ROOM APARTMENT

TYPICAL FLOOR PLANS



FIVE ROOM APARTMENT — SIX ROOM APARTMENT

HAWTHORNE COURT APARTMENTS, QUEENSBORO, NEW YORK CITY

G. H. WELLS, ARCHITECT

DEPARTMENT OF ARCHITECTURAL ENGINEERING

A SURVEY OF RESIDENCE LIGHTING

At the annual convention of the Illuminating Engineering Society, Swampscott, Mass., in September 1922, Mr. M. Luckeish presented a progress report on a survey of residence lighting. This paper is based upon the results of a detailed survey of lighting in the urban middle-class homes. The results are averages of about 1,500 representative homes consisting of groups from a number of cities throughout this country. The average values obtained for the first 800 homes did not differ materially from the average values of the rest of the homes represented in the survey to the present time. This indicates that the aggregate number is sufficient to be representative. The survey is being continued and extended to smaller towns and to the low-class home.

The following conclusions are some that may be drawn from the data.

The most popular rented middle - class home has about six rooms. The most popular middle-class home occupied by the owner has about seven rooms. More than 80 per cent of the homes having six or less rooms are rented. More than 80 per cent of the homes having more than seven rooms are occupied by the owner. There is a very marked transition from predominantly rented to predominantly occupied by the owner in passing from the six-room to the seven-room home. The number of "rented" homes approximately equals the number of "owned" homes.

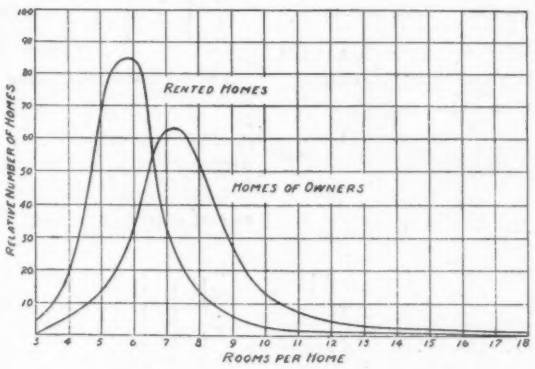


Fig. 1. Relative numbers of owned and rented homes

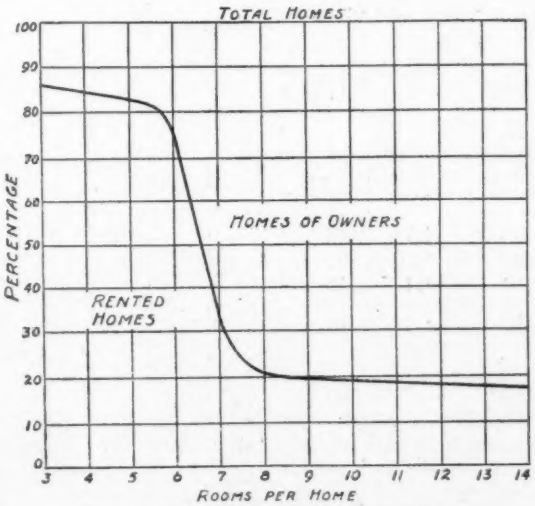


Fig. 2. Percentage of owned and rented homes

In Figure 1 are plotted the relative numbers of houses of various sizes for equal groups of "rented" and "owned" homes. In other words the areas under the two curves should be equal. It is seen that the maximum is at about 5.8 rooms per home for the rented group. There is somewhat more spread in the owned group but there is a definite maximum in the region of 7.3 rooms per home.

In Figure 2 is plotted the percentage of rented and of owned homes of the total of each size.

The use of ceiling luminaires is as extensive as can be justified and averages nearly one per room. Table 1 gives the distribution revealed by the survey. It is interesting to note the predominance of the multi-socket luminaire in living and dining rooms.

Wall brackets are much less plentiful than they should be. Table 2 shows the numbers found and Mr. Luckeish states that an increase of 250 per cent in the number of utilitarian wall-brackets appears justifiable.

As shown in Table 3 an average of 1.6 port-

ables per home is found in the middle-class home. Considering their advantages this number is small. In the "conservative ideal" average home

TABLE 1. CEILING LUMINAIRES IN THE MIDDLE-CLASS HOME

Type of room	Fixtures per room	Sockets per fixture	Watts per socket
Living room	1.0	2.8	41
Dining room	1.0	3.4	40
Kitchen	1.1	1.1	59
Bedroom	0.8	1.3	43
Bathroom	0.5	1.0	51
Average	0.88	1.92	47

eight portables, including the small decorative ones, have been provided.

Figure 3 illustrates the well known scarcity

TABLE 2. WALL BRACKETS IN THE VARIOUS ROOMS OF THE MIDDLE-CLASS HOME

Type of room	Fixtures per room	Sockets per fixture	Watts per socket
Living room	0.40	1.2	34
Dining room	0.21	1.3	31
Kitchen	0.17	1.0	35
Bed room	0.45	1.1	40
Bath room	0.63	1.0	45
Average	0.37	1.12	47

of convenience outlets. There should be not less than one in each room and at least two or three in the living room.

TABLE 3. PORTABLE LAMPS IN THE MIDDLE-CLASS HOME

Type of room	Portables per room	Sockets per portable	Watts per socket
Living room	0.95	1.7	42
Dining room	0.12	1.4	37
Bedroom	0.14	1.1	40
Average	0.40	1.4	40

Figure 4 shows the wattage found and Table 4 gives a comparison with a desirable average. The average total wattage per home is less than half what it should be to provide adequate and proper lighting. The average wattage per socket is fairly satisfactory although it could be increased somewhat with justification. The sockets in the portables and wall brackets, which should be added to the average home in order to secure desirable lighting, represent the desired increase in wattage to a large extent.

A comparison of the wattage in low- and middle-class homes is given in Table 5 and Table 6. The average total watts and the average number

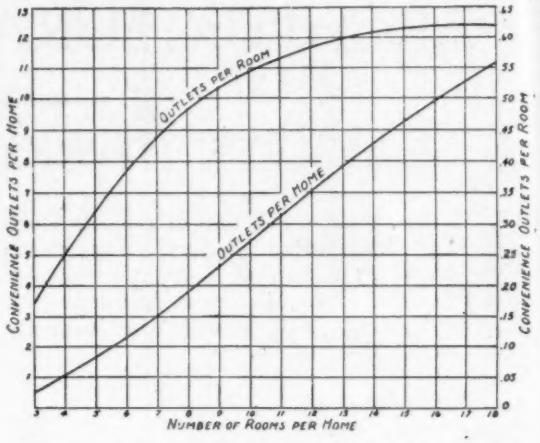


Fig. 3. The survey revealed the well known scarcity of outlets

of convenience outlets per home increase almost directly with the number of rooms. This is true for the average watts per room and average number of convenience outlets per room for the smaller

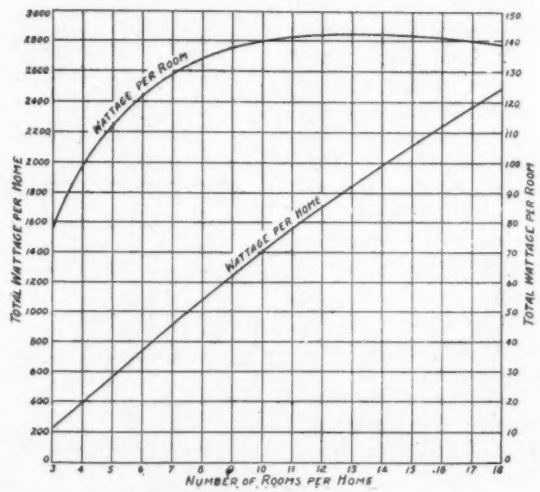


Fig. 4. Result of survey of wattage consumed

homes but these items appear to approach a constant value for the larger homes.

There is an average of about 24 sockets in the middle-class homes. Table 7 shows that the wiring and lighting equipment of the low-class home is very much inferior to that of the middle-class home. The deficiency is particularly marked by a nearly total absence of convenience outlets, portables, and wall-brackets, and by the large percentage of unshaded lamps. From 26 to 56

per cent of the luminaires, exclusive of the basement, were found to have no shades.

Table 8 shows that the wiring and lighting equipment in the rented home is marked by inferiority to that in the home occupied by the owner.

TABLE 4. AVERAGE TOTAL WATTAGE IN VARIOUS ROOMS COMPARED WITH DESIRABLE TOTAL WATTAGE

Type of room	Actual Wattage	Desirable wattage
Living room	234	540
Dining room	150	230
Kitchen	76	180
Bedroom	67	140
Bathroom	57	100
Basement	94	300

The lesson to be drawn from Table 9 is that from the standpoint of an adequately and properly wired and equipped average middle-class home the average wired home today might be said to be less than "half-lighted."

TABLE 5. AVERAGE TOTAL WATTAGE PER HOME IN LOW- AND MIDDLE-CLASS HOMES

Number of rooms	Total Wattage		Ratio
	Low-class	Middle-class	
4	215	400	0.54
5	319	560	0.57
6	417	720	0.58
7	520	910	0.57
8	605	1080	0.56

Mr. Norman D. Macdonald presented a paper containing lighting statistics of representative urban and suburban homes in which the following conclusions were drawn:

The average central station customer lives in a dwelling of nine enclosed spaces (probably five rooms, bath, two halls and a closet) of about 1,000 square feet in area. He uses about sixteen incandescent lamps of the 25- to 60-watt sizes. There are three to four persons in the family (average 3.6). The rooms vary in size from 45 square feet to 190 square feet. The rooms in general are illuminated in spots, but the watts per square foot indicate that the general illumination is low, although the most used portions of the rooms are fairly well illuminated. The customer selects home decorations from the viewpoint of custom or appearance and pays relatively little attention to their influence upon illumination. He has far too few convenience outlets and therefore uses drop cords for table lamps and appliances. He needs 4 per cent more lamps at once to replace outages and has not been taught the value of keeping spare lamps on hand. He has abandoned 11 per cent of his original installation as unsatisfactory or superfluous.

Owing to height or inconvenience, he has trouble in replacing 25 per cent of his bulbs. He needs to be taught the value of light reflecting decorations and that his lighting appliances need to be cleaned as often as his windows. And last, and most important, he is unadvised of the advances in lighting practice of the past few years, and of his own need of proper modern lighting equipment, as in the majority of cases the lumin-

TABLE 6. AVERAGE WATTAGE PER ROOM

Type of room	Low-class	Middle-class
Living room	104	234
Dining room	83	150
Kitchen	58	76
Bedroom	39	67
Bathroom	38	57
Basement	52	94

TABLE 7. AVERAGE NUMBER OF FIXTURES, PORTABLES, WATTS AND VARIOUS OUTLETS IN THE LOWER- AND MIDDLE-CLASS HOMES

Items	Low-class	Middle-class
Ceiling fixtures	5.4	5.4
Wall brackets	0.4	2.6
Portables per home	0.2	1.6
Sockets per basement	1.3	2.3
Convenience outlets per home	0.3	2.5
Total watts per home	400	863

TABLE 8. THE INFLUENCE OF OWNERSHIP ON WATTAGE, WIRING, ETC.

Items	Rented homes	Owned homes	Ratio (per cent)
Total wattage of lamps per home	762.0	942.0	81
Percentage of total wattage per home	45.0	55.0	82
Convenience outlets	1.8	3.1	58
Percentage of total convenience outlets	37.0	63.0	59
Portables per home	1.5	1.7	88

TABLE 9. PERCENTAGE OF COMPLETE SATURATION OF VARIOUS PHASES OF THE AVERAGE MIDDLE-CLASS HOME

Items	Per Cent
Total wattage of lamps	46
Convenience outlets	28
Portable lamps	20
Wall-brackets	29
Ceiling fixtures	100

aires found are of the same period as the house. A rough estimate would indicate that less than 10 per cent of the luminaires reflect modern engineering thought. This is further emphasized by the fact that in living rooms 50 per cent of the lamps are so placed that bare lamps are in the line of vision, and in 33 per cent of these rooms portable lamps have been introduced to improve the original installation.

The condition is not being improved because the average man handling lighting products, be he manufacturer, dealer, architect, contractor, or central station representative, has not been sufficiently impressed with the need for good lighting.

The attention of our readers is called to the inclusion of the architect in the list of negligent individuals.

DESIGNING CHART FOR REINFORCED CONCRETE COLUMNS

THE accompanying charts are for use in the design of reinforced concrete columns according to the building code of New York City. They are of value in all cities which have the same requirements.

The stresses per sq. in. are as follows in Sec. 334; Concrete in direct compression .... 500 lb. Tensile stress in cold drawn steel wire or fabric, 35 per cent of the elastic limit but not more than ..... 20,000 lb.

Sec. 339 requires that the reinforcement in columns and girders shall be protected by a minimum of two inches of concrete. The diameters given on the charts are net diameters; fire protection to be added.

The design regulations on which the charts are based are as follows, (the lateral reinforcement in Chart A having a tensile stress of 10,000 lb.; in Chart B, 15,000 lb. and, in Chart C, 20,000 lb. per sq. in.):

Sec. 337. Columns. 1. *With Longitudinal Reinforcement Only.*—In concrete columns, having not less than one-half nor more than four per cent of vertical reinforcement secured against displacement by one-quarter-inch steel ties placed not farther apart than fifteen diameters of the vertical rods nor more than twelve inches, the allowable load shall be five hundred pounds per square inch on the concrete, plus seven thousand five hundred pounds on the vertical reinforcement.

2. *With Longitudinal and Lateral Reinforcement.*—In concrete columns, having not less than one-half nor more than two per cent of hoops or spirals spaced not farther apart than one-sixth of the diameter of the enclosed column nor more than three inches, and having not less than one nor more than four per cent of vertical reinforcement, the allowable load shall be five hundred pounds per square inch on the effective area of the concrete, plus seven thousand five hundred pounds per square inch on the vertical reinforcement, plus a load per square inch on the effective area of the concrete equal to two times the percentage of lateral reinforcement multiplied by the tensile stress in the lateral reinforcement prescribed by Sec. 334 of this article, the percentage of lateral reinforcement being the volume of the hoops or spirals divided by the volume of the enclosed concrete in a unit length of column. The hoops or spirals shall be rigidly secured to at least four verticals to insure uniform spacing.

3. *Structural Steel and Concrete.* * * *

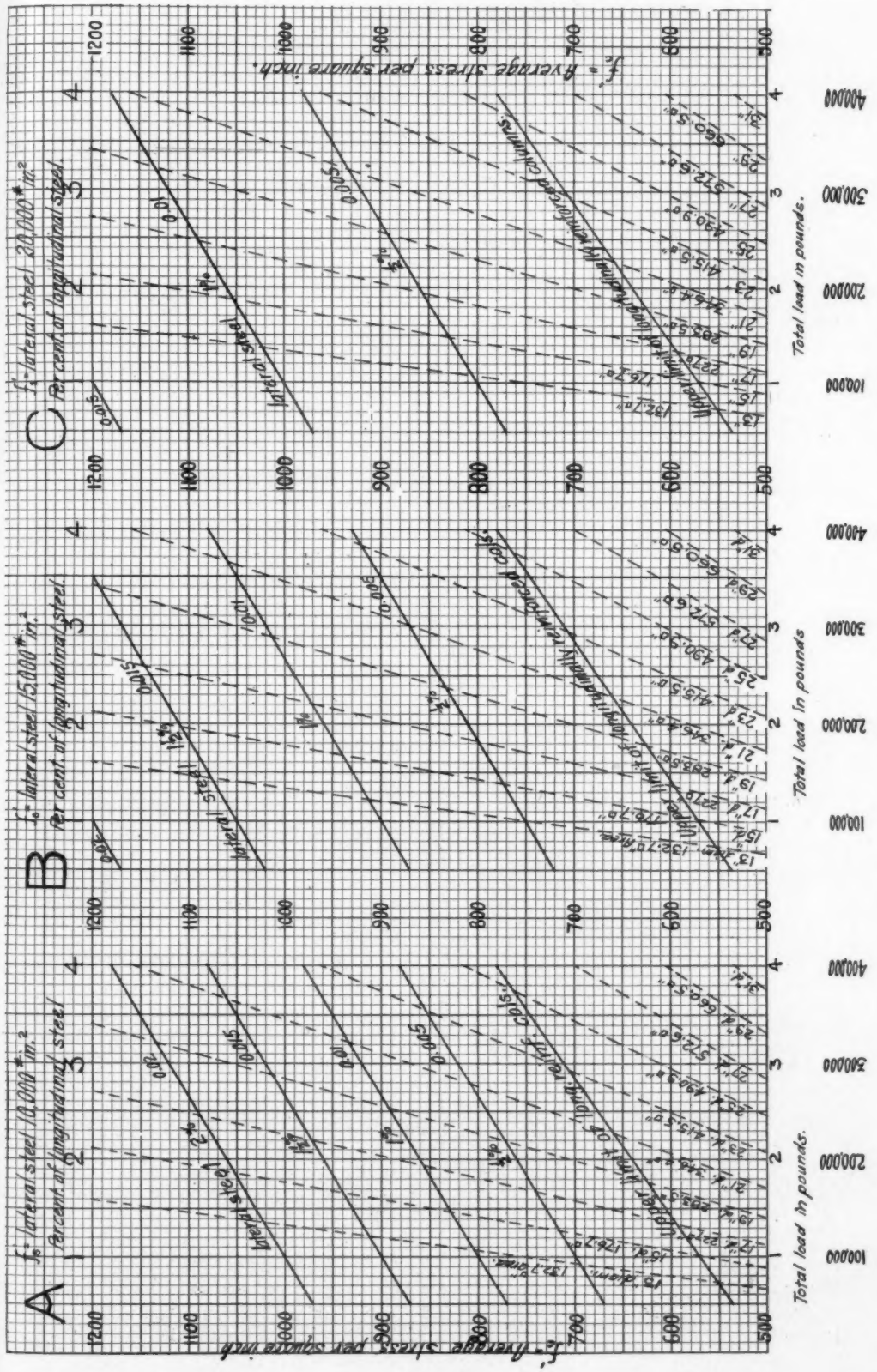
4. *When Richer Concrete Is Used.* * * * *

5. *Eccentric Loads.*—Bending stresses due to eccentric loads shall be provided for by increasing the section of concrete or steel until the maximum stress shall not exceed the allowable working stress.

6. *Length.*—In columns, the ratio of length to least side or diameter shall not exceed fifteen, but in no case shall the least side or diameter be less than twelve inches.

In all structural designing the column is without fire protection and the least side or diameter mentioned in the above paragraph, 6, is the net, or core, diameter.

Enter the chart at the bottom for any required load and go vertically until the desired diameter is found. The percentage of vertical reinforcement is on the vertical line and the average stress is on the intersecting horizontal line. The percentage of hooping is on the sloping line above this point or, if the designer wishes to be exact, it may be interpolated. Diameters below the lower sloping line are for columns with longitudinal reinforcement only.


A
B
C
Total load in pounds.
Total load in pounds
Total load in pounds.
Designing Charts for Reinforced Concrete Columns—Building Code of New York City

Fireproof Requirements for Buildings

THE following table outlining the requirements of the National Board of Fire Underwriters for fireproof building construction was compiled by the Editor of *Safeguarding America* from the N. B. F. U. Building Code, pages 19 to 23.

1. The following structures to be fireproof:
   - Armories
   - Asylums
   - Bath Houses (with sleeping accommodations)
   - City Halls
   - Colleges
   - Court Houses
   - Detention Buildings
   - Police Stations
   - Hospitals
   - Libraries
   - Museums
   - Nurseries
   - Railway Passenger Stations
   - Schools with pupils above second story
   - Theatres

2. When over three stories high the following to be fireproof. When three stories or under, must have fireproof floor over cellar or basement.
   - Amusement Halls
   - Churches
   - Exhibition Buildings
   - Lodge Rooms
   - Public Halls

3. When over three stories high. When three stories high shall have fireproof floor over cellar or basement.
   - Dormitories
   - Hotels
   - Lodging Houses

4. When having more than 15 sleeping rooms or, when over three stories high. When three stories high shall have fireproof floor over cellar or basement.
   - Bachelor Apartments
   - Club Houses
   - Studios

5. When over four stories. When four stories, must have fireproof floor over cellar or basement.
   - Dwellings
   - Tenements
   - Apartment Houses

6. Mill or fireproof when over four stories or 55 feet. Mill construction not permitted over 65 feet without sprinklers, and 75 feet with sprinklers
   - Factories
   - Lofts
   - Office Buildings
   - Printing Houses
   - Stables
   - Stores
   - Warehouses
   - Workshops
   - Garages

7. The following should be permitted only in isolated locations:

(a) Fireproof,
   - Oil Houses
   - Oil Refineries
   - Rendering Plants
   - Soap Factories
   - Smoke Houses
   - Dry Cleaning Establishments
   - Laboratories
   - Buildings for Combustibles

(b) Fireproof or mill if in fire limits or if over 55 feet high. Mill construction not permitted over 65 feet without sprinklers, and 75 feet with sprinklers.
   - Car Barns
   - Foundries
   - Power Plants
   - Freight Stations
   - Ice Houses
   - Refrigerator Plants
   - Malt Houses
   - Grain Elevators
   - Slaughter Houses
   - Wharf Buildings

A New Building Material

ACCORDING to a correspondent in the London *Times*, a new building material known as "Stone Turf" is being used in German Silesia. Strips of turf are placed within heavy timber wall framing, alternating with layers of cement and chalk or hydraulic lime. Board forms are used as for concrete. The material is moistened and tamped as the layers are successively deposited. The material quickly hardens and tests have shown it to be equal in strength to walls laid up in brick.

It is said that the forms used are much less expensive than those required for concrete and the material is superior to concrete as a conductor of heat and dampness. Houses of this material are not damp and are warmer in winter and cooler in summer than houses with concrete walls of equal thickness. The cost is said to be about 40 per cent less than for buildings of other materials because the materials are abundant and ordinary labor is used. For farm buildings and country houses it is quite popular. Stucco is used on the outside and plaster on the inside face of the walls.

Progress in Ventilation

THE code for the ventilation of public and semi-public buildings adopted by the American Society of Heating and Ventilating En-

gineers in 1915 has been submitted to the American Engineering Standards Committee for approval as AMERICAN STANDARD. The Committee wishes to learn from those interested, of the extent to which they make use of this code, and to receive any other information regarding the code in meeting the needs of the industry. Address the Secretary, American Engineering Standards Committee, 29 West 39th Street, New York, N. Y.

In response to requests from state commissioners, legislative bodies, public health agencies and other organizations for suggestions to be used in the preparation of legislation and regulations regarding the heating and ventilation of buildings, a committee of the American Society of Heating and Ventilating Engineers endeavored in this code to cover the general features most essential to the public health, in such a manner as to protect the public with the least possible expenditure for equipment and without unnecessarily limiting the methods of obtaining the desired results.

Section 1 of the code relates to general matters pertaining to all classes of buildings; the remaining three sections relate to schools and colleges, factories, and theatres, respectively.

Among the states that have utilized parts of the code in their regulations are: Illinois, Indiana, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Utah, Virginia and Wisconsin.

Danger in Bridged Fuses

UNDER the caption "Tying Down the Safety Valve," the editor of *Safeguarding America Against Fire* had the following to say about a practice followed by the class of people to whom "a little knowledge is a dangerous thing."

From time to time, suggestions are published in magazines of a semi-scientific nature advising readers how to doctor blown-out fuse-plugs so that circuits will continue to function. One magazine suggests the use of pennies in fuse-plug sockets and other make-shifts, little realizing that such action is equivalent to tying down or sealing the safety-valve of a steamboiler, since the fuse is the "safety-valve" of an electrical circuit.

If a fuse is replaced by any non-fusible material, the wire, when sufficiently overloaded is certain to heat excessively and, conditions being propitious, the insulation will then become ignited and start a fire. This, of course, does not always occur, but the terrific losses of electrical origin make it obvious that such fires are happening every day in the year. Electrical inspectors, in the course of their rounds, discover numerous doctored fuse-plugs.

Not long ago Fire Chief Arnold Neuenschwander reported that the use of copper cents in place of the links in burnt-out fuse-plugs had reached serious proportions in Louisville, Kentucky, and that nearly a peck of pennies was removed during an inspection in the city.

A National Board engineer who inspected several motion picture studios found that the continuous blowing of the heavy barrel fuses, due to overloading, resulted in electricians rendering them inoperative by bridges of ordinary No. 18 bare copper wire connected to the exterior screws at each end of the fuses.

In Memphis, Tennessee, a movement has been started to have an ordinance enacted requiring the use of sealed or locked fuse boxes, so that people will be unable to doctor blown-out plugs.

The public should realize that when the fuse-metal gives way, it is a symptom indicating trouble somewhere in the system, and should be so recognized. Instead of rendering the fuse-plug valueless for the purpose it is designed to fulfill, the cause of the "blowing" should be removed. The symptom should not be made the disease.

In reporting a fire in New Orleans, which resulted from a bridged plug-fuse and a circuit of ordinary No. 18 bell wire stapled to the wall with double point tacks extending from the kitchen into the bathroom, the Louisiana Fire Prevention Bureau comments as follows:

"Had this building been entirely destroyed, or had a conflagration resulted, the cause would have been attributed to a fire of unknown origin; this is mentioned simply to show that the alarm sounded by The National Board of Fire Underwriters about electrical fires is not exaggerated. We think that many fires in which the cause is not ascertainable owing to the complete destruction of the building, are due to bridged fuses. Again the warning is sounded against the present type of plug fuse, as being one of the greatest known electrical fire hazards, because it may be bridged by anyone with very slight effort."

A New Lumber Handbook

THE amount of fragmentary literature on the subject of lumber is enormous but the occasional and casual inquirer for accurate information cannot obtain a summary of modern knowledge of wood construction. It is scattered through technical periodicals, trade brochures, society and association proceedings, etc.

To correct this defect the National Lumber Manufacturers' Association through the technical and research department, in collaboration with the Structural Service Bureau of Philadelphia, will issue a series of uniform publications which will be an orderly digest comprehending all the available information on the subject. The series will be in several parts, of a number of chapters each, under the general title of "Lumber and Its Utilization" and will ultimately appear in book form.

The distribution will be without charge, though only upon request after the first chapter, from persons likely to make use of the data. The first chapter is now on the press and requests for copies may be forwarded to the Chicago, Ill., or Washington, D. C., offices of the association.

Building Costs

THE cost of an average residence that is well designed and properly built may be divided among the various items about as shown in the following table:

36.1 cents for Masonry
29.1 cents for Carpentry
8.7 cents for Heating
6.5 cents for Painting
6.0 cents for Electrical Work
6.0 cents for Plumbing
3.5 cents for Sheet Metal Work
2.9 cents for Roofing
1.2 cents for Hardware

100.0 cents = 1 Dollar

These figures were given to the Copper and Brass Research Association by competent quantity surveyors and building estimators of long experience.

Government Needs Steel Designers

THE United States Civil Service Commission announces an open competitive examination for structural steel work draftsmen. Applications will be rated as received until December 29, 1922. Applicants should at once apply for Form 1312 to the Civil Service Commission, Washington, D. C.

How to Remove Soot

LARGE numbers of shingle roof and defective flue fires are being reported, due to the increasing use of soft coal. The accumulations of soot on heating surfaces reduce the value of the fuel, and frequently clog the flues and start fires. The Federal Fuel Administration Board suggests the following plan for removal of soot:

The fire is put into good condition with a substantial body of hot fuel. Common salt, thoroughly dried, is then thrown or sprinkled onto the incandescent fuel bed in a quantity depending entirely on the size of the furnace. In the case of a house heating furnace, one pound at a time is ample, in the case of a large power plant boiler, four or five scoops full may be required. The dampers are kept open so as to maintain the furnace temperature and the salt is allowed to remain until the fumes have entirely disappeared.

Immediately upon charging the salt, the furnace becomes filled with dense white fumes which may require as much as half an hour to disappear entirely. If results are not secured on the first application, it should be repeated as many times as necessary.

Once the heating surface is thoroughly cleaned a small application every few days is usually sufficient to keep it so.

Everyone using soft coal is urged by the administration to use this remarkably simple and cheap process for getting rid of the soot, cleaning and heating surfaces of boilers, thus saving large amounts of coal, *preventing fires from chimneys* and generally conserving all along the line of heating and the production of power.

The Slate Situation

THE National Slate Association states that the August 1922 production and shipments of slate by producers reporting ran 31% higher than the same month in 1921, and about the same as 1920. The 8 months ending August 1922 show about 10% greater sales of slate than in 1921.

Over 90,000 squares of roofing slate are available. Some 370,000 square feet of blackboard, and 235,000 square feet of millstock for building, sanitary and structural purposes have been prepared to take care of the anticipated next few months' demand in addition to the regular production which is running at the fullest capacity possible considering the scarcity of quarry workers, many of whom were taken from the industry during the war and have not yet migrated back.

Radio Information

THE following circulars of the Bureau of Standards may be purchased from the Superintendent of Documents, Washington, D. C., at five cents per copy.

No. 121 Construction and Operation of a Two-circuit Radio Receiving Equipment with Crystal Detector.

No. 122 Sources of Elementary Radio Information.

Fire Losses in New York City

FIRE losses in New York City, during the first six months of 1922, amounted to $13,182,986 as against $10,443,889 for the corresponding period of last year, according to a report issued by the New York Board of Fire Underwriters. These figures cover only the fires coming under the jurisdiction of the Committee on Losses and Adjustments, which are believed to represent about 60% of the total losses. This would indicate that the fire destruction for the first half of this year amounted to $21,971,600. The reported losses in 1922 numbered 2,381 as compared with 1,834 in 1921.

DEPARTMENT OF SPECIFICATIONS

Specifications for Structural Steel

SPECIFICATIONS for structural steel may be written in several ways. The preferred way in the case of complete drawings for a building of substantial importance will be complete in every detail of shop practice and field erection, the specifications for the shop practice portion consisting of general matter relating to standards and standard practices that are to be resorted to. Another way equally useful is to produce a specification written from the general standpoint where the work is not of very great importance and is shown only in a general way on the drawings, leaving the detailing of connections, etc., to the structural steel contractor to be determined when he makes his shop drawings. It is not meant by degress of importance that the structural steel is not structurally important but many buildings having an extremely low tonnage do not require specifications as completely written as buildings having many tons of material that is to be fabricated in the shop and erected in the field in an extremely careful manner.

As in the preparation of all specifications, it is extremely important that the degree of completeness of the drawings be understood thoroughly before the preparation of work for the final production of the specifications.

In order that the questions that would arise on any operation handled by an architect may be covered completely, it would be assumed that specifications under discussion here would be written most completely for a building having a fairly large tonnage of steel.

The General Conditions must be referred to as in all sections of the specification. These General Conditions in architectural practice usually are the General Conditions of the Contract as set forth by The American Institute of Architects.

The second paragraph of the specifications will be entitled Scope of Contract. This paragraph should detail carefully all work that is to be included and if necessary should state specifically what work is not to be included. It will be found most convenient to schedule the items that are to be included unless the drawings are purely engineering drawings, customarily called "Structural Steel Drawings" in which case it will be sufficient to say that all of the structural steel work shown on the structural steel drawings, unless specifically noted otherwise, is to be included in the contract. When the structural steel drawings are incorporated with the architectural drawings, especially when the architectural drawings are well filled with notes, dimensions, etc., making the picking out of structural steel rather difficult, the scheduling of the various items will be much more convenient, not only for the bidders and contractors, but for all others who must use the specifications. Quite often it will be found that contractors other than structural steel contractors are expected to furnish some work, which from the indications on the drawings appears to be work that properly should be included in the structural contractor's work. Either one of the conditions above mentioned may require the preparation of a list of material that is not to be furnished, and which should be included in one paragraph under the caption Work Not Included, reference to which should be made in the paragraph under Scope of Contract.

The Structural Steel Society which is an association of a number of structural steel and iron shops in this country, has prepared a "Code of Practice" which is recommended as being standard practice to be followed in all cases. So far as known, this is the only association of this character that has attempted to codify the rules and practices of structural steel work, and while it is not known that the codes of practice are the best and should be recommended in all cases, it is not unreasonable to follow the recommended practices in the interests of fair and equitable dealings between contractors and architects. One paragraph in the "Code of Practice" is as follows:

> "Clauses in the specifications to the effect that all iron items necessary to complete the building shall be furnished by the fabricating shop whether or not they are shown on the drawings or called for in the specifications, being obviously so unfair, will not be recognized or subscribed to."

The fairness of this clause cannot be questioned, as it is utterly ridiculous to expect the contractor to pick things out of the sky for inclusion in his estimates, or to require that he analyze the drawings and specifications and attempt to determine the idiosyncracies of the architect's practice. This is especially important in cases where structural steel is expected to include what is called "Miscellaneous Iron and Steel" or "Ornamental Iron." It is not to be questioned that the latter two items should be covered in specifications for sections differing from the structural steel sections, and naturally, the discussion of these items in these columns would be covered under those headings.

A further quotation from the "Code of Practice" referred to above, which has important bearing on the Scope of Contract is as follows:

"Contracts taken to furnish the structural iron and steel for a building are based on furnishing the following items only:

All anchors for structural steel only
Angles (steel)

Bases (cast iron or steel)
Bearing plates (cast iron or steel)
Brackets made of structural shapes
Channels (steel)
Channel and Angle supports only for suspended ceiling where they attach to structural steel
Columns (steel, cast iron or gas pipe)
Girders (steel)
Hanger (rods or bars)
Lintels (steel)
Marquee (frame only)
Rivets
Separators
Tees and clips
Tie rods
Trusses (steel)

Note: In furnishing a bill of structural steel for a structure, where no provision to the contrary is made, the fabricating shop will furnish only the following rivets or bolts for field purposes:

1. If the structure rivets in the field—the fabricating shop will furnish sufficient rivets of suitable size plus at least 10% allowance for waste for all field connections for steel to steel, but will furnish no bolts, except for such connections, steel to steel, as it will not be possible to rivet.
2. If the structure bolts in the field—the fabricating shop will furnish sufficient bolts of suitable size plus a 5% allowance for waste for all field connections steel to steel, but will furnish no rivets."

The specifications under Scope of Contract should make clear whether the material is to be furnished at the building and erected or whether it is to be furnished only for erection by another contractor. In the latter case, the question of furnishing of field rivets must be covered specifically. In like manner, if the connections in the field are to be bolted, the furnishing of bolts must be specified clearly, all as indicated in the above quotation from the Structural Steel Society's "Code of Practice." Further, as in all specifications, it is advisable to specify distinctly that where material is to be furnished at the building or other point of delivery, as selected, it must be furnished f.o.b. delivery point, and not f.o.b. fabricator's plant with freight allowed to destination, in order that the shipper will bear his responsibility in delivery of material at the delivery point chosen.

The next division of the specification should schedule the drawings that are to be furnished by the architect and by the structural steel contractor with correlative matters covered in full. In usual custom, the architect will furnish his drawings only, on which the structural steel is indicated, or he will accompany the architectural drawings with a set of structural drawings, the architectural drawings being complementary to the structural drawings. In this case specifications should state that the indications on the architectural drawings are purely diagrammatic and that reference must be made to the structural steel drawings for all information in connection with items so shown.

The structural steel contractor is expected to prepare shop drawings of all of the work shown on the drawings or included in the specifications furnished by the architect. These shop drawings should show in detail all measurements and the character of connections and all other points involved in careful fabrication of the work. Should there be any errors in shop drawings, the detection of such errors should be left to the responsibility of the contractor as the architect should not be expected to check these drawings for accuracy insofar as they conform with the indications or diagrammatic representations of the work desired as shown on the architectural drawings or the structural drawings. A case in point comes to mind: The structural drawings for a building indicated clearly that the center line of one row of columns was several degrees off right angles with the intersecting center line of the building. The drawings were dimensioned sufficiently to inform the contractor of this condition, and the drawings further indicated that spandrel beams were to be attached to the column on the outer face of the column. The shop drawings indicated very poor connections and it was only discovered through careful checking of the engineer. The work shown on the shop drawings was not in accordance with the best practice and since the specifications required that all work should be done in accordance with the best practice, this error was called to the attention of the contractor, who protested without avail the decision of the architect. In all cases figured dimensions should govern, and where dimensions are lacking, they should not be scaled from the drawings furnished by the architect, but should be obtained from the architect. Any other requirements in connection with the submission of shop drawings or the furnishing of architectural or structural drawings by the architect undoubtedly will be covered by the General Conditions of the Contract, especially if the A. I. A. document is used.

A paragraph specifying the quality of workmanship desired is quite important, especially in view of the case cited above. For work of any importance, that is, where there are shop and field connections, the specifications should require that work be done in accordance with the best standards of accepted practices of structural steel shops. For complicated structures, it might be well to specify that standards of bridge shops, rather than structural shops, be used. If the specification writer is familiar with the "Code of Practice" of the Structural Steel Society, he might make reference to that "Code of Practice" with the pro-

vision that it is to be followed except where specific obligations of the specification conflict therewith, in which case the specifications shall govern.

A clause with regard to the quality of materials to be furnished comes next in sequence. The standards of the American Society for Testing Materials should be referred to except in cases where local practice follows some manufacturer's specification. The specification writer should endeavor in all cases to use the A. S. T. M. standards or the standards that may have been adopted by the American Engineering Standards Committee. The material generally included in the structural steel specifications consists of rolled steel, cast steel, cast iron and sometimes wrought iron.

The specifications should be quite specific on the subject of paint. The paint field seems to be full of chicanery, and is oftentimes fraught with the greatest possibilities for ultimate success or failure. The specification writer must be familiar with the field conditions, that is to say, how the structural steel is to be protected by fireproofing, or whether fireproofing is to be omitted entirely and the steel exposed. Further, the steel may be placed in such a position below ground that it will be subject to the action of water and of chemicals sometimes found in ground water. If the structural steel is to be encased entirely with concrete, it may not be necessary to protect the steel with even a shop coat of paint. Opinions on the effect of concrete on steel as far as protective coatings are concerned may be said to be divided. It is not amiss to suggest that the specification writer should assure himself that if he intends to omit the protective paint and depend on the protection afforded by concrete, he should make sure that the concrete is waterproof and that no destructive influences may reach the steel. Since the subject of protective coatings for steel work has been covered by thousands of printed pages, it does not seem possible to make any suggestions other than those gained from personal experience, consequently the specification writer is cautioned to make sure that the paint he specifies for shop and field work, is the best paint his judgment permits him to select. There are many sources undoubtedly known to specification writers, any one of which would give valuable information to the specification student.

The next paragraph in sequence should cover the making of inspections and tests on the structural steel. For some reason, it has been the practice to have the structural steel contractor pay a testing engineer out of his funds, the testing engineer usually being chosen by the architect or the owner. This practice is not to be recommended, as it is ridiculous to expect an absolute impartiality in the dealings between the contractor and the inspecting engineer where there are financial arrangements between them. The specifications should state quite clearly that the owner or architect will furnish the services of an inspecting engineer, who will act on behalf of his employer in the shop and field inspection of structural work and of all phases of the contractor's work. It is usual to require shop inspection on many operations of seemingly small magnitude, but the field inspection work has not been turned over to the attention of a testing engineer as frequently as has the inspection of shop work. It is equally important that the field work be inspected on the same basis as shop work in order that there may be the most complete assurance that all conditions laid down by the contract documents have been complied with. If the specifications for paint call for specific quantities of vehicle or pigment, or of constituents of either of these parts, the specifications should state that all the paint furnished will be inspected by the testing engineer. Reports of all tests should be sent to the contractor, to the superintendent of the architect on the work, and to the office of the architect, with copies to any other parties having interest in the information given in the reports. The specifications covering the employment of a testing engineer, should provide for the rejection of materials found not to be in conformity with the contractual requirements. This matter of rejection sometimes is rather difficult to handle unless the specifications are quite clear.

SOME COLONIAL LETTERING

BY WM. M. CAMPBELL

THE influences that were brought to bear on the architects and designers of the eighteenth century which stamp their work as Georgian or Colonial or by whatever name you wish to call it, were also at work on the men who had for their profession or side line, the art of lettering. Lettering during this period had its own characteristics and while the subject seems to have been fairly well ignored, it has enough of interest and beauty to make a little study of it well deserving of our attention.

Yesterday there was a wealth of material to choose from, today there is a good deal, and tomorrow there will be none unless those specimens that have withstood the ravages of time are placed in some interior place of protection.

The tombstone is perhaps the largest and most available source of the cut stone letter. Nearly every old graveyard in the East contains a number of interesting examples but wind and rain and frost have so attacked them that rubbings from many are quite impossible, as the letters have been worn away till nothing remains but a mere indication of what was formerly there. Fortunately many were made of slate and this material has weathered wonderfully well, and, except for the occasional spalling of the surface due to the cleavage of the material the letters on them will be found almost as fresh and clear as the day they were cut.

Fig. 1

Many of the early tombstones were apparently done by local stone cutters who had varying degrees of taste and skill, and to whom spelling was a useful, but not a fine art. A matter like putting the letter N backwards as in Figures 1 and 2 seemed to be small enough to overlook. In Figure 1 the first N is correct but the artist had a change of heart when he came to the next word and reversed it. Nor did the forgetting of a letter seem to be a particular cause for worry. In Figure 3 the cutter when he discovered his mistake frankly superimposed his new letter on the old one and continued his inscription. If he filled the mistake in it has since washed out. In Figure 4 the problem was solved by inserting a small letter over the space where it had been left out.

Fig. 2

In the early part of the century the chief aim of the inscription seemed to be to give information, and not particularly to please the eye, but in the later work more attention was paid to regularity, though in many cases with the gain in perfection of the letter, came a loss of robustness.

Noticeable also in the early work are the admixture of capital and meniscal letters in the same word, and the dotting of the capital I. An example of this is Figure 3 where a capital I has been used in the word James and a J used in the date 1714.

A crude but pleasing effect is seen in Figure 5. The varying size of the letters; the mixing of upper and lower case; the way in which the mistakes in spacing have been overcome; the dots and crosses that separate the words; and the little angels' faces all combine to make a very interesting composition.

Fig. 3
Christ Church Yard, Philadelphia

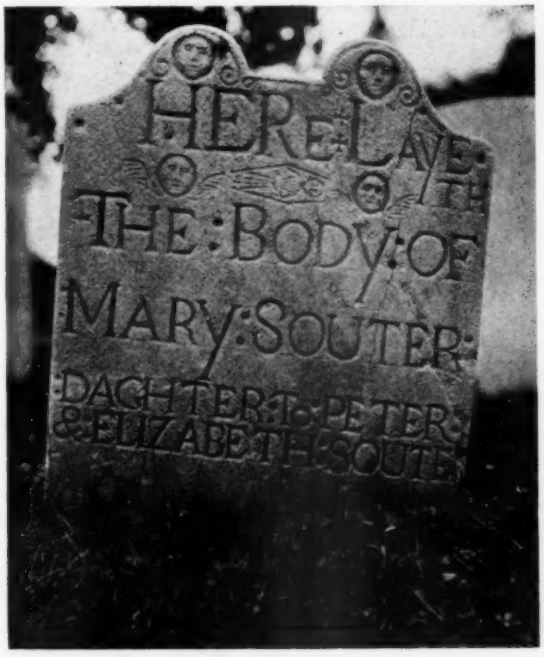


Fig. 5
Note the crude but pleasing effect displayed in this stone, particularly in the cutting of the first line

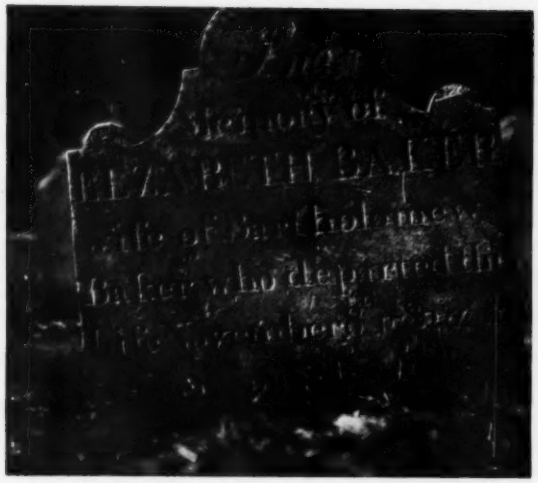


Fig. 4
Note the correction of the mis-spelled word "Elizabeth" and the method used by the stone cutter to effect it

Fig. 6
The stone carver has secured a great relief in the monotony of the lettering by an artistic admixture of capitals, small letters and italics

SOME EXAMPLES OF COLONIAL LETTERING

PROCLAIM LIBERTY THROUGHOUT
ALL THE LAND UNTO ALL THE
INHABITANTS THEREOF LEV XXV X
BY ORDER OF THE ASSEMBLY OF
THE PROVINCE OF PENSYLVANIA
FOR THE STATE HOUSE IN PHILAD.A

X.PR
D.A BY

PASS AND STOW
PHILADA
MDCCLIII

BY OR
D STO

Detail of Inscription on Liberty Bell

Fig. 7

Fig. 8

SOME EXAMPLES OF COLONIAL LETTERING

Interest was injected into the work by using different types in the same inscription, capitals, small letters, and italics being mixed in a way that was a great relief to monotony. Figure 6 illustrates this, as it also does the habit then in vogue of abbreviating words. This was quite common in the writing of the period and even found its way into the permanent inscription.

There were of course two forms of the small letter s, the long and the round, the former being used in the body of a word and the latter at the end. A number of letters were doubled or connected with the long s. A spelling book of the period gives the double letters as ff, ssi, ffl, fi, ss, sk, sh, si, sb, sl, ffi and st. Ct was also connected.

The inscription on the Liberty Bell is of raised letters. It is a pleasing combination of large and small capitals, the unimportant words in small capitals, the more important ones prefixed by a large capital and the most important ones in all large capitals. The diameter of the bell as the lower line of lettering is slightly greater than at the upper line, which in the rubbing, to reproduce with fidelity, would necessitate showing it in the form of an arc of a circle, the diameter of which is so large that the straightening out process made practically no difference. It has been shown in panel form but the lower corner inserts show the relation of one line to the other and to the bell foundry's name.

The bell was originally cast in England in 1752. It cracked, and was recast in Philadelphia by the firm of Pass and Stow in 1753 with the same prophetic inscription as had been originally cast on it in England.

War scenes in Wooden Shipyards

(From the original Aquatint by Frederick K. Detwiller)

LEGAL DEPARTMENT

Conducted by

CLINTON H. BLAKE, Jr., of the New York Bar

AT various times, I have discussed in these columns the right of the architect to a mechanic's lien and the protection which the Mechanic's Lien Law affords to him. We have seen that it is no longer necessary, in New York, for the architect to superintend the work done in order to support his right to protection under the New York Lien Law, and that, under the amended wording of this law, he can file his lien and collect under it, if he has prepared the plans and specifications used in the building operation, notwithstanding the fact that no superintendence was included, as a part of his duties.

A case has recently come before me, which leads me to add an extra word of caution with regard to this lien right. It is a right which is extremely important to the architect, and of which the profession is more and more availing itself. It is the only way in which the architect can protect his fee, when the client is not financially responsible, and in many cases is the only way in which a client, who is financially responsible but unwilling to pay, can be compelled to pay promptly. While a lien can be disposed of, so far as the property is concerned, by filing a bond, nevertheless, in many cases, rather than have it appear on record that the lien or bond is still outstanding, the owner of the property will dispose of the lien by making payment of the amount due and so remove any possible doubt as to the existence of any claim involving his real property.

The additional caution I have in mind relates to the ownership of the property. Under the law of New York, and under the lien laws generally, to give to the architect the right to a lien, the work for which he seeks to collect must have been done with the consent of the owner of the land affected. This is clearly right and in accordance with common sense. Otherwise, no owner of land would be free from the danger that a lien might be placed upon it at any time, as the result of unauthorized acts on the part of someone else and work done without the knowledge of the owner, at the instance of some third party who did not have authority to direct that it be done.

It is not necessary that the consent of the owner be direct, that is, it is not necessary that the owner specifically state, in so many words, that he consents. His consent may be implied from what he says or, conversely, in some cases, from his failure to say anything, knowing meantime, that the work is being done. Where an owner, seeing the work in progress, or having knowledge that it is progressing, fails to protest or inquire regarding it, he may impliedly, by this failure, in some jurisdictions, approve the work and be considered, under the law, as consenting to it.

Direct or implied, however,—and the decisions as to what constitutes consent vary with the circumstances in each case and jurisdiction—the consent must be had, if the lien is to be sustained and the right of the architect to recover under it upheld.

Where a client whom the architect does not know to be amply responsible desires to have work done, the architect should, if he wishes properly to protect his lien right, ascertain who is the owner of the property and, if the client is not the owner, then the consent of the actual record owner should be secured, before the architect proceeds.

It is a frequent thing, for instance, for a client to order plans and specifications, where the building in connection with which they are to be used is, or is to be, on land, which stands in the name of the client's wife. In such a case, if the wife is not acquainted with the fact that the work is being done, she is not bound by the orders given by the husband, and can successfully defend any attempt to charge the property with a lien. If, in the first instance, the architect, finding that the property is in the wife's name, has had her approve his employment and consent to the work being done, all complications on this point are avoided.

It is particularly desirable, of course, to get something in writing, showing the consent of the wife, or other actual record owner. This consent need not be of any formal character, but can be covered quite informally by correspondence or any other writing, so long as it appears that the person owning the property knows of the work to be done and the employment of the architect and approves, or, at the very least, does not object.

The ideal, of course, is not to do any work for any client whom you do not personally know and know to be personally responsible. Unfortunately, this is not a thing which professional men can always do. With an architect, as with a lawyer, a new client will often call, of whom the architect personally knows nothing. The work which the client brings in may be of real importance, and the architect may not have any opportunity to investigate the client's standing and responsibility, before making his decision to accept or reject the job. It may not, also, be possible, with tact and good feeling, to inquire of the client direct as to his responsibility. Where an architect accepts work under such circumstances, it is doubly

important that he have, if possible, an anchor to windward, in the form of the lien statutes, and that he so conduct himself and handle the situation, as to safeguard his right to take advantage of the protection which the statutes give him, if and when it becomes necessary for him to do so. There are very few, if any, cases where an architect cannot quite easily and by casual inquiry learn where the title to the property rests, and, by perfectly natural correspondence or memoranda, bring home to the record owner of the property notice of the work that it is proposed to do, or secure from the owner some form of letter or memorandum showing that the owner has knowledge of the improvement and approves it. It is manifest that attention to this point should be given early enough, so that the architect may not be placed in the position of doing a large amount of work and then finding that the consent of the true owner is not forthcoming. The consent should be taken care of before expense is incurred, or any substantial work done or obligations assumed, so that, if there be any hitch on this point, the architect may withdraw, without obligation on his part, and without facing any loss in time or money.

LEGAL DECISIONS

THE defendant employed the plaintiff, an architect, to prepare plans and specifications for a residence, and to superintend the construction of it. The architect prepared the plans and specifications and superintended the work, and the client, the defendant, paid him the full amount due therefor. Later, the client sold the house and had the architect prepare preliminary sketches for a new residence. Upon the submission of these sketches, the client found them unsatisfactory and rejected them and decided to use the plans for the first house in building the second. The architect had the original drawings from which blue prints had been made, and the client procured these from the architect, had new blue prints made from them and used these in the construction of the second house. The client took the position that, having paid the architect for his services in making these plans for the former house, they had become the property of the client and he had the absolute right to make use of them as he saw fit, without compensating the architect therefor. The Court held that, while it is probably true that one who employs an architect to prepare plans and specifications and pays him therefor, becomes the owner of the plans and specifications, unless the contract provides that they are to remain the property of the architect (citing Gibbon v. Pease, 2 Ann. Cas. 713) nevertheless, in this case, there was, in fact, an agreement between the parties that the plans should remain the property of the architect and, this being so, the architect was entitled to recover for the use of the plans and specifications in the building of the second house. It was urged further by the defendant, that the filing of the plans with the Building Inspector of the City made them public records, and that, in consequence, the architect lost all property rights in them. The Court, without specifically passing upon the effect of the filing of the plans, held that, in view of the definite contract between the client and the architect, they should remain the property of the latter, the question of the filing, as between these parties was immaterial, and the client could not take advantage of the claim that the plans were public records, as a defence to the claim of the architect.

McCoy v. Grant et al, 174 *Northwestern* 728.

WHERE a husband contracts for improvements on property belonging to the wife and a mechanic's lien is filed, it is not necessary, under the Kansas Statute, that the lien statement shall recite that the contract was made with the husband of the owner, and conversely, where the wife contracts for improvements on property belonging to the husband, it is not necessary that the lien statement recite that the contract was made with the wife of the owner.

Hardman Lumber Co. v. Blanch, 192 *Pacific* 742.

IT appeared that the building operation was substantially completed on September 20, and that the owner accepted the building and entered into occupancy eight days thereafter. It further appeared that, after the owner had taken possession, the contractor came in and replaced, at a cost of $3550. the work which had been defectively done. It was held that, under these conditions, September 20 might be taken as the true date of the completion of the building, so as to start running the time for the filing of mechanic's liens from that date. It was further held that imperfections in the performance of the building contract, which are so trivial that the contractor might recover, despite them, on the theory of substantial performance, are not such imperfections or failures to live up to the contract terms, as to prevent the filing of a mechanic's lien under the California Code.

Hammond Lumber Co. v. Yeager, 197 *Pacific* 111.

THE AMERICAN SPECIFICATION INSTITUTE

Member of The American Society for Testing Materials

19 South LaSalle Street, Chicago, Illinois

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

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

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

Publishers, The American Architect and The Architectural Review.

November Meeting of Chicago District

THE November meeting of the Chicago district was held at the Hamilton Club of Chicago on the evening of November third. The meeting was well attended and a spirited discussion lasting over three hours was had on the bulletins issued to date. The major part of the discussion was devoted to Bulletins No. 5, 8, 13, 14, and 16. All those attending the meeting entered into the discussions and many suggestions on the bulletins issued, as well as some of the bulletins contemplated in the near future, were received. As a direct result of this meeting the Institute has gained several new members.

It is hoped that the remaining districts will have monthly or bi-monthly meetings to quicken the interest of the members and of non-members who are eligible to membership, as well as to accentuate the important work that the Institute has accomplished.

A Compliment

The Executive Secretary's office has received a letter from one of the hard working members from which the following is quoted:

"I am pleased with Bulletin No. 16. It is a very fine document and I think that the Institute is well under way to find the best arrangement of subject matter that is to appear in the bulletins. I am thankful for this work and am glad indeed to have been able to contribute some small part to this result."

This encouraging letter is most gratifying to the Board of Governors, who hope that many other members will have the same feelings although it is not essential that their sentiments be expressed as delightfully as this member has done.

Issuance of Bulletins to Non-Members

The Board of Governors is attempting to evolve a rule governing the issuance of bulletins to non-members to comply with numerous requests from foreign countries as well as continental United States. Many of these inquiries have come from professors in architectural schools, who have in their charge the instruction of students in specifications and contract subjects, as well as from the students themselves. The basis on which the Board of Governors is working contemplates the issuance of bulletins under such rules that in any one year it will hardly be possible for a non-member to obtain bulletins of interest to him at a price totalling less than the cost of the annual dues. In the case of students, some relaxation of this rule

CHURCH OF ST. AGNES, ROME, ITALY