SOUTHERN ARCHITECT and BUILDING NEWS

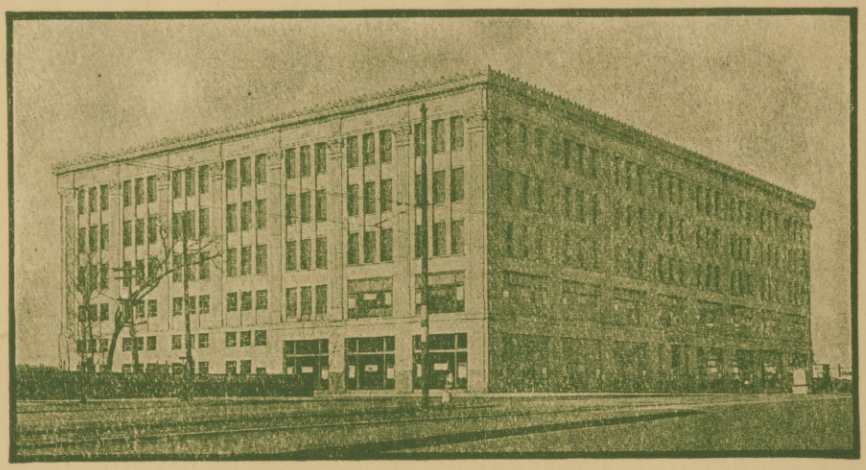
MAY
1930

CIRCULATION IN THE SEVENTEEN SOUTHERN STATES
2 TO 5 TIMES LARGER THAN ANY ARCHITECTURAL JOURNAL

MILD DAYS MEAN MILD HEATING

(and 25% fuel saving)

WITH DUNHAM DIFFERENTIAL HEATING



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C. A. DUNHAM CO.
DUNHAM BUILDING
450 E. Ohio Street Chicago, Illinois

SOUTHEASTERN DIVISION
SALES OFFICE
FORSYTH BUILDING,
ATLANTA, GA.

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The Editor's

ANNOTATIONS

FROM every right consideration, economic, aesthetic and the general beautification of our cities and towns, the greatest need of our age is a united vigorous effort to bring all building under the domination of true architects. Will it ever be done? Can it be done? Only the architects themselves can give us that.

"America has splendid architects, but their influence does not reach far enough. It is still a fact that most of the smaller homes of the country are built without help of good architects, and the results are sorry, indeed. We have architectural quality; what we now need is architectural quantity." This is the thought of an intelligent newspaper editor who has the vision to see and the courage to speak the truth. What is the answer?

I have a letter from the president of one of the South's leading Art Associations; a man who has gained for himself an enviable position in the business world which tells us how the great need can be accomplished. "I see no reason why architects, competent ones, should not advertise. There is no reason for men of genius, as most of them are, to hide their light under a bushel. A great many people know about architects and employ them in their building operations. Many I am sure do not employ architects, because they know very little about them. They probably regard them as temperamental and impractical, and perhaps supernatural individuals, who carry their heads high, not desiring to come into contact with the common herd of business men. It is fine to hold to professional ethics. At the same time, there is no reason why the public should not know the truth about architects; that their services may be had at reasonable prices; that they give value received for fees paid them. As I see it an architect's fee does not cost a building owner anything. It is practically free because of better plans, better work, and a saving of money in construction that far offsets his commission. Advertising is one way to give the people a proper understanding of the value of an architect's services. The value of architectural service does not stop with good building, in efficient service, and in the saving of cost—there is an artistic side which should be considered—by all means advertise."

As I see it, the architectural profession today stands at the parting of the ways. To stand still simply means that as a profession it will be engulfed in the mighty waves of many combined forces within the building industry, forces which are already fast making inroads into the channels of legitimate architectural practice. Are our architects being out stripped in the art of economic building, in refinement and good taste and finally in successful building? I am sure they are not. But, how has this condition come about? It does not require deep research to determine the answer—simply the failure of the architectural profession to maintain a close contact with the public, who are acting just like human beings throughout the ages have acted—spending their money with those who are constantly trying to arrest it from them.

Will the architectural profession remain static and be swallowed up or will it move forward resolute and determined to conquer the slashing waves of a yet unchartered sea? That is the question. I think we shall know about this after the meeting of the A. I. A. this month at Washington.

DISPLAY WINDOW

THE NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

GREENE, LAROCHE & DAHL, ARCHITECTS

VOLUME LVI
No. 5

SOUTHERN
ARCHITECT
and BUILDING NEWS

MAY
1930

ARCHITECTURE and MERCHANDISING

BY

E. B. LAROCHE

Greene, LaRoche & Dahl, Architects

EVEN the most unobservant frequenter to the retail shops along the streets, avenues and boulevards of our American cities today must recognize the handiwork of the architect, for architecture is being applied with new and intriguing vigor in the realm of retail merchandising as it has never been applied before. There is no reason why architecture, good architecture, should not have been used more advantageously in the past but, then, we did not know so much about the big and ever bigger problem of selling, nor has the public demanded so much in the way of art as at the present moment. Madam is becoming more fastidious, quite more tasteful and weighing the looks and value of her purchases with a great deal more thought than she has for, lo, these many years. Consequently, the merchant has been forced to put out or get out—that is, he has found it good business to display his wares in the most attractive fashion and with a background that sets off his merchandise to the very best advantage.

The architect's big problem is, of course, centered about the department store which presents many ramifications which require an unusual amount of study both as to plan, general exterior design and interior embellishment. There are some merchants and still some architects who consider a department store building as just a "dressed up warehouse" and are content to give their clients a good looking street elevation and some times a first floor interior that is pleasing, and then for the balance of the building leave the various floor interiors simply four plain walls and some columns; whereas in many stores there is more volume of business done on some of the upper floors than on the first floor. Therefore, to have a well balanced and properly designed interior on all selling floors, careful study must be given to the exposed interior building surfaces so that the finished structure presents a proper and attractive home for the merchandise which is to be housed, displayed, and sold. Go wherever you may, you will find the largest number of purchasers thronging the shops and stores where architecture and art in merchandising have become wedded into the happy selling family.

The original unit of the present Neiman-Marcus Store located at Main, Commerce and Ervay Streets, Dallas, was completed in 1912. The first unit covers a ground area one hundred feet square, provides a basement and four floors, and was designed to permit eight additional stories. The frame is of steel.

The policy and ideals of the Neiman-Marcus Co. have been to offer to the women of the Southwest individual shops of outstanding distinction, each featuring merchandise of appropriate appeal and having its own atmosphere of spaciousness, smartness and artistic appeal, all blending into an ensemble of restrained good taste.

The fact that this policy has met with public approval is attested by the growth and success of the business, the demands of which so developed that in 1926 the owners decided to double the capacity of their physical plant. Mr. Herbert M. Greene was the architect of the original building and the succeeding firm, Herbert M. Greene, LaRoche & Dahl, were commissioned to design the new unit together with the necessary remodelling of the old. The new addition, like the first unit, covers an area of one hundred feet square, and has a basement and four floors with provision for eight future stories.

The most important problems involved were: first, to create an exterior design that would utilize the facade of the existing building and still bring about a more imposing exterior; second, to remodel the existing interiors to conform to the new treatment desired in such a way that the final result would present a unit in all respects. All to be accomplished without interfering seriously with the daily performance of business.

DETAIL OF DRESS SALON

THE NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

GREENE, LAROCHE & DAHL, ARCHITECTS

ENTRANCE TO MEZZANINE FLOOR

SHOE SALON ON
MEZZANINE FLOOR

NEIMAN-MARCUS
DEPARTMENT STORE
DALLAS, TEXAS

DETAIL IN ONE OF THE FOYERS

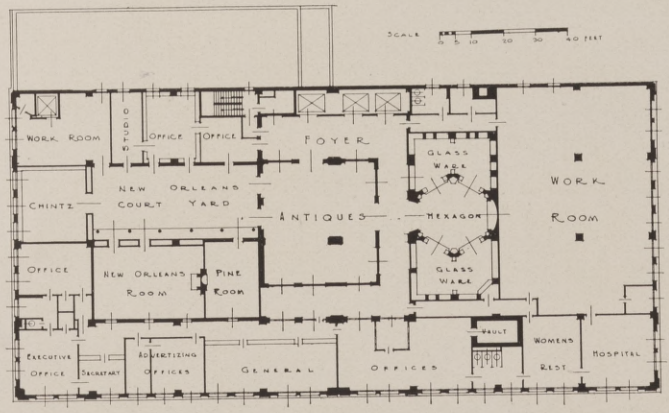
THE BEAUTY
SALON

NEIMAN-MARCUS
DEPARTMENT STORE
DALLAS, TEXAS

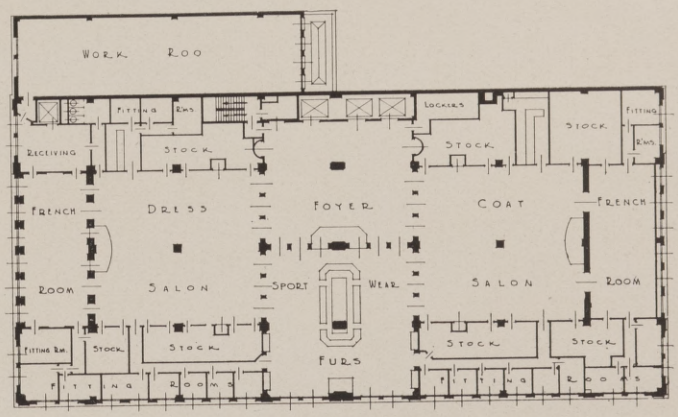
ENTRANCE TO BEAUTY SALON

THE NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

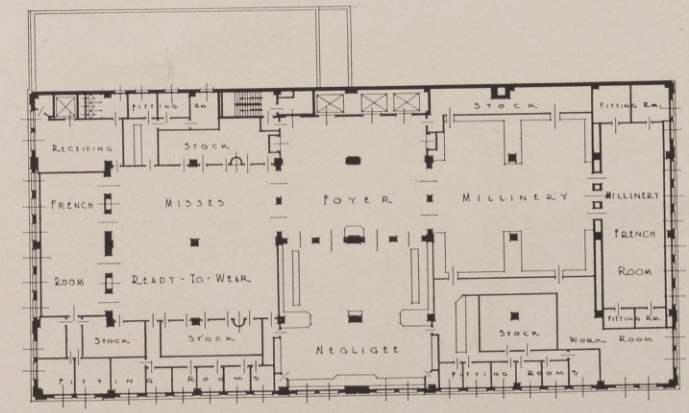
GREENE, LAROCHE & DAHL, ARCHITECTS



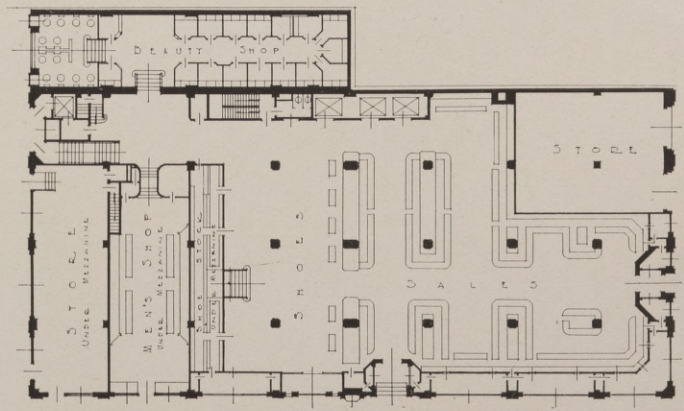
FOURTH FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN



FIRST FLOOR PLAN

THE NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

GREENE, LAROCHE & DAHL, ARCHITECTS

DETAIL IN BEAUTY SALON

THE NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

GREENE, LAROCHE & DAHL, ARCHITECTS

The completed building presents three street fronts all in terra cotta. To accomplish this result brick facing originally used between the terra cotta pilasters was removed and new terra cotta used in its place.

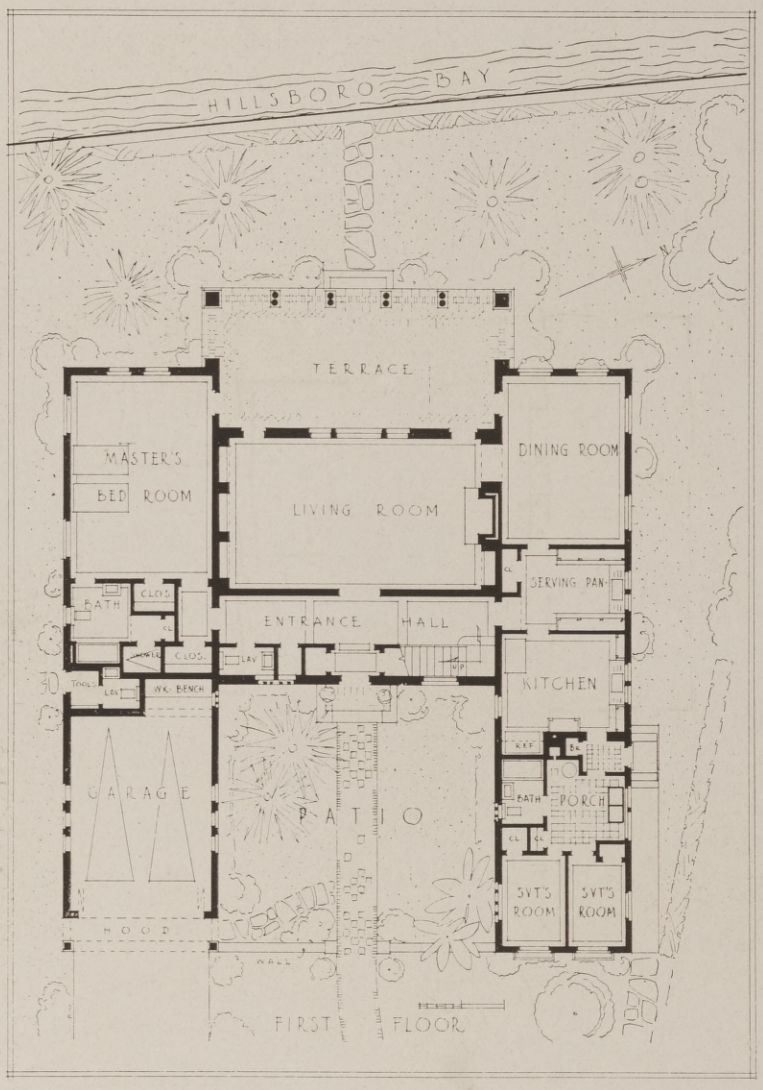
The floor plans show results obtained in location and layout of the various shops. The old elevators were changed to a new location and additional elevators added. The interior views convincingly demonstrate the fact that there is no separation between the old and new portions, either structurally or in architectural treatment. Ceilings in the main selling areas are gently vaulted in plaster; dignified detail, appropriate decoration and quiet, restrained fixtures, together with distinctive flooring materials and a generous spaciousness throughout produce an interior that has attracted wide attention and admiration. That part of the fourth floor space in which is located an interior decorating shop is of special interest.

DETAIL OF FOYER
SHOWING ENTRANCE TO ELEVATORS

All of the construction work was done by the Watson Co., builders of Dallas, on a "fee basis" contract. Their splendid co-operation in carrying out the designs and enabling the owners to continue their daily business with minimum inconvenience is deserving of the highest praise.

THE FRENCH SALON, NEIMAN-MARCUS DEPARTMENT STORE, DALLAS, TEXAS

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.
FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS

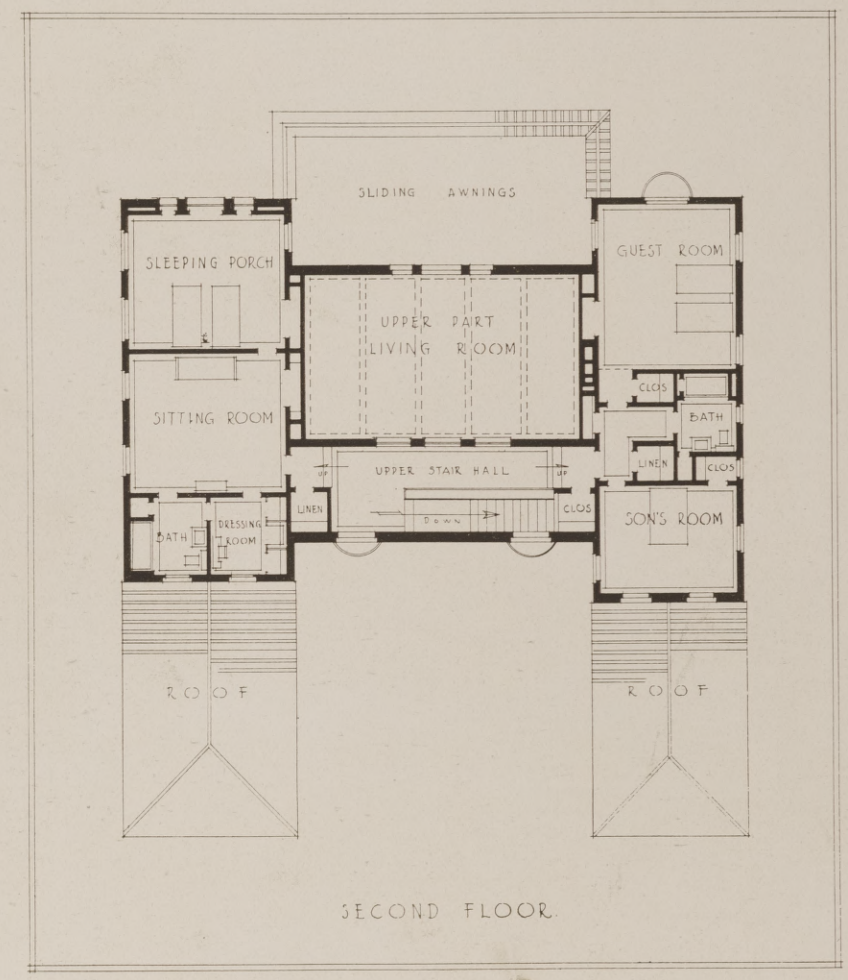


FIRST FLOOR PLAN

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.

FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.
FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS



SECOND FLOOR PLAN

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.

FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.
FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS

HOUSE OF S. E. THOMPSON, ESQ., DAVIS ISLAND, TAMPA, FLA.
FRANKLIN O. ADAMS AND J. M. HAMILTON, ARCHITECTS

ADOLPH S. OCHS MEMORIAL TEMPLE, CHATTANOOGA, TENN.
BEARDEN & CRUTCHFIELD, ARCHITECTS
HENRY B. HERTS, ASSOCIATE ARCHITECT

A Simple Expression of an Ideal
Characterizes the Architecture of

THE OCHS MEMORIAL TEMPLE

By

Ray Holcombe

"AMERICA is cursed with bigness. The very vastness of our continent, the sweep of our plains, the rugged height of our mountains strains our nerves and fevers our brains. We strive to match the bigness of nature in our industrial enterprises, in our Gargantuan cities, where Towers of Babel by the score jostle and jabber at each other. Our dreams are the phantasmagoria of giants moving mountains, shifting oceans, and reshaping a universe as a sculptor twists his clay"—such is a word painting of Mr. Louis La Beaume's impression of modern life in America.

No wonder then that we find delight in the simplicity, the peace and quiet of this noble little edifice which Mr. Adolph S. Ochs of New York, has given to the people of Chattanooga. Erected as a memorial to his father and mother, it furnishes the place of worship for the Mizpah Congregation, which is the reformed Jewish Congregation in Chattanooga, but was built with the hope that it would form a common meeting place for all creeds and faith. In search of a style which would portray this broad idea of Mr. Ochs, the architects turned to the colonial as exemplified in the early buildings at the University of Virginia. The work was begun by Charles E. Bearden, associated with Henry B. Herts of New York, but in its complete form was the work of William Crutchfield.

A wide monumental stair of white marble leads from McCallie Avenue, one of the main thorough-

THE CHAPEL, ADOLPH S. OCHS MEMORIAL TEMPLE, CHATTANOOGA, TENN.
BEARDEN & CRUTCHFIELD, ARCHITECTS HENRY B. HERTS, ASSOCIATE ARCHITECT

THE UPPER FOYER, ADOLPH S. OCHS MEMORIAL TEMPLE

fares of the city, to the temple which stands on a rise above the street. One enters a loggia bearing on either side a beautiful memorial tablet carved in Caen Stone and bearing some of the sayings of the former Rabbi, Julius Ochs. The loggia is paved in black and white marble, has a high groined ceiling and is lit by ornamental tripods throwing the light on the ceiling. The doorway has a marble frame and pediment over which is a marble tympanum carved in bas-relief, picked out in color. This is the work of Mr. Duncan Smith, sculptor of New York City. The surface exterior of the building is of a dull, sand-faced, wood-moulded brick, trimmed in white marble and the idea was to produce a look of age.

Inside, one enters a foyer with white marble spiral stairs leading to the second and auditorium level. These stairs have metal balustrades trimmed in silver with mahogany rails. The upper foyer is in reality a reception hall and is furnished luxuriously in pieces of colonial furniture, with handsome Persian embroideries on the walls and antique oriental rugs on the floor. From the foyer one gains access to the auditorium, which is a high-vaulted room with white marble aisles, ivory panelled wainscots and pews of mahogany and ivory. The ark, which is on the pulpit, is also done in the colonial manner. On either side of this pulpit are the organ chambers, Rabbi's study, choir room, etc. This auditorium is hung with ecclesiastical blue satin hangings at the windows and all upholstery is of the same ecclesiastical blue satin. All of the lighting fixtures are in silver and blue and the wall fixtures have embossed on them the twelve insignias of the twelve tribes. This building is equipped with a very beautiful organ and organ concerts are given every so often to the general public.

Adjoining this building is a community house which takes care of a small chapel, parlors for both ladies and men, Sunday school rooms, entertainment room, which can be used for dances, banquets, etc., a heating plant for both buildings and also the secretary's and Rabbi's office. The building is carried out in a colonial style and the same materials were used on the outside.

In concluding this comment we can do no better than apply to this structure the final words of Thomas Carlyle in his criticism of Chelsea Hospital, England: "I had passed it, almost daily, for many years without thinking much about it, and one day I began to reflect that it had always been a pleasure to me to see it, and I looked at it more attentively, and saw that it was quiet and dignified and the work of a gentleman."

THE LOWER FOYER, ADOLPH S. OCHS MEMORIAL TEMPLE, CHATTANOOGA, TENN.
BEARDEN & CRUTCHFIELD, ARCHITECTS HENRY B. HERTS, ASSOCIATE ARCHITECT

SOUTHERN BELL
TELEPHONE AND
TELEGRAPH BLDG.
LOUISVILLE, KY.

MAYRE, ALGER & VINOUR
ARCHITECTS

Pitfalls May be Avoided by
Careful Advance Study of

OFFICE BUILDING ECONOMICS

By

WALTER J. ARING
The Ferguson Company

A BANK or commercial building must be something more than a work of art or a monument to pride. It must pay its way and yield dividends. No matter how impressive a building may be, if it is not a good business investment, it is a monument to neglect of economic and engineering fundamentals that are vital to the success of the enterprise.

For over thirty years I have been engaged in the development of commercial property. As construction executive, owner's representative, architects' supervisor or consultant, I have had an opportunity to study buildings from every possible standpoint.

Some projects have proved unsuccessful; others have surpassed expectations of their owners. In the majority of cases the earning power of the property could have been increased had greater care been used in fitting it to the purpose for which it was intended.

A building that is built to rent must be designed primarily to suit the requirement of tenants. It must grow naturally out of the needs of the community for better facilities. What the investor requires is accurate knowledge of those needs. These basic economic facts can readily be obtained by consultation with qualified specialists and can be checked with owners and managers of successful existing prop-

THE SOUTHERN RAILWAY BUILDING, WASHINGTON, D. C.
WADDY B. WOOD, ARCHITECT

THE TOWER BUILDING, WASHINGTON, D. C.
ROBERT F. BERESFORD, ARCHITECT

erties and with occupants. They can furnish facts and figures concerning their experience and outline what they consider ideal facilities for their business.

Thousands of dollars and much valuable time are thrown away in alteration work, much of which can be avoided by intelligent forethought. Worse than this is the loss to the tenant who pays well for space in an attractive new building only to discover that his space is unsuited for his purpose.

Several years ago I was called to a city in Ohio to consult with a banker in regard to a twelve-story combined bank and office building which he planned to erect on a 32-foot lot. The drawings, which were ready for bids, provided for a tower of modern set-back design. The first floor, which was to be devoted to banking use, was without columns. Beams and girders of enormous depth were required to support the upper floors. At each set-back a similar condition existed, because the columns for the upper floors were staggered above the lower columns. Space equivalent to the cubes for two entire floors was wasted by the excessive depth of steel members. Of course the total steel tonnage for the building was entirely out of proportion for the size of the structure.

The arrangement of the columns also prevented an advantageous location for elevators, stairways and service facilities, so that the available renting space was small in area and undesirable.

Of course all concerned were deeply disappointed to have their plans for a monumental tower building cut to pieces, but fortunately for the banker a monumental blunder was avoided.

A few months ago I was asked to go to a large middle western city to see the plans for a twenty-two story bank, office and medical building. It was to be located in a secondary business center which was at a considerable distance from the main center of the city.

No survey had been made to determine the number or character of tenants or the prevailing price of space in the locality. They had provided for a number of exclusive retail shops on the first floor without considering the fact that third-rate stores prevailed in the section. In their study of the office portion of the building they apparently failed to realize that business concerns of the type they hoped to attract object to the presence in the building of a large number of doctors and dentists. Sick and crippled patients in elevators and halls, and odors of anaesthetics and disinfectants are out of place in an office building.

Even the layout for the banking space was faulty, for the office building design had been emphasized in spite of the fact that the bank space was the most expensive and important part of the building. The elevators, stairs and service facilities for the upper floors were brought down through the center of the bank space so that the bank had to be laid out around them.

When a tenant pays the price of space in an up-to-date office building, he has a right to expect that every foot he pays for will be usable. A study of local usage will reveal the accepted width between walls that is suitable for economical layout of offices. I am well acquainted with a large office building which is one of the landmarks of the city in which it is located, in which the floors are so planned that the distance between outside walls is fifty-eight feet. In some cases offices are as much as thirty-seven feet in depth, while the average is twenty-five feet. Every office has to pay a part of the cost of an extra five to fifteen-foot strip that often is poorly lighted, and in the majority of cases is of no use. The investor also loses because he cannot charge for such space at the prevailing rate for useful space.

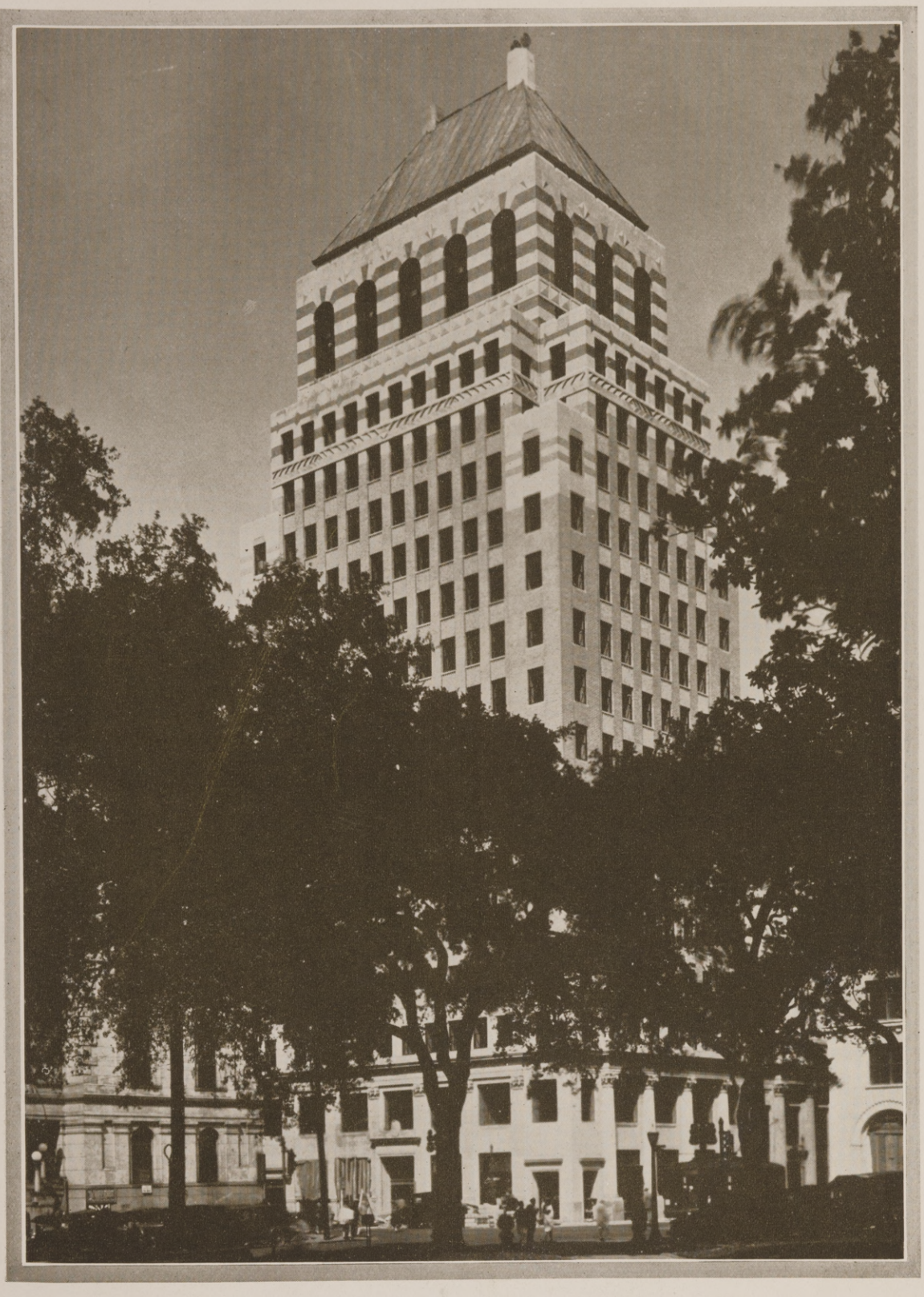
Good architecture is vital to the success of a business property. The public has been educated to expect beauty and style in everything it uses, and revolts against the ugliness of a bare utilitarian building. But good architecture is not a veneer. Goodness must go through and through.

There needs to be a wider recognition of the fact that good architecture does not necessarily call for a display of garnish ornament. In fact a great deal of very bad architecture may be covered up by marble and gold-leaf. The real beauty of a building is the product of skill in the proportioning of mass, and judgment in the choice and combination of materials.

Much is being said nowadays about obsolescence. Most economists agree that, as in the case of the weather, there is very little we can do about it. But we can insist that our buildings shall embody the very latest improvements that modern science can offer.

The last five years has seen a greater advance in the development of elevators and elevator machinery than was made in all the previous years in which elevators had been used. A friend of mine who has charge of a building that was finished about twelve years ago, told me recently that an estimate has shown that it will cost about seventy-five thousand dollars to replace the old elevators in his building with equipment of advanced type, embodying multivolt control and floor leveling devices. It is difficult, and in many cases impossible, to avoid occurrences of this kind, but they can be reduced to a minimum if the architect insist on material and

(Continued on page seventy-one)



MERCHANTS NATIONAL BANK BUILDING, MOBILE, ALA.
WARREN, KNIGHT & DAVIS, ARCHITECTS

Photos: By Tebbs & Knell, Inc.

LIBRARY, WESLEYAN COLLEGE, MACON, GA.
HENTZ, ADLER & SHUTZE, ARCHITECTS

LIBRARY, WESLEYAN COLLEGE, MACON, GA.
HENTZ, ADLER & SHUTZE, ARCHITECTS

READING ROOM

LIBRARY, WESLEYAN COLLEGE, MACON, GA.

HENTZ, ADLER & SHUTZE, ARCHITECTS

HOUSE OF LYNN B. RIDDLE, ESQ., TULSA, OKLA.
JOHN DUNCAN FORSYTH, ARCHITECT

ENTRANCE
LYNN B. RIDDLE HOUSE
TULSA, OKLA.

Modernism Cannot Supplant
Regional Fitness in

SOUTHERN DOMESTIC ARCHITECTURE

By Ernest D. Ivey, A. I. A.

THE enthusiasm of visitors from the East and their remarks concerning the "native savour" which, as they say, "seems to predominate in all our domestic architecture here in the South," has been so forcefully drawn to our attention recently we cannot refrain from giving vent to some long pent-up thoughts in our mind regarding this one particular characteristic which lends a note of distinct individuality to our houses. For this discussion there has been selected three examples, two country houses and one city house, which seems to possess, and well illustrates that significant and charming characteristic which, as Louis La Beaume remarked in reporting for the jury of awards for the recent Southern Architectural and Industrial Arts Exposition, "intrigued the entire jury."

It is a matter of record that architecture—good architecture—down through the ages in every country has been, and always will be, a logical expression of the habits, taste, social instincts and economic standing of the people. The form and details of all building varying in certain sections of each country according to the varying climatic conditions, the accessibility of basic materials and with the contour of the landscape. We should not expect to find, for instance, the people of the mountain sections building the same type houses as those of the great plains country. This is good reasoning, pure and simple. Each little corner of England, we know, developed its own technique of building, and the traditions of this technique persisted without much wavering before the winds of fashion for long periods. Local peculiarities and customs, weather conditions, economic necessities and accessibility of materials slowly

HOUSE OF CAM DORSEY, ESQ., ATLANTA, GA.

HENTZ, ADLER & SHUTZE, ARCHITECTS

ENTRANCE DETAIL, CAM DORSEY HOUSE

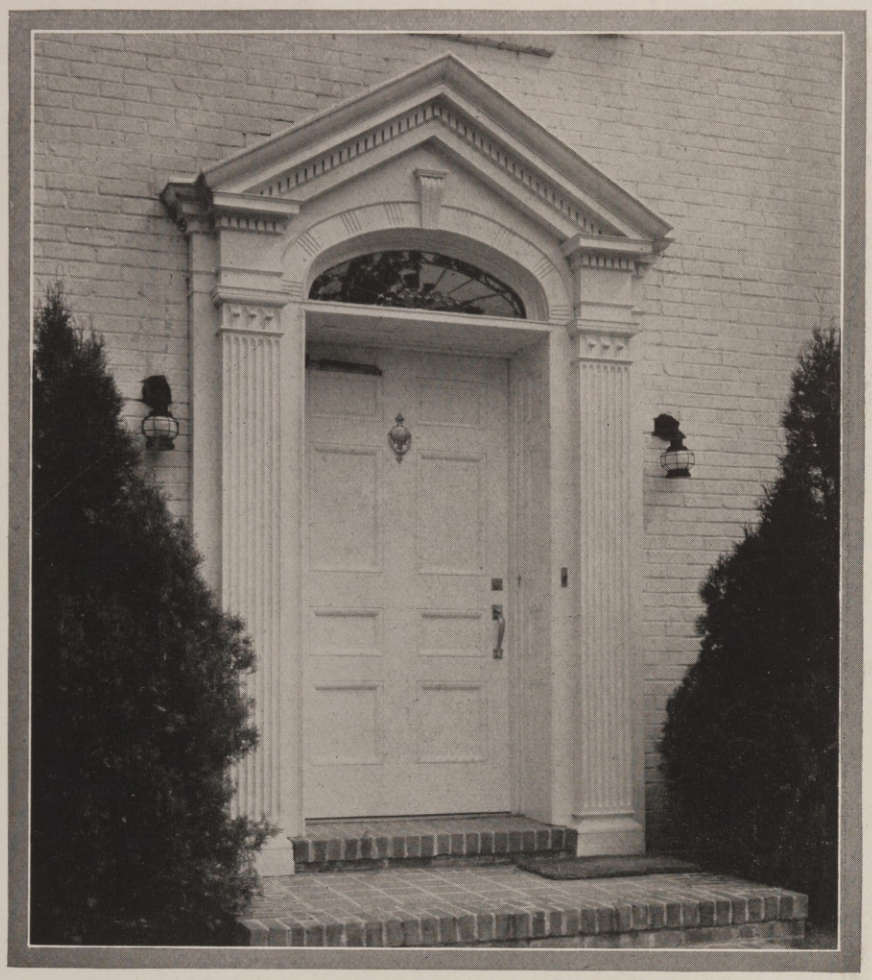
brought forth a knack of building to be handed down from father to son; a craftsmanship simple and pure. Today we look upon these buildings as among the finest of all the architectural treasures which have been handed down to us.

The very qualities which so strongly attract us to the old work, we acknowledge, are those which are most difficult to gain under our present-day working conditions. Irregularities in timbers for instance no longer exists, for they are milled to a uniform size at great distance from where they are eventually used for building. To frame a roof with straight timbers in such a manner as to imitate the winds and sags of the old roofs would be an unpardonable offense. Though this be true, yet, with workmen here in the South who are in sympathy with our local traditions and with architects who appreciate that intangible something called "personality," we are still able to produce houses which will perpetually hold our interest, and this will be the case so long as we continue to heed the dictates of a strong traditional consciousness. "American architecture," says Charles D. Maginnis of Boston, "will gain greatly if the sentiment of local individuality is not permitted to be submerged in a dead national monotony." The better will be our American architecture as time passeth with the eventual elimination of that unpardonable effort on the part of a few silly "nationalists" who are always seeking an opportunity to standardize and nationalize everything, even architecture.

John Taylor Boyd, writing in the March issue of "Arts and Decoration," speaks convincingly of this localism in architecture which we believe to be the South's greatest asset. Mr. Boyd says, "There is an eternal principle in art, and architecture is an art, namely, that art must be solidly based on the climate and character of the region. We had forgotten that truth, in our concern with universal factors in art. Whether it was world styles, revivals, periods, psychology, standardization, cosmopolitanism, internationalism, or the recent modernism, none of these could supplant regional fitness. Until recently the regional character of architecture was only slightly recognized. The point is that the influence of natural environment is decisive on the art side, as much as on the construction side."

"It occurs chiefly in the shapes, the scale, the

HOUSE OF CAM DORSEY, ESQ., ATLANTA, GA.
HENTZ, ADLER & SHUTZE, ARCHITECTS



ENTRANCE, HOUSE OF HUGH RICHARDSON, JR.

contours and colors of the landscape; in the character, scale and color of the planting; and in the quality of light, in the atmosphere, with its subtle influence in the light that is reflected from the sky, land and water, and on the play of light and shadow and shade. The effect of these on architecture cannot be ignored, or a house will be out of harmony with its site."

"One of the worst errors of the Victorian era was to either ignore or to minimize the regional fitness. The general tendency was to force a typical Georgian or picturesque style of house on any landscape, whatsoever, with as little change as possible. This tendency still persists today in some sections. So let us hope," says Mr. Boyd, "that the people of the Southwest and of the Southeast, will in time, become our true meridionals, and will give to American civilization that emotion in building which is so much needed."

The majority of our architects in the South are doing their houses different. They have a characteristic that literally sticks out. Not dormers, chimneys, columns, of course. Something that the untrained might not be able to see, but nevertheless it is there. We are speaking of personality, local sentiment, those qualities which will keep our contemporary architecture alive when the present changing fashions of other sections will have been cast aside for another more startling fashion. Our climate, our landscape, our instincts will not permit an inter-breeding with that architecture of any other section of this country, though excellent as it may be. There is no place for a bastard architecture in the South.

The point we are trying to get over is perhaps best expressed in relating a story which Mr. Grosvenor Atterbury of New York, tells concerning a visit of St. Gaudens, the sculptor, to his mother's old home. "He came over to see us," says Mr. Atterbury, "I remember, soon after the house was built and we began to be afraid he did not like it because he was silent all during the tea. Just as he was leaving he turned to my mother and said, in his soft, hesitating way, 'You know, when I see anything very beautiful I feel a pain. This house,' he said, looking around, 'gives me a pain!'" What would not one give to have invented this jewel of architectural criticism?

HOUSE OF HUGH RICHARDSON, JR., ATLANTA, GA. R. S. MONDAY, ARCHITECT

Analyzing the Acoustics of SOUND MOTION PICTURE THEATRES

By

W. KEITH FRIEND, *Engineer*

The American Seating Company

THE purpose of this article is to throw more light on the subject of acoustics as it is related to the sound motion picture theatre, by showing how the acoustical properties are determined, the factors involved and how the proper corrections are applied.

Before the advent of the talking picture, little thought was given to acoustics of picture theatres. Consequently, since the establishment of the "talkie," many theatre operators have found their houses inadequate acoustically for the satisfactory projection of sound.

The acoustical properties of the theatre itself must be considered independently from the sound projecting equipment. For the sake of this discussion, the projecting equipment will be assumed to be performing perfectly and attention will be directed to the acoustics of the theatre itself.

In a previous article appearing in "Southern Architect," the common acoustical faults were set forth as being improper distribution of sound energy within the room and excessive reverberation or the continuance of the sound for too long a time before becoming inaudible. There are other factors affecting architectural acoustics in general but these are largely overcome in the case of reproduced sound in theatres through the ability of the operator to increase the loudness of the sound over that of ordinary speech.

In the previous article, the factors surrounding faulty distribution of sound energy in a room were enumerated and their correction or means of prevention set forth. Fortunately, cases of objectionable sound distribution are comparatively few in number, the larger portion of acoustical trouble by far being excessive reverberation. In the few cases of acoustical correction of sound theatres which do happen to involve other outstanding faults in addition to excessive reverberation, the reduction of the reverberation period does much to mitigate the other difficulties. The reverberation period may be termed the key to the hearing conditions, the hearing conditions improving with the reduction of this period.

The optimum or satisfactory reverberation period is the time allowance for reverberation consistent with good hearing for the particular room in mind. The optimum reverberation period varies according to the volume of the room. The larger the room, the longer the reverberation time can be without interfering with satisfactory hearing.

TYPICAL THEATRE ANALYSIS. In order to make an acoustical analysis, it is not necessary to see the theatre, unless the room posesses some unusual features, providing a complete set of architect's plans can be obtained. Sabine's formula for computing the reverberation period, it will be remembered, holds the following relation:

$$t = \frac{.05\ V}{a}$$

where: t = the reverberation time in seconds
v = volume of room in cubic feet
a = total units of absorption in the room.

Assume for the purpose of illustration, a typical motion picture theatre, the plan and elevation sketch of which are shown in Figure 1. The main floor and balcony floor will be assumed to be concrete with carpeted aisles and the total seating capacity to be 1,500. The stage floor will be varnished wood, the walls partly hard plaster and partly glass, and the ceiling flat and finished with hard plaster.

The factors effecting the good distribution of

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In the residence of Mr. Howard F. Smith, Provencal Road, Grosse Pointe, Michigan, there are seven telephone outlets at convenient locations. They include one in the garage, and one in the children's wing of the house. RAYMOND CAREY, Architect, *Detroit, Mich.*

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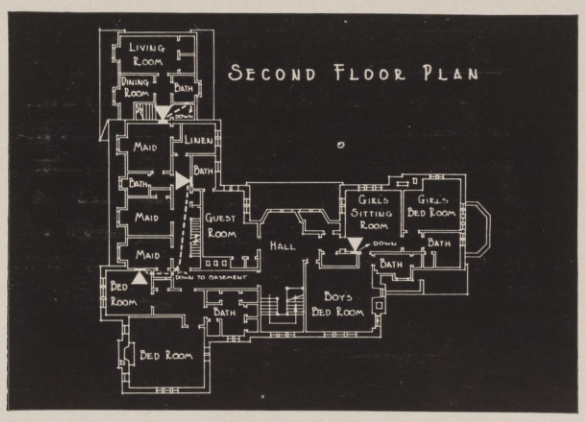

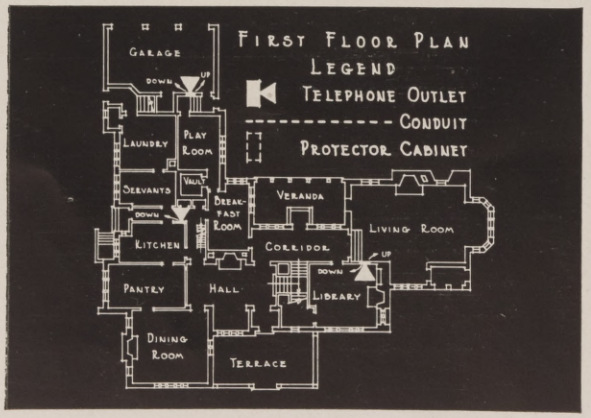

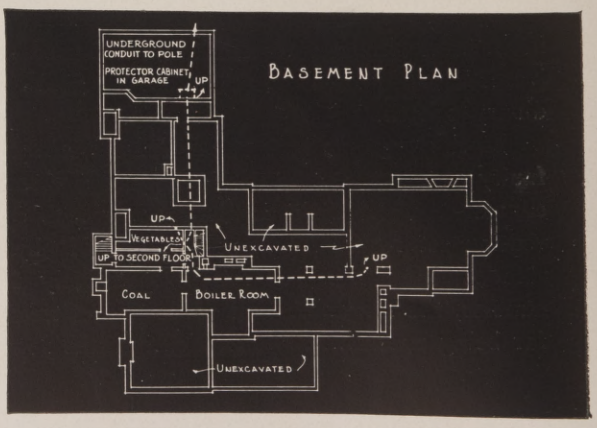

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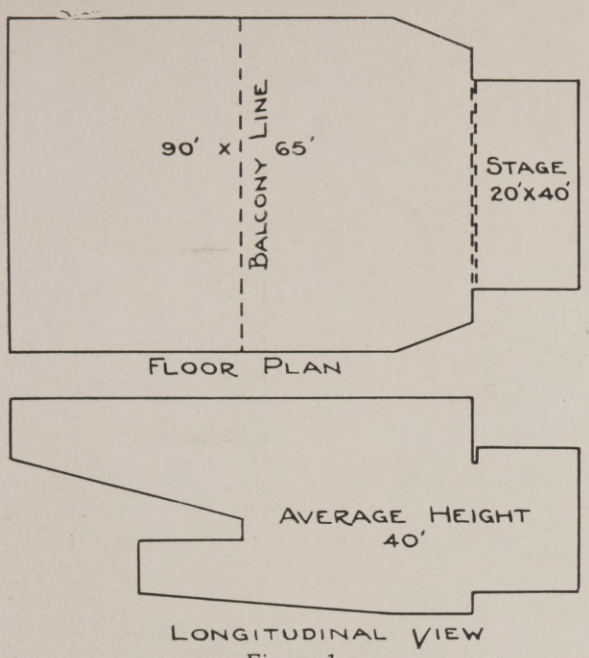


Figure 1

sound energy have been set forth previously and it is seen that this room complies favorably with these requirements so it can be safely predicted that the distribution will be satisfactory. The problem then resolves itself into one of excessive reverberation. The calculation of the reverberation periods follows:

It will be remembered that the total absorption of the room is the sum of the absorption furnished by the various kinds of surfaces and furnishings in the room. The areas of the various materials are found and multiplied by their absorption coefficients. Coefficients of sound absorption have been determined for most materials of construction. These coefficients are expressed in terms of the amount of absorption the materials possess per sq. ft. compared to 1 sq. ft. of open window which is accepted as the unit and is said to be 100% absorptive and thus have a coefficient of one. The sound absorption coefficients for common materials are given in Table I.

COEFFICIENTS OF ABSORPTION. Table I. The following coefficients are taken from the published works and test data of Professor Wallace C. Sabine, Professor F. R. Watson and Bureau of Standards. They are for the standard pitch of 512 vibrations per second:

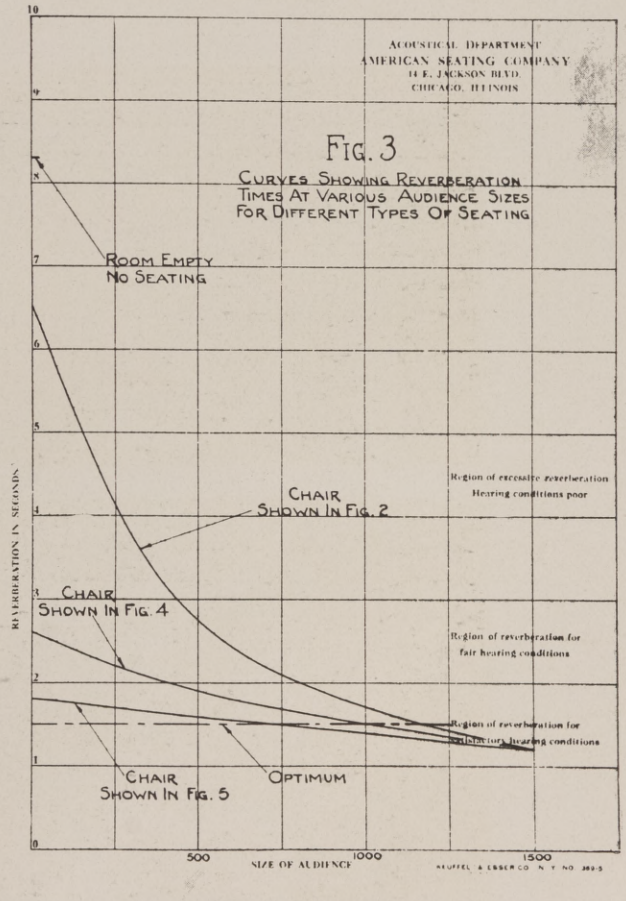
	Units per Sq. Ft.
Open Window	1.00
Plaster	.025 to .034
Concrete	.015
Brick set in Portland Cement	.025
Marble	.01
Glass, single thickness	.027
Wood Sheathing	.061
Wood, varnished	.03
Cork Tile	.03
Linoleum	.03
Carpets	.15 to .29
Cretonne Cloth	.15
Curtains in heavy folds	.50 to 1.00
Hairfelt ½" (Johns-Manville)	.31
Hairfelt 1" (Johns-Manville)	.59
Flaxlinum ½"	.34
Sabinite Acoustical Plaster	.21
Acousti-Celotex, Type BB, painted or unpainted	.70
Acousti-Celotex, Type B, painted or unpainted	.47
Sanacoustic Tile, 1" rock wool filler	.74
Nashkote, Type A, ¾" thick	.27

Individual Objects

	Units
Audience per person	4.7
Plain Church Pews per linear ft.	.18
Upholstered Church Pews per linear ft	up to 1.6
Plain Plywood Auditorium Chairs	.24
Upholstered Theatre Chairs	1.6 to 4.5

In case of chairs or other individual objects where it is difficult to find their area and express the absorption in terms of a coefficient per sq. ft., it will be noticed that the absorption of the object is expressed in units. For instance, a chair may possess three units of absorption, which means it is equivalent to 3 sq. ft. of open window in absorptive power.

Figure 3



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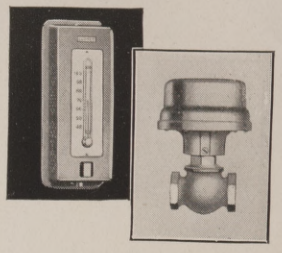

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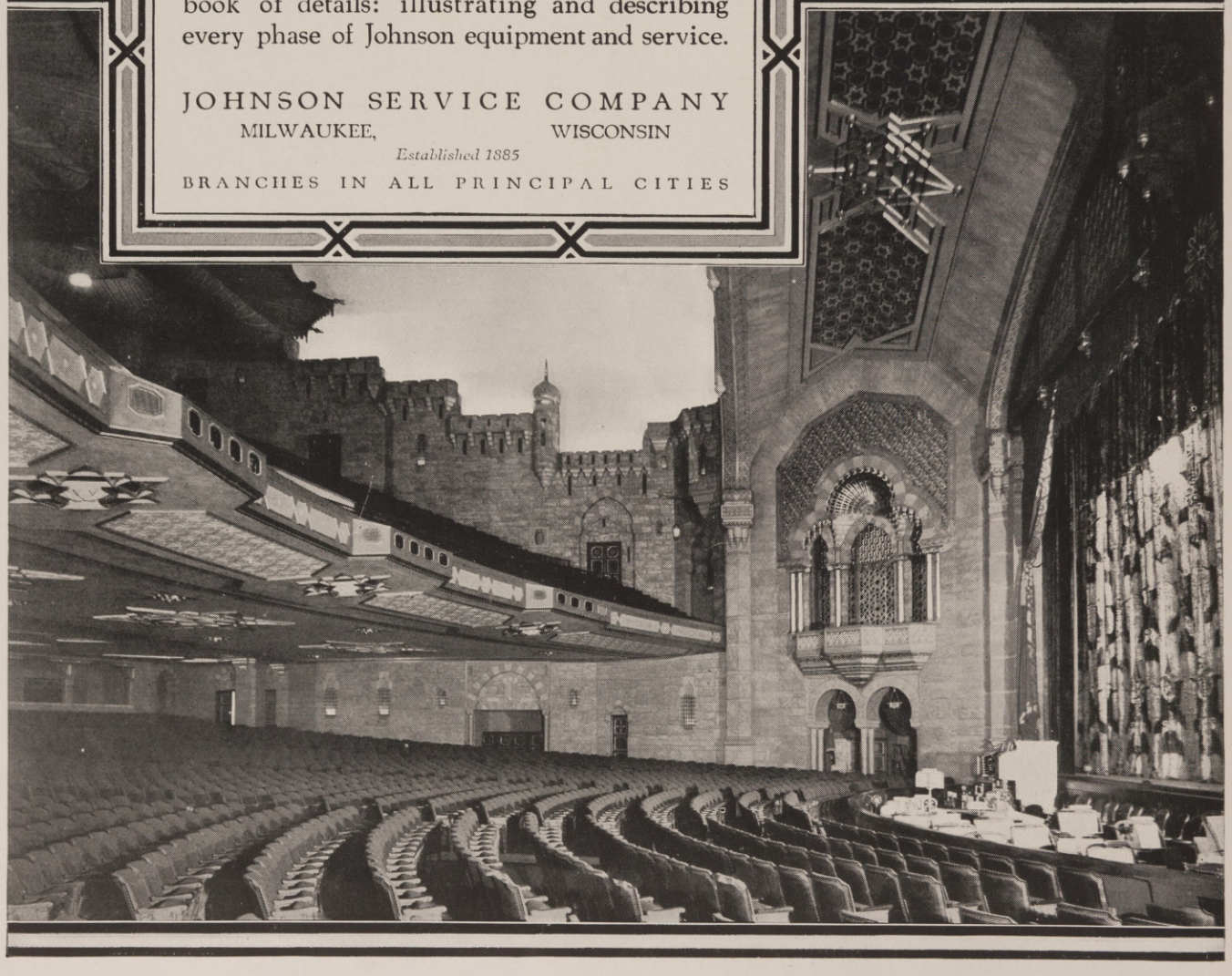
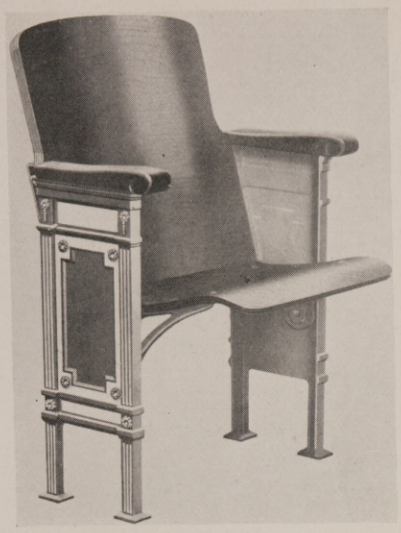
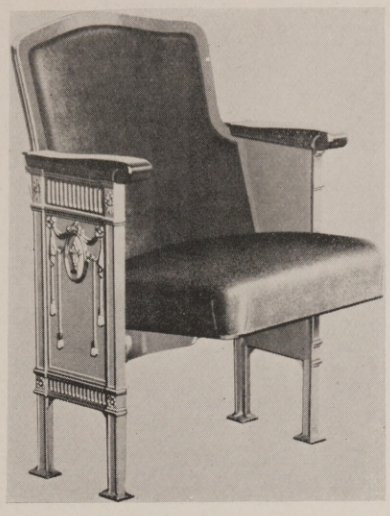




Chair, Figure 2



Chair, Figure 4

Chair, Figure 5

The computations for the absorption of the empty room, shown in Figure 1, is given as follows:

	Units
Balcony and Main Floors, 10,400 sq. ft. Concrete @ .015	156
Stage Floor, 800 sq. ft. Wood @ .03	24
Ceiling and Walls, 23,500 sq. ft. Plaster and glass @ .03	705
Aisle Carpets, 1,600 sq. ft. @ .22	352
Total units of absorption	1237

The volume of the house is very nearly 206,000 cu. ft. Then, from the Sabine formula:

$$t = \frac{.05 \times 206{,}000}{1{,}237} = 8.3 \text{ seconds}$$

This is the reverberation period for the house empty, with no seating. The formula holds for a sound of 512 frequency, or one octave above middle C on the piano, and of standard intensity. In other words, it would take a sound of 512 frequency and standard uniform intensity 8.3 seconds to become inaudible after the source of sound had ceased. The maximum time allowance for best hearing conditions has been previously termed the optimum or satisfactory reverberation period. The optimum for the present room with 206,000 cu. ft. volume is 1.5 seconds. This value is found in Table II:

OPTIMUM PERIODS OF REVERBERATION. Table II. The following table is prepared from publised data compiled by Professor F. R. Watson:

	Secs.		*Secs.*
Below 7,000 cu. ft.	1.0	145,000 to 225,000	1.5
7,000 to 20,000	1.1	225,000 to 330,000	1.6
20,000 to 45,000	1.2	330,000 to 465,000	1.7
45,000 to 85,000	1.3	630,000 to 835,000	1.9
85,000 to 145,000	1.4	835,000 to 1,100,000,	2.0

This compared with 8.3 seconds, as just computed for the room empty and with no seating, indicates that intelligible hearing would be very nearly impossible. The trail of sound following one syllable of speech would not die out until approximately 25 or 30 succeeding syllables had been uttered. There would consequently be such a jumbe of sound that an average speaker could not be understood unless within a few feet of the listener.

In order to show the effect of seating upon the acoustical conditions, first consider placing unupholstered plywood chairs in the room similar to that shown in Figure 2.

This chair has a sound absorption value of .24 units each as determined by actual laboratory tests. The following change in the reverberation period would result:

	Units of Abs.
1,500 plywood chairs @ .24 per chair	360
Absorption of the room without chairs	1,237
Total units of absorption	1,597

$$t \text{ for room with no audience} = \frac{.05 \times 206{,}000}{1{,}597} = 6.5$$

Due to the absorption of the plywood chairs, the period for the room has been reduced from 8.3 to 6.5 seconds but it is still so far in excess of the optimum reverberation period that hearing conditions are greatly impaired. The bad condition is relieved, however, with the admittance of auditors. Due to the loose and porous nature of clothing worn, and to its considerable area, the human being possesses considerable absorption qualities. It has undoubtedly been noticed by the reader how much better hearing conditions are with a maximum audience than when a house is but sparsely filled.

Table I gives the average value of the absorption per auditor seated as 4.7 units. This figure was de-

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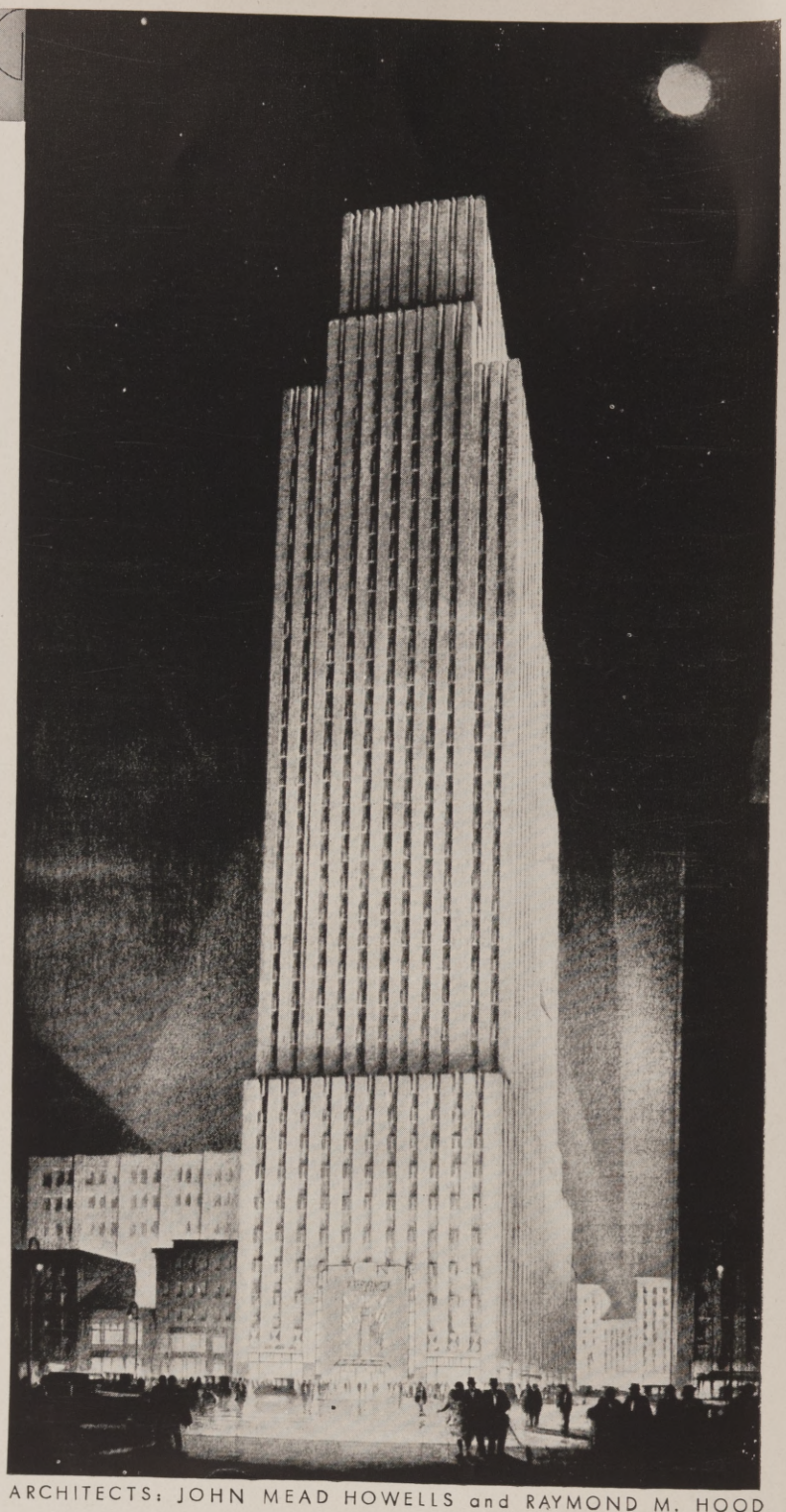

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termined by Sabine and has been generally adopted for acoustical analysis work. In the preceding computations, the plywood chairs were figured as having .24 units of absorption per chair. Since the accepted absorption value of auditors seated is 4.7 each, in figuring the absorption added to the room by increasing audience, it is necessary to deduct the absorption already computed for the chairs. Consequently, each auditor would add 4.7 — .24 or 4.46 units by his presence.

It is customary to compute reverberation periods for the house with no audience, ⅓, ⅔ and maximum audience. Correction is usually obtained that will give optimum or satisfactory conditions of reverberation at ⅓. Following are the computed reverberation periods for the house seated with plywood chairs for the various audience sizes:

$$\text{No Audience } t = \frac{.05 \times 206{,}000}{1{,}597} = 6.5$$

⅓ Audience (500 @ 4.7 — .24 or 4.46 units each)

$$t = \frac{.05 \times 206{,}000}{1{,}597 + 2{,}230} = 2.7$$

⅔ Audience (1,000 @ 4.46 units) =

$$t = \frac{.05 \times 206{,}000}{1{,}597 + 4{,}460} = 1.7$$

Maximum Audience (1,500 @ 4.46 units) =

$$t = \frac{.05 \times 206{,}000}{1{,}597 + 6{,}690} = 1.2$$

This clearly shows the effect increasing audience size has in furnishing more absorption in the room with the consequent reduction in reverberation period. The optimum, however, is not reached until the house is well past ⅔ full or at 1,200 auditors.

The wide range in the reverberation period in the above case is shown graphically in Figure 3.

This steep curve is a wide departure from the flat optimum line pictured. The wide range of reverberation for the various audiences produces noticeable change or modulation of the hearing conditons. Since the intensity of the sound reproduced by the "talkie" equipment is diminished in a room with increasing absorption, the equipment must be continually adjusted under such conditions to maintain uniform intensity. The desired effect is a more constant reverberation over the various audience ranges, this reverberation being in all cases as near as possible to or below the optimum line. This may best be done by building more absorption into the chairs and placing it in such a manner that it will be cancelled by the audience, the auditors replacing the chairs' absorption with their own, thus maintaining a more uniform absorption condition.

The next computation is made with upholstered chairs which possess an absorption of 1.7 unit each as determined in the laboratory. This chair is pictured in Figure 4.

With this chair in the room in place of the plywood, the absorption of the room is increased as follows:

1,500 chairs @ 1.7 units each	2,550
Absorption of the room without chairs	1,237
Total	3,787

In this case, the absorption added by the auditors has been reduced to 3.0 units per auditor (4.7 — 1.7 = 3.0). The following reverberation periods would obtain:

No Audience

$$t = \frac{.05 \times 206{,}000}{3{,}787} = 2.6 \text{ Seconds}$$

⅓ Audience (500 @ 3.0)

$$t = \frac{.05 \times 206{,}000}{3{,}787 + 1{,}500} = 1.9 \text{ Seconds}$$

⅔ Audience (1,000 @ 3.0)

$$t = \frac{.05 \times 206{,}000}{3{,}787 + 3{,}000} = 1.5 \text{ Seconds}$$

Maximum Audience (1,500 @ 3.0)

$$t = \frac{.05 \times 206{,}000}{3{,}787 + 4{,}500} = 1.2 \text{ Seconds}$$

Here it is seen that the optimum has been obtained at ⅔ audience or 1,000 instead of at about 1,200 as in the case of plywood chairs. There is less variation in the reverberation periods and the reverberation curve is much flatter than that produced with plywood chairs, the curve more nearly resembling the flat optimum line (Figure 3). The curve crosses the ⅓ audience line at about a half a second above the optimum which shows a decided improvement over the plywood curve, which crosses at about 1.2 seconds above.

If it were necessary to have optimum conditions at ⅓ audience, where it is usually desired, and still use either plywood chairs or those with inserted panel backs, a certain amount of wall treatment would be necessary in addition. Treatment applied to the walls or anywhere in the house except in the chairs would not be cancelled by the auditors and would, therefore, give wider variations in reverberation periods with varying size of audience than if the absorption were properly built into the chairs. If, however, it were decided to install wall treatment, it would first be necessary to determine the amount of absorption required in the room to give optimum reverberation. This is found by substituting the optimum reverberation time 1.5 in the Sa-

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bine equation and solving for the absorption, as follows:

$$1.5 = \frac{.05 \times 206{,}000}{a}$$

$$a = 6{,}860 \text{ units}$$

In the case of the plywood chairs, the amount of absorption already in the room at ⅓ audience is 3,827. The additional amount necessary to give optimum conditions would be 6,860 — 3,827 or approximaely 3,030 units. In the case of the inserted panel back chair, the addition required would be 6,860 — 5,287 or approximately 1,570. This additional absorption could be obtained through the use of any of the recognized wall treatments now on the market. Some makes give as much as 70% absorption. In computing the sq. ft. of wall treatment, it should be remembered that the treatment covers up plaster, the absorption of which has already been figured at 3%. Thus, if a wall treatment were being considered, the absorption of which is .50 per sq. ft., the additional absorption added by the treatment would be .50 — .03 or .47 units per sq. ft.

Acoustical conditions can be made more uniform by installing a chair with still better absorption properties than the two already mentioned. Such a chair is pictured in Figure 5, its absorption being 3.0 units each. The computations using this chair follow:

1,500 chairs @ 3.0 units each	4,500
Absorption of room without chairs	1,237
Total	5,737

No Audience

$$t = \frac{.05 \times 206{,}000}{5{,}737} = 1.5 \text{ Seconds}$$

⅓ Audience (500 @ 4.7 — 3.0 or 1.7)

$$t = \frac{.05 \times 206{,}000}{6{,}587} = 1.55 \text{ Seconds}$$

⅔ Audience (1,000 @ 1.7)

$$t = \frac{.05 \times 206{,}000}{7{,}437} = 1.4 \text{ Seconds}$$

Maximum Audience (1,500 @ 1.7)

$$t = \frac{.05 \times 206{,}000}{8{,}287} = 1.2 \text{ Seconds}$$

Here the range of reverberation time is limited to from 1.2 to 1.5 seconds. The acoustical conditions are so uniform from no audience to maximum audience conditions that during rehearsals when the operator makes out his log sheets, there should be no changes necessary in fader settings to compensate for fluctuations in intensity due to wide changes in absorption. The curve (Figure 3) shows that optimum conditions are obtained at a little below 750 auditors. For ⅓ audience, the reverberation time is .1 second over the optimum, a difference which it is impossible to detect.

Thus it is seen that the seating in a theatre has a vital bearing upon the acoustical properties of the room. What is desired is uniform reverberation at the optimum or satisfactory reverberation period. A balancing factor is necessary to maintain this uniform condition by keeping absorption conditions from changing through too wide a range with changing size of audience. This balancing factor is found in scientifically designed upholstered seating embodying the proper construction and distribution of absorption materials.

OFFICE BUILDING ECONOMICS

(Concluded from page forty-eight)

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Style, too, must be reckoned with in the planning of the modern building. The soaring lines and profound shadows of the modern tower have ushered in a new school of design that is sounder in many respects than the dowdy facades that line many of our older streets. To ignore this new trend in design is to invite obsolescence. Even if a building is of the most advanced design from an economic and engineering standpoint, it still is at a disadvantage among its neighbors, if it does not conform with the modern note in style.

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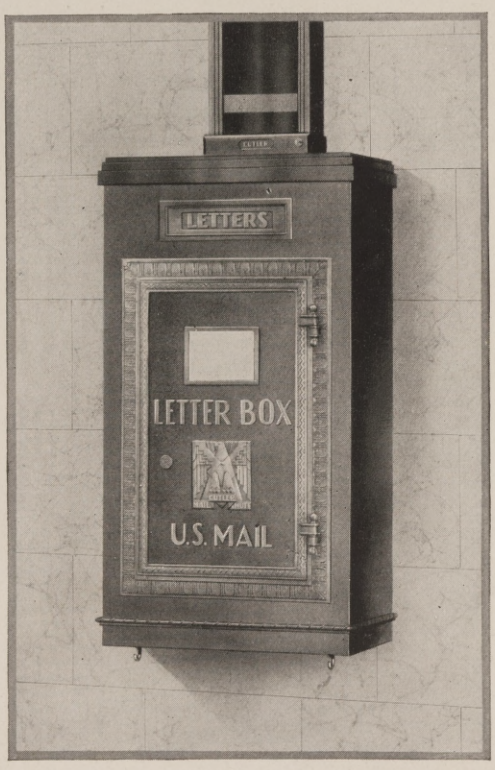

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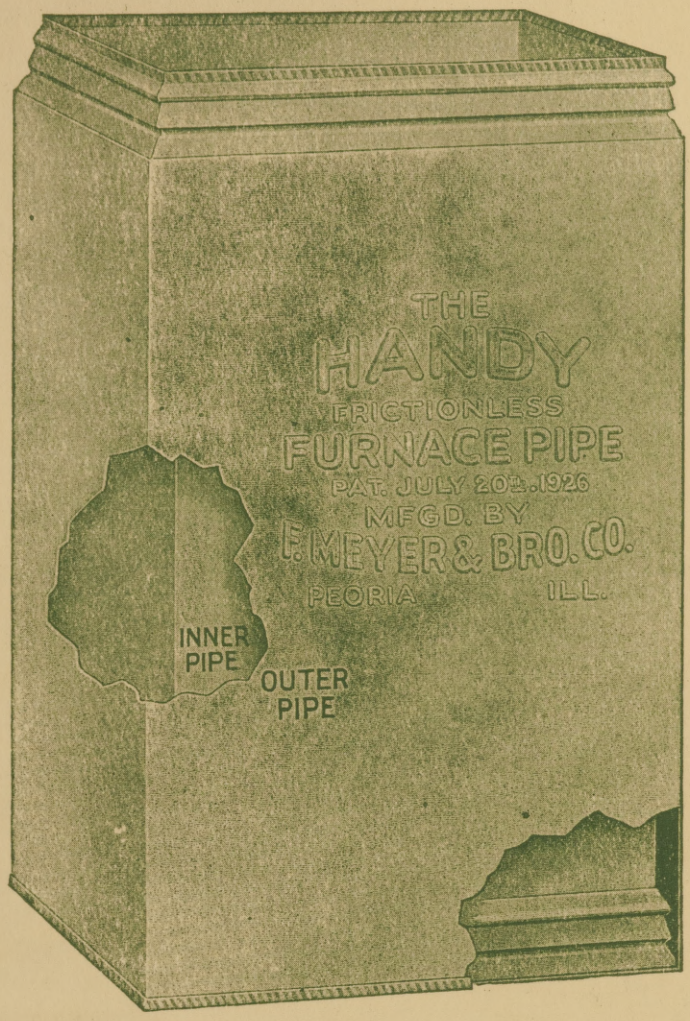

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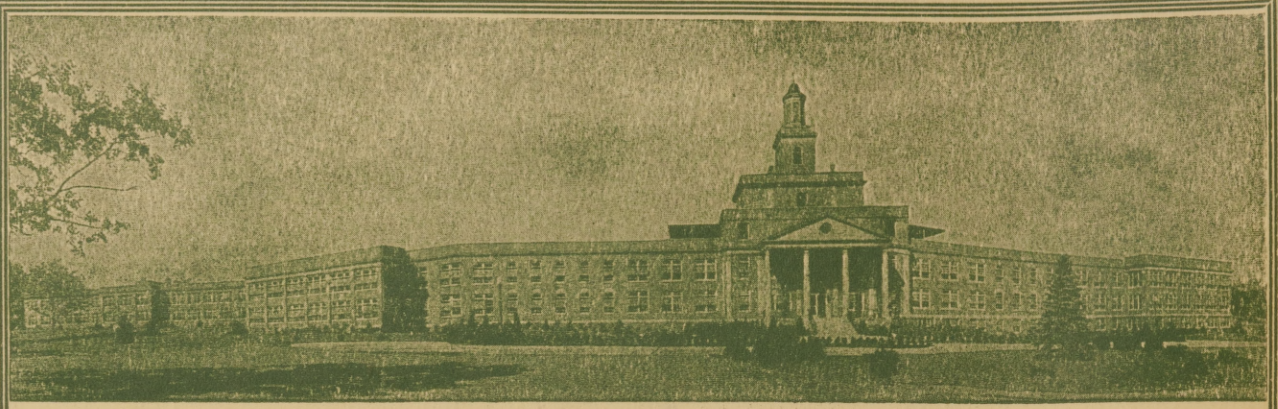

VALLEY VIEW SANATORIUM, PATERSON, N. J.
Fred W. Wentworth, *Architect*

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E. M. SHEPARD, M. D.
Superintendent
and
Medical Director

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