

The AMERICAN ARCHITECT

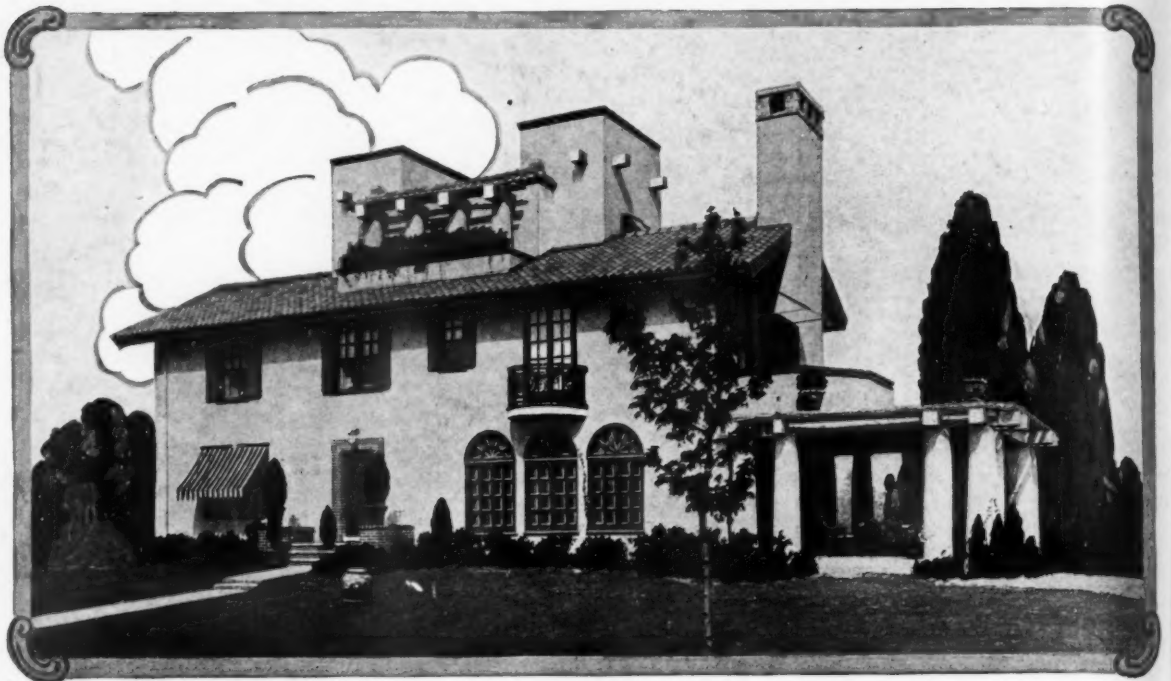
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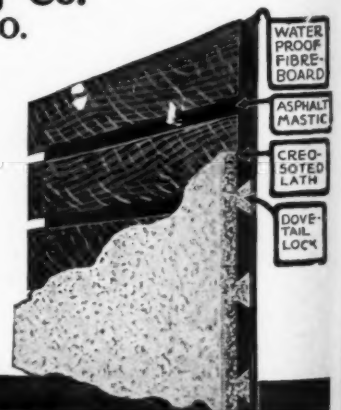
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VOL. CXV

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The New Architectural Education

Report of Sub-Committee on Education of the Reconstruction Committee of the Illinois Chapter, A. I. A. and the Illinois Society of Architects

LEADERS in architectural education should not be behind those in other lines of endeavor in realizing the necessity for reconstructional measures, even though they be revolutionary in character. The student of the architectural schools has always been educated to look to the past. A large part of his time has been misspent in the study of subjects of which he is never called upon to make use, and which he soon absolutely forgets. Many subjects, the knowledge of which is necessary in the pursuit of his profession, are not touched upon, to his everlasting detriment and regret. After graduation, the first two years or so of his experience are taken up with the most elementary work, such as tracing, etc., under an assumption of his employer that he knows nothing, and its tacit admission by himself.

Our educational system should be reorganized so that the graduate can become of immediate value to his employer and his services a source of income to himself. It also should aim to cast off in some fashion the shackles of the past and help architecture to take a more honorable part in the destiny of this nation.

The practicing architect, which it is assumed the student intends to become, functions in three entirely diverse directions—the aesthetic, in which he designs his buildings in plan and elevation; the practical, in which he constructs them; and the social, in which he deals with those consummating his plans, and with his clients, present and prospective. These obvious divisions of an architect's practice are, to a greater or less extent, recognized by all the architectural schools, and special studies are provided in their curriculum, intended to prepare the student for these diverse demands.

Your committee is of the opinion that while the program or the ideal toward which the schools work is excellent, yet great improvement could be wrought in the subjects selected for this chosen purpose, and also in the manner in which they are

taught. We believe that some should be omitted, and others now untaught should also be included.

We believe, furthermore, that there is a fatal lack of correlation in the subdivision of the aesthetic, practical and social studies, and that it is both unnecessary and unwise to leave such correlation to the architect after he has left school.

At present the courses of instruction in the principal architectural schools are almost identical, and are all founded on that of the École des Beaux Arts, with which they still agree in general in subject but from which they differ widely in administration. These subjects, taken from one of our best architectural schools, and accomplished within the hours of school work and preparation required for the entire course, which covers four years, are substantially as follows:

Aesthetic—Architectural design, 1555; Free-hand Drawing, 510; Shades and Shadows, 45; Perspective, 120; Watercolor, 70; History of Architecture, 305; History of Ornament, 45; Total, 2650.

Practical—College Algebra, 90; Plain Trigonometry, 90; Analytical Geometry and Calculus (elements), 180; Descriptive Geometry, 240; Applied Mechanics, 200; Physics, 270; Chemistry (inorganic), 180; Design, 120; Sanitary Engineering, 30; Steel Construction, 145; Acoustics, 5; Total, 1550.

Social—History of Civilization, 330; English, 210; French, 105; History of Sculpture and History of Painting, included in History of Civilization and Art; Arch. Prac. & Bldg. Law, 45; Philosophy of Arch., 15; Political Economy, 90; Office Practice, 60; Military Science, 90; Total, 945.

This curriculum seems to be comprehensive, and the hours required are certainly as many as the student will stand. Criticisms and suggestions for improving such a course to meet post-war conditions will be taken up in order as follows:

1. Obtain a better correlation of subjects in the curriculum.

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2. Omit or shorten the courses in certain subjects and add certain other subjects.

3. Inculcate by actual experience a better knowledge of architectural practice and of building practice.

4. Make a decided effort to stimulate the creative and not the imitative instinct of the student.

5. Lengthen the course for a degree in architecture to five years.

1. *Correlation.* To the student in architecture, and to the student in liberal arts as well, the subjects of the curriculum are separate and distinct—gems of different water and of various colors, if you please, which he is to assort and string into a beautiful harmony or odd-shaped pieces of a picture puzzle, which, if he can find time to fit them together in the strenuous battle of life, will surely result in a beautiful, harmonious and complete ensemble. Of the aesthetic subjects, Architectural Design is rightly the most important, requiring in a typical course 1555 hours of a total of 5145. In the ordinary course this subject is correlated only with Shades and Shadows, Water Color, and, to a small extent, with Perspective. It ought, in our opinion, to have in addition close union with Construction, Specifications and Ornament. The subject of Architectural History, perhaps the second in importance to that of Architectural Design, should go hand in hand with the History of Civilization, the History of Sculpture and Painting, Modeling and Ornament. The course should be arranged so that contemporary epochs in these varied courses are studied simultaneously, and, in general, in regard to all of the courses in the curriculum their intimate relationship to each other and to subsequent office practice should be taken advantage of wherever possible.

2. *Curriculum.* Architectural Design, pointed out above as the most important subject in the course, should maintain its supremacy, but should undergo revolutionary changes in the direction of correlation and modernization. The Beaux Arts method of presentation at present in vogue has been practically unchanged since the time of Napoleon, and its *modus operandi* need not be here described.

We suggest that the student should begin the study of Architectural Design in the second year. Instead of drawing minutely and in ink, mathematically casting the shadows, and painstakingly rendering the elevation with graded washes, he should draw at as large a scale as possible with pencil, sketching on tracing paper and consulting the library, as at present. Every drawing should be annotated, showing the principal materials, and should be figured in its principal dimensions. In connection with each design, besides plan, elevation,

and section, a large size detail or section (if possible, full size) should be made of some important feature, or of some bit of ornament, and a sketch in perspective be made of the ensemble. The student, at least once during the term, should publicly explain and defend his project either before the jury or his classmates. This procedure should be followed in the second, third and fourth years, the problems becoming larger and more complicated as the student progresses from year to year. By this means we believe a better correlation could be obtained between the aesthetic, practical and social functions, and a sense of scale and a knowledge of material so necessary to rational design be obtained early in the course. The large size details and the perspective sketch would acquaint the student with the real function and form of mouldings and a conception of the design in three dimensions.

The last term of the fourth year should be devoted to the thesis, which should consist of working drawings and specifications of a small building complete in all details, including plumbing, heating and ventilation.

At the end of the fourth year the student should be able to go forth and qualify as a competent draughtsman, and, if he so elects to do, he should be given a certificate to that effect.

For the man who elects to remain for the fifth year and receive a diploma and his degree as an architect, he would find his last year taken up with the design of large theoretical projects, which would be elaborately rendered and presented without the notations, figures and details characterizing his earlier studies.

A great defect in the present system of education is the idea that the orders and the various motives appertaining to the historic styles furnish to the architect a stock in trade, or a bag of tricks which he may use at random, and to the use of which he is limited. In some schools, particularly in the East, originality and creative design are frowned upon and discouraged, and the student is told that these may be developed in actual practice.

The instinct of creation may be cultivated in two ways—first, by the method of teaching Architectural Design, and second, by a proper method of studying ornament. Architectural History should be taught, as its name implies, as History, and this should include all exercises in drawing the orders. The course should begin in the freshman year and continue through four years, the last year being devoted to the study of the History of Architecture in America. It should go hand in hand with the course in the History of Civilization, and careful drawings should be made showing the varying manifestations of architecture as influenced by climate, materials, society and history. The student

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should be made to understand that this knowledge is part of his cultural foundation, and not material to be used irresponsibly in modern building. He should be told that the "styles" in the present century have no longer any chronological or structural significance; they merely refer to the *type* of ornament with which the structure is decorated. No one can prophesy in the presence of a skeleton steel frame whether the building, when hatched, may be Classic, Romanesque, Gothic, or one of the 57 varieties of the Renaissance. For this reason it seems to us that possibly in the proper study of ornament lies the solution of the whole problem of creative design.

A knowledge of historical ornament is a necessary cultural acquisition, but the hand of the architect trained exclusively in the tracing of historical ornament can only with the greatest difficulty guide his pencil to new forms, and in the stress of office practice he will ever find his hand mechanically reverting to the familiar acanthus, the unending fret, the Renaissance arabesque, or the Adam festoons. Therefore, great stress and much time should be spent in considering the purpose of ornament, and in learning to design living ornament. Actual leaves, flowers, fruits, animals, and geometrical shapes should be brought into the classrooms, and the student should be taught to arrange and conventionalize these to apply for beautification to such parts of his building as are suitable for ornamentation. Furthermore, the function of ornament in relation to repose and stress should be carefully brought out.

Other subjects in the curriculum can only be touched upon. Already great improvement has been effected by eliminating waste of time in the study of Calculus beyond its elements, and we believe that Physics and Inorganic Chemistry could be required for admission, and could be eliminated from the curriculum. The subject of Applied Mechanics could be restricted to Statics. This would clear the way for the introduction of other subjects for which the architect has crying need in the practical pursuit of his profession. Simple Surveying with field work should be included, and a course in Interior Decorating, to consist of the study of textiles, marbles, metals, glass, tiles, etc. This could well come in the fifth year, in which year should also be included a course in the Business of architecture, with examination of the accepted methods of promotion and soliciting business. No man is better fitted than the architect to handle and direct the complex problems arising in the design of industrial buildings, and unless the student is prepared in his college course to solve the problems he, individually, and the profession in general, will see this lucrative and important branch of work en-

tirely slip through their fingers to repose in the grasp of the engineers and the contractors. The greatest improvements already effected in industrial plants, such as the saw-tooth roof, have been made by architects. Industrial design should be taught as a combined engineering, social and aesthetic problem. The student should be shown that industrial buildings can and should be made beautiful, and that in this branch of work he is, if he is doing his work well, rendering a great service to society. With the design of industrial plants is collaborated the science of housing, and lectures and reference reading, at least, should be given, preferably in the fifth year, covering this most important matter. A very necessary part of industrial design and housing is the actual visiting and study of the best examples in the locality.

For advanced students courses should be included in city planning and in landscape gardening. In connection with the latter, practical courses in Applied Botany and Arboriculture should be given.

3. *Experience.* After graduation, under the present system, two or three years in actual office work are often wasted years for the young architect. In these years he is supposed to learn the practical side of architectural practice. This the faculty has told him it is impossible to acquire at college. Months spent in the drudgery of tracing full-size details and other work better suited to the intellectual level of the office-boy spell low wages, and often discouragement to the young architect. More serious yet, during this same time he is apt to forget a great deal of the theoretical knowledge that he has so laboriously acquired through lack of opportunity to apply it. There should, therefore, be inducted into the course actual experience in an architect's office. This should be required work, extending through the major part of two of the long vacations. The architectural offices where this experience is to be acquired should be accredited offices, with their names printed in the college catalogues. We believe this experience most important, not only for the success of the student after graduation, but also for his better comprehension of his undergraduate work.

The class of individuals with whom the architect in his practice is in the most constant and intimate connection is the contractor. Under the present system of education, this personage and his organization, who consummate the architect's plans, is never mentioned, nor is any study made of his relationship. Largely in consequence of this ignorance, the relationship, which should be one of sympathy, becomes one of distrust and often open hostility. Furthermore, the architect, through his ignorance of the business, or, as it is rapidly becoming, the profession of contracting, is placed at a

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disadvantage in regard to questions of cost, quantities, extras, etc. We therefore believe that there should be an accredited list of building contractors whose names should be published in a college catalogue. Then the student should, at some period of his college course, spend the major part of one summer vacation in a contractor's office.

4. *Originality.* The matter of creative work has already been mentioned, in connection with the study of architectural design and ornament. We believe that the development of a truly American expression in architecture can only be achieved through an evolution of forms, reflecting the manners and culture of the people, and influenced by matters of environment, climate, material, etc. We do believe, however, that this natural feeling for free and independent expression, which exists with every people, should not be stultified and warded off by the insistence of perpetuating archæological forms. We think the spirit, therefore, of the entire curriculum should be that of a new country and a new epoch, instead of the past and the ancient or modern European world.

5. *Extension of Course.* We suggest that the course for a diploma in Architecture should be lengthened to five years for the regular student, and that a certificate as a draughtsman may be given at the end of the fourth year. This is in order that the name "architect" shall become a more honored one, for the profession can only acquire honor through the individual performances of its members. We do not believe it is possible for the architect of tomorrow, with his added responsibilities and duties, to receive fit cultural and technical preparations in four years. An examination of the curriculum which we have suggested makes this obvious. The extra year also gives added maturity to the student, fitting him for an earlier individual practice, and it will also, we hope, deter him from the procedure of preparing himself for practice in America by a course in a foreign country.

The above suggestions may be epitomized as follows:

1. Affiliation with architects' offices, students to spend four months in accredited offices in superintendence and draughting.
2. Affiliation with accredited construction companies, students to spend two months in estimating and superintendence.
3. Extension of course to five years for archi-

tectural diploma; draughtsman's diploma may be given at the end of four years.

4. Present so-called Beaux Arts system of elaborately rendered plans and elevations to be changed.

5. The orders and details to be studied full-size in pencil.

6. All problems in design to be studied in perspective, as well as elevation, and presented in pencil with little rendering.

7. Problems in design to be small and practical for the first four years, and studied in relationship to the materials used.

8. All problems in design to be roughly dimensioned and annotated.

9. The thesis to be a small practical problem, worked out in a complete set of working drawings with specifications attached, and to be presented in the second half of the fourth year.

10. Antique, Mediæval, and Renaissance decorated forms to be studied only in connection with the History of Architecture.

11. The subjects of Chemistry, Calculus beyond the elements, Physics, Applied Mechanics beyond Statics, Spherical Trigonometry, Analytical Geometry to be omitted.

12. Shade and Shadows as a science to be omitted, students to get their knowledge largely from nature.

13. Study of ornament to be based on a study of nature and indigenous and geometric forms.

14. Interior Decorating to be taught, with instruction in the nature of textiles, glass, ornamental iron, tiles, etc.

15. Practical elementary Surveying to be taught, with simple field work.

16. The design of industrial plants, with modern method of unit multiplication, and factory construction to be taught.

17. A course in housing, with its social relationships, to be taught through lectures and reference reading.

18. The science and history of City Planning to be given as an elective study.

19. A course to be given in business promotion, showing sound methods of promoting and financing building operations.

20. Extemporaneous speaking to be taught through practice in presenting building projects.

21. Last, a general change in spirit to be awakened in the schools to the ultimate end of modernizing and Americanizing the education of the architect.

Architectural Education

The present war times have demonstrated to us beyond reasonable doubt that, as architects, we are considered by the public at large as a body of visionaries, theorists and occasionally beautiful picture makers, and our ability and celebrity, with rare exceptions, ends there. At present most of the architects are perplexed as to their future *modus operandi*, hoping for the unexpected to happen.

There is still a very great percentage of architects who have lulled themselves to sleep with the idea that the pre-war times and conditions will again prevail. This is not surprising to anyone conversant with the training of the present day architect. We have our architectural colleges to blame for this condition, chiefly.

When architectural schools were unknown, there lived then the real architect—whose work we only poorly imitate to-day. The original schools of architecture were established, no doubt, to give the future architect a broader and universal culture in subjects which he could not acquire in the shop or in the field. This was inspired by the then practicing architects who, although finding themselves a directing force in the community by the very nature of their work, were nevertheless very much deficient in the knowledge of other subjects expected of a man of their standing. It was the realization of their shortcomings, no doubt, that led them to supply this deficiency to the future architect.

In time it was also discovered that the principles underlying the stability of the structure could be taught better in the school room by the development of formulae and thereby save time and eliminate to considerable degree of guesswork regarding this particular branch of the work.

Later on, as science progressed and inventions multiplied, it was found not only very desirable but very essential to know the chemical properties of the material with which they worked, and this branch was also incorporated in the curriculum of the schools. And so, as the world progressed in science, our schools gradually assimilated the new inventions and discoveries and made it a part of their course, and thus eventually they assumed the entire training of the architects.

While this was very creditable to the schools it was very unfortunate for the architect. The practical training he received in the shop and field under his master we see disappearing altogether and architects have ceased to be operative and have become speculative.

Outside of the laboratory tests the student of architecture acquires only a bookish knowledge of

the actual operations on the building. His time is spent—I am almost tempted to say wasted—on a lot of copying, water coloring, sketching and picture making, which, altogether a very good accomplishment to have, nevertheless does not tend to make him a real architect and adds very little to his knowledge as a business man. And business man he has to be to-day if he is to be successful at all.

Our schools of architecture are more or less working under false pretenses—though their honesty is not questioned—because of lack of foresight and general inertia on the part of our directors and professors. The world has moved faster than our schools. This is a very strong statement to make, nevertheless it is true, and this is so of nearly all our colleges with the exception of probably medicine and chemistry. Schools turn out the graduate—give him a beautiful diploma—and presto, he considers himself a full-fledged product.

His disillusionment comes when he tackles the real problem. I again repeat, the fault lies mostly with our teachers. We have too many bookish teachers, people who are out of joint with the outside world and consequently adhere to methods long obsolete in every-day practice. We place more value on diplomas than on the man's experience. This is demonstrated in nearly all our civil service examinations.

I realize that the duty of the school is not to turn out men practically equipped for their vocation. I realize that the schools serve as implements by which the intellect of man is cultivated so that he may be more fully prepared intelligently and effectively to grapple with life's problems. However, this method of education, as it pertains to the architect, makes him a mere copyist, theorist, and very often a "swell head" who possesses a vague idea of the responsibility and duty of a real architect. This kind of training fills him with intricate theories on which he often places too much importance and from which he is helpless to extricate himself. His profession and ethics constantly battle in his brain, while in the meantime the practical, often looked-down-upon contractor, gets ahead of him.

It is a conundrum to me how such educated youngster essaying the practice of architecture can judge the character of the work performed when he is absolutely deficient in the practical knowledge of laying brick, even to hold correctly a saw, knows nothing of how to make a miter, properly drive a nail, or tell the difference between slacked and burned lime. We can fool some people sometimes,

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etc. However, I think we have been fooling ourselves the most.

Nowadays, we hear much talk about reconstruction. Would it not be a good policy to start at the source of this trouble? Some years ago, when a member of the Chicago School Board, I advocated the adoption of a system whereby every teacher in the system would be compelled to spend a year at some work outside of the school every five years. This would not be a vacation by any means for the teacher. During this period, such teachers would draw no salary from the board and would depend upon that which they earn at their outside employment. In this manner teachers would bring back to the class room invaluable experience and knowledge of the present day method in the business world. To accomplish this result the salaries of all the teachers would necessarily have to be raised so that it could be possible for a teacher to accept a position during that period regardless of the pay attached to it.

The salary of a college professor is a very meager one, indeed. We are pursuing here a policy of penny wise and pound foolish. How can we expect to have the best talent of our profession in the colleges, where we ought to have it, when a mediocre architect earns as much and sometimes more than the average professor? I have known the best teachers forsaking school rooms for other more remunerative calling, and this is true not only of architects but in other branches as well. Nowadays a person must be possessed with extraordinary love for teaching, or else is lacking in initiative, to spend his lifetime teaching. This is not meant as any criticism on the teaching profession but rather on the system. When a young man spends his entire time in the school room between the ages of 25 and 35, what chance is there for him to quit it after that and start on his own resources?

If he does, he starts with a handicap of ten years to overcome. Let us make it an object for a person to become a teacher and we may then expect the right material for our teaching force.

Now, as to the course of training architects. Almost every college or university is continually planning some improvement on the campus or in planning new buildings. Why cannot all this work be performed by the junior and senior students in the architectural and engineering colleges under the direction of their professors? This is not only possible but absolutely feasible!

We have positive demonstration of this at the Tuskegee Institute for colored students now in Alabama. This, in my opinion, is the most practical school of architecture in the United States, and possibly in the world. It was left to Booker T. Washington to show us how. Here the student not only prepares the drawings but he actually lays the brick, pours the concrete, does carpenter work, plumbing, painting, plastering—in short, everything that enters into the building to make it complete. There are now in the neighborhood of some sixty buildings on the campus, and these buildings as a whole will compare very favorably in architecture and workmanship with most of our State University buildings. It follows that graduates of such schools are not only competent intelligently to design a building but they are supplied with the necessary business knowledge which most of our graduates absolutely lack. Had such methods been in vogue in our universities we would have now more intelligent contractors and possibly less mediocre architects, who not only are a hindrance to themselves but to the whole profession at large.

Will our university directors consider this necessary change in their school curriculum?—James B. Dibelka in the December issue of *The Bulletin* of the Illinois Society of Architects.



The Group House—Its Advantages and Possibilities

By RICHARD HENRY DANA, JR.

*An address delivered at the Seventh Annual Conference on Housings in America,
held in Boston, Nov. 25-27.*

IN most parts of America, there is a mania for the single house. Regardless of the size of the house or the lot or other circumstances, the cry is always "let each family have a separate house to itself. What applies to the ten-room house should apply to the four-room house. What is good on the lot of 10,000 sq. ft. should also be good on the lot of 2,500 sq. ft., one-quarter the size. Why discriminate against the small wage earner?"

After thirteen years of sympathetic study of the matter, I feel more convinced than ever that the single house is *not* the best type for the small wage earner, and I should be interested to see if you do not feel that my reasoning in the matter is sound. I felt it instinctively in July, 1905, when I was at the opening of the first Garden City at Letchworth, England, and have ever since been trying to prove it logically, and think I have at last.

Is not this mania for the single house peculiarly American? Do the English or the French, for instance, have this same feeling? Even though they may not have as many radiators or bath tubs per family as we do in America, yet they certainly know how to live healthily and attractively. After two years living in France and three summers in England, I felt convinced that those two countries are as domestic as we are in America, and care even more about privacy than we do. Have we not something quite vital to learn from the grouping of their houses over there? Is not the American mania for the single house perhaps a prejudice coming down to us from the pioneer days, when a man had to battle with nature on a large scale, and had little or no time for community or social life? Other men were either his enemies, rivals, or at best "strangers." His one idea was to live independently, off by himself. The fact that the mania for the single house in the West is stronger than in the East would seem to bear this out. But just because the single house is the American solution for the small wage earner, is it, therefore, the best? Because it was the best for yesterday, is it necessarily the best for to-morrow?

"But," you protest, "you surely do not favor tenement houses—either the crowded city kind or the proposed zig-zag type with finger tips touching around a playground in the full country! You do not approve surely of the double deckers or triple

deckers, or those monotonous row houses where a man can't distinguish his own front door from a hundred others when he comes home late at night." No, by no means, I am opposed to those types of dwellings as much as anyone; but I would have the small wage earners, for their own good, live in group houses; that is, two or more families living side by side with party walls between, but under one roof.

The basis of our discussion must surely be the rent of the houses we are talking about. The *maximum* rent in question is \$35 a month. This, at the high price of building to-day, means six rooms at \$5 a room, plus \$5 for conveniences, such as modern plumbing, electric lighting and heating. The tendency to-day is for smaller and more comfortable houses than formerly. Therefore, I do not think anyone would question that six rooms, plus these conveniences, is better than seven rooms without them. This rent means a two-story house, with cellar, of about 500 sq. ft. area per floor, or 20 x 25 ft. in plan. Above this rent, the problem is quite different and does not concern us in this discussion.

The minimum rent would be \$25 a month, or four rooms at \$5 a room, plus \$5 for conveniences. This means a two-story house and cellar, of about 350 sq. ft. area, per floor, or 16 x 23. Below this rent, tenants must not expect to obtain a new model house, but will have to live in houses built a few years ago when construction was cheaper.

Because the single house is good for a small house on a lot of 100 ft. wide, it does not follow that it is good for a medium sized house on a 50 ft. lot or a small house on a 25 ft. lot. Land cheap enough for large lots can only be found in outlying regions reached by doubtful trolley service. The worker very justly prefers to be within *walking distance* of his work, as this saves him from sixty to eighty-four cents a week, or from thirty to forty-two dollars a year, which is enough to keep him in clothing for a year. Furthermore, it is unquestionably more healthy to *walk* to and from one's work rather than breathe the bad air of over-crowded cars. Land within walking distance of factories is usually held so high that the lots for the rents under \$35 a month would have to be as small as 250 sq. ft. in area. The shape of this area is flexible, no matter what the real estate men have said to the contrary in the past! The suggested shape, 50 x 50 ft., leaves no decent space anywhere outside the single

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house. The usual shape, 25 x 100 ft. gives a fair front yard and back yard, but side yards are objectionably narrow between the single houses.

If the side yards are wide and planted, they are a separation between houses; but if narrow they are less private than no side yard. The windows of the middle rooms of two adjoining houses look across at each other only a few feet apart, with no more privacy than in a narrow city court. This can be avoided by having the houses only two rooms deep, with the windows facing chiefly the front yard and the back yard. Still these windows into the side yards are a doubtful addition to the rooms and, personally, I feel it would be better to concentrate the windows on the front and back yards, and to omit the side windows entirely, thereby giving much needed unbroken wall space in the rooms.

Because these side yards are so narrow, the sunlight does not dry them out. The snow lies there long in winter, and the grass won't grow there in summer, so that they are always damp, muddy and unsanitary.

Furthermore, these narrow side yards cannot be used for anything. The front yards can be used for lawn flower gardens and the back yards for drying clothes and vegetable gardens, but the side yards are not needed.

Some people claim that these side yards are needed in warm weather for ventilation, but let us look at the facts closely. Is it not much more important to have ventilation *through* the house than *around* the house in warm weather? In cold winter weather the wind draws through these narrow slits between the houses, so that there is no side of the house protected from the wind, where a small baby in its carriage could get an airing. The family never sits out of doors in the spring and autumn, simply because there is no sunny place out of the wind where they can sit comfortably.

It is also claimed that the side yard is needed as a passage to the back yard from the street. The back yards, however, can be reached conveniently by a community path connecting the back doors, with access to the street about every hundred feet or more. Therefore, since the narrow side yards are unnecessary and undesirable, let us omit them as much as we can and make the houses adjoin each other. At intervals, where we must have side yards, let us concentrate the space of the many narrow side yards omitted, into decently wide side yards, each 20 ft. wide at least.

Let us first look at the usual objections to the group house, and see if they are really valid. The real estate men object that they are difficult to sell. Is this not pure prejudice based on the usual poor construction of the row houses that look as if they would not stand up alone. One real estate agent

even told me that 20 ft. lots the width of the units would involve half numbers to the houses, because the numbers were laid out in the basis of 25 ft. lots. When I explained to him that a four-family group house 80 ft. long was located on a 100 ft. lot, and we, therefore, only had four families to the 100 ft., the same as his custom, he still was unconvinced.

Another claim is that these group houses are noisy and that you can hear your neighbor change his mind in the next house. This may have been true in some old fashioned bad examples, but the brick party wall from cellar to roof, now required by law, is as soundproof as it is fireproof.

Another objection is that the middle rooms of these group houses are stuffy without the cross-ventilation of the corner rooms. But all well-designed group houses are only two rooms deep, and have connecting doors between the front and back rooms purposely for this cross-ventilation, which is certainly more thorough than just across the corner of a room.

Another objection is that there is no privacy on the front porches, based on the bad custom of adjoining piazzas. By good planning, the porches can be kept separate, and even recessed so that you cannot look across from one to the other.

Another objection is that these group houses are monotonous looking, owing to the fact that some of the first of these were poorly designed. There is in reality much more variety of design possible in the group house than in the single house; a variety that we architects have hardly begun to discover. In short, are not all these objections to the group house based on poor examples, and would not the answer to them be "go to a good architect?"

The advantages of the group house are quite obvious. It is cheaper to excavate, build and maintain than several single houses, on account of fewer outside walls, and one chimney and one line of plumbing serving two families. This means that the tenant gets the same house for less rent, or a larger house for the same rent, than he would if he rented a single house.

The units of the group house are cheaper to heat than single houses, as they keep each other warm. We have always found in a group that the middle units rented before the end houses for this very reason, and that the canny tenants of the middle units did not light their furnaces in the fall until several weeks later than their neighbors at the end of the group.

The group house has greater privacy on the interior than single houses, as the neighbors at the side cannot see or be seen from the rooms. All the views are across broad, open spaces; either the broad back yards or the front lawns and street.

The chief advantage, however, is that the group

THE AMERICAN ARCHITECT

houses have so much better proportions on the exterior than the single houses. They present a better front. This is not only of interest to the architect, but to the community as a whole. The economic single house has to be two stories high, with air space above the second floor rooms, so that it is difficult to make the total height from the grade to the ridge less than 25 ft. The width of the single house, of course, is limited by the rent to 16 or 20 ft. The result is that the single house is necessarily higher than it is wide, and stands up in a restless, perky way. The height may be disguised by bringing the roof down to the first floor ceiling, but this spoils the headroom in the second floor bedrooms, and adds greatly to the cost of the house, owing to the necessary dormers and complicated roof construction. A whole town of such single houses close together seems to me to present a very unfortunate pill-box effect, that we, as architects, cannot approve of as the final word in the matter. The group house, on the other hand, is necessarily longer than it is high, and gives the feeling of a house sitting comfortably on the ground. These group houses certainly look like bigger and nicer houses than the small single house, and from the real estate point of view can be made to look like a better class development.

If the group house is to be the happy medium between the jerky single houses and the monotonous row houses, we must take care in the group house to avoid either of these extremes. We have tried group houses of eight families, but I confess that these are a bit too long, unless broken up by more architecture than can usually be afforded. Certainly group houses should never be more than eight units long, on account of easy access to the back doors. An even number of units is advisable for the using of one chimney and one line of plumbing for each two units. A group of four units seems to give the best proportion. This would be 64 to 80 ft. long by about 25 to 30 ft. high. Groups of two units and six units are also good. Here is chance for real architectural composition, and interest, with long roof lines, occasional gables, recessed and projecting porches, etc. The 20 ft. space between these groups breaks the monotony of the row and alternating long and short groups give still further variety.

A full architectural study of the problem demands that we compose these groups as well as the individual façades. A group of three or five houses has more possibilities for architectural composition than a single group house. This grouping of the

groups gives variety and interest to a town. It brings out the design of each type of house by contrast with the right sort of houses next to it. It "pushes" the feeling of the town plan by houses especially designed for corners, ends and vistas, etc. It gives contrast between groups of houses and open spaces by concentrating each in large masses. The group houses only 20 ft. apart give a sense of continuity that is pleasing. The open space would be concentrated into large playgrounds, allotment gardens, etc. This gives much more quality and scale to a development than the old method of small dabs of land cut up by dots of houses. Is not the unbroken lawn with groups of trees at the side more pleasant than the lawn dotted all over with single trees?

Although our study is by no means complete, we have reached the following conclusions: Alternating long four-family houses with shorter two-family houses give a pleasant rhythm, and relieves any possibility of monotony. It looks better not to mix hipped and gabled groups, but to have one group of gabled houses with ridges and gables carefully composed, and another group of all hipped roof houses. Group houses more than 20 ft. apart look scattered, and a 20 ft. distance between gives them a pleasant feeling of continuity and mass. Broad front lawns make the street far too wide for the height of the buildings, and, therefore, except around the community greens, it looks best to have the houses only 20 to 25 ft. back from the sidewalk. It accordingly would seem to be better to concentrate the biggest open spaces at the back of the houses rather than in front.

To sum up the matter briefly: A home for the small wage earner within walking distance of his work, means today a small house on a lot so restricted that the side yards are objectionably narrow and had better be omitted as much as possible. This results logically in the group house. The objections to the group house are based on old badly planned and badly constructed examples. These objections would be entirely eliminated in the new group houses, designed by sympathetic architects. The advantages of the group house over the single house are chiefly economy of construction and heating, greater privacy inside and better looks outside. A development of such group houses, of different sizes, grouped with relation to each other and to the town plan, would be much more varied and pleasing than a village all of single houses, crowded together to give the same number of families per acre.

Recent Legal Decisions

MECHANICS' LIENS—WHAT CONSTITUTES CONSENT BY LESSOR

Where lessors had no knowledge of and did not consent to improvements, a complaint in an action to foreclose a mechanics' lien will be dismissed as to them. A requirement that the lessee may or shall at his own expense make alterations does not constitute consent within the New York Lien Law. But where, although contracts for improvements were made with the lessee, the lessor's acting president, who signed the lease, was present on the premises daily while the work was progressing, and all the transactions which he conducted with the architect and builders, and approval of the plans, took place in the office of the lessor, there would be a consent by the lessor, within the Lien Law, although the acting president was also attorney for the lessee.—*H. A. Berger's Metal Ceiling, Etc., Co. v. Farmers' Loan & Trust Co.*, 170 N. Y. Supp. 934.

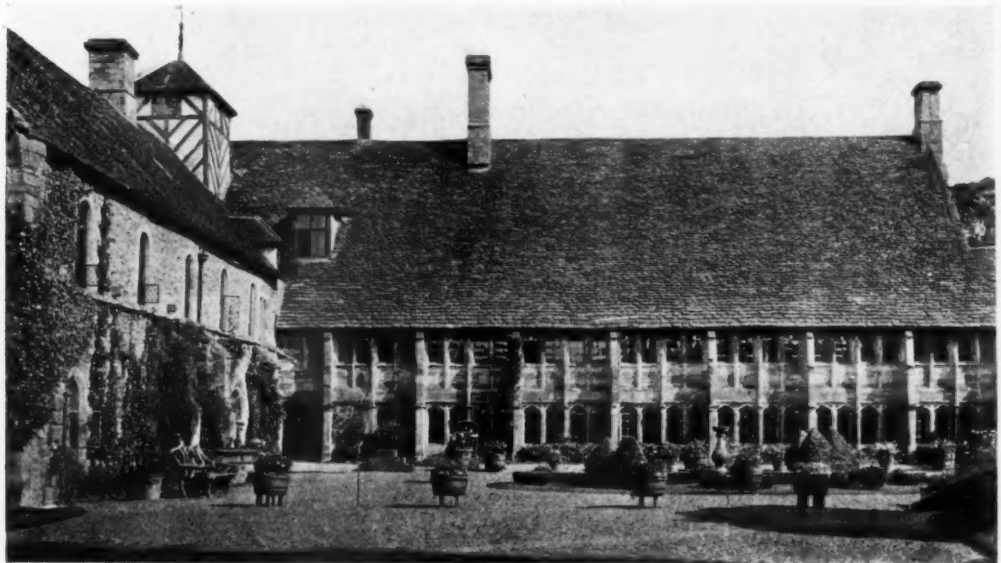
CONSTRUCTION CONTRACT AND BOND

In an action on a bond for the faithful performance of a construction contract, where there is sufficient evidence that certain items are lienable, the liens are admissible in evidence. A provision in such a contract (in this case for the construction of

a water system) "that the contractor agrees to pay all expenses, such as engineering, supervision, and inspection, that the village or its engineer may be put to by reason of the work not being completed at the time specified in the contract," does not contemplate any liability on the part of the construction company or the bonding company for engineering services rendered prior to breach of the contract. In such an action testimony showing clearly that certain sums were expended by the obligee in completing the contract in accordance with the plans and specifications is sufficient to make a prima facie case against the bonding company.—*Village of Council v. United States Fidelity, etc., Co.*, Idaho Supreme Court, 175 Pac. 44.

MECHANIC'S LIEN—FARM DEVELOPMENT

It is held that farm development, consisting of ditches, drains, embankments, and roads, so correlated as to form one harmonious entity, designed to convey water to and constituting a permanent improvement to the land, increasing its value, is a "structure," within California Code Civ. Proc. §1183, providing for a mechanic's lien on specified improvements "or other structures."—*Mendoza v. Central Forest Co. (Cal.)* 174 Pac. 359.



THE PRIOR'S HOUSE, MUCH WENLOCK

THE AMERICAN ARCHITECT

THE AMERICAN ARCHITECT

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A Report on Education

THE report of the Sub-committee on Education of the Joint Reconstruction Committee of the Illinois Chapter, A. I. A., and the Illinois Society of Architects, printed in this issue, makes two commendable statements when it says that "our educational systems should be reorganized so that the graduate may become of immediate value to his employer and his services a source of income to himself," and later on where it urges a "decided effort to stimulate the creative and not the imaginative instinct of the student."

These two points are no more fundamental today than they have been in the past. They must be kept in mind in any efforts toward reorganization of architectural educational methods.

From the crucible of the past two years there has emerged a better realization of our needs in education, and in any work that is undertaken to revise present methods it will be well to entrust it to groups of men actively engaged in professional work, eliminating the theoretical elements that have controlled architectural education in the past.

While there will not be unanimous concurrence with all of the things proposed in this report, it will probably be conceded that it contains the germ of a system which must ultimately be adopted if the student of the future is to become fitted for the conditions that will from now on control the practice of architecture.

Critical examination of this report may suggest that it might well be more drastic, as it undertakes only the improvement of existing courses, rather than the substitution of new points of view, based on the new order and the changing conditions of practice.

What is really needed is a complete reversal of our educational system—one that will eliminate every non-essential thing, supplying in its place the practical development of the student who seeks a living in a profession that will, if it is to endure, become more practical than ever before.

In its general direction the report may be commended. It is the result of close study on the part of groups of men who are in the highest degree qualified to advise in these matters. Similar reports on the part of other organized bodies in the profession should lead to a reorganization of our methods of education that will be of the utmost value.

A Leadership in Art Needed

JUST at this time when the matter of memorials is being very widely discussed and the opinion generally expressed that if we are not to become afflicted with a great many inartistic examples we should be guided by expert counsel, it may be pertinent to inquire exactly what are the real relations of the National Academy toward these and other questions which refer to art.

As the representative organization in the field of the fine arts, and as one that includes a majority of distinguished American artists in its membership, it is logical to expect that at such times when questions affecting the present and future of art in this country are being discussed, the influence of this dignified organization should become evident.

Twice a year the Academy holds exhibitions which, while not always representative of all the phases of art in this country, are conceded to be representative of Academy membership. Having opened its doors for certain periods, it closes them for the rest of the time, and the silence between these recurrent picture shows becomes profound.

During the period when we were at war the Academy as *the* Academy was not in evidence. Artists everywhere gave the best they had in war work, and considerable of this work was not only highly artistic in its result, but also possessed of a utilitarian purpose. The successful artistic exploitation of our various Liberty Loans, the preparation of essential "range-finding" pictures, were due to the unselfish work of artists either as individuals or through organizations of illustrators. In all of these very important movements the

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Academy as the national and properly ruling organization was not officially present.

If in France, for instance, any one of the Academicians had publicly painted a large canvas in order to promote patriotism and serve a very important end, his relationship to the Academy would have been as insistently set forth as the artist's name and the title of his picture.

In this country, many National Academicians forsook the privacy of their studios, set aside a natural modesty and stood up before vast crowds of people to paint the canvasses they patriotically agreed to. As far as any special significance as to their prominence in the field of art was shown, or their relation to the Academy as distinguished artists, they might as well have been commercial sign painters, placing on some hoarding an announcement of a loudly heralded nostrum. They do things differently in Europe, where art is regarded as a more dignified and serious effort. Just why it is not so considered in this country may possibly be due to the lack of public activity and a truly representative policy on the part of our National Academy.

It is not possible that a group of men so highly educated as the members of the Academy can be lacking in appreciation of the many and important matters in art with which they could very properly become associated. It is possible, however, that there may exist a certain apathy that needs the spur of sharp but well-meant criticism to awaken this organization to a full sense of responsibility and the great opportunities which are presented for a useful activity. Every field of industry is now actively engaged either in evolving a plan for readjustment or is steadily working out the details of a scheme which had with commendable foresight been prepared. We hear much lamentation over the

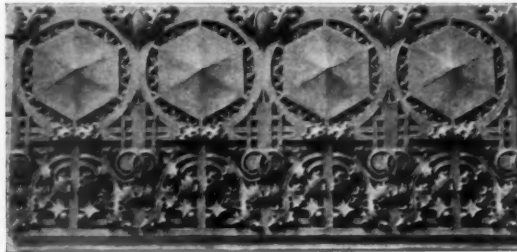
apathetic attitude toward art in this country. If as a nation we are to become awakened to the dignities of art and the value of its correct interpretation to all the people, should we not consistently look to the National Academy for direction and leadership in these matters?

There are many directions in which the Academy might lead and encourage such popular demonstrations in the field of art. First, however, it would be necessary for a more widespread knowledge that there is a National Academy, national in the true sense of the word, and that it is not merely an organization for the holding of two exhibitions a year.

Its officers might become more actively identified with national movements in art. Its councils might discuss important art matters and give widespread publicity to their conclusions affecting these things. By this means it could, as it should, take the initiative in important matters and become the arbiter in every discussion affecting the more widespread knowledge of artistic matters.

There have been organized in many cities, municipal art commissions whose duty it becomes to watch over the integrity of the artistic property of the city. These commissions have been organized as the result of public sentiment that there should be proper control of matters pertaining to art, and in the lack of interest shown by previously organized artistic bodies, it has been felt necessary to form these commissions.

Why not a bureau of the Academy whose duties would be the dissemination of the opinions as reached in its councils? In public life the services of many men are valued because of the fact that they are regarded as moulders and leaders of public opinion. Why should not the Academy take the lead as moulders of opinion in all matters relating to art?



Criticism and Comment

The Practice of Architecture

The Editor, THE AMERICAN ARCHITECT:

It is with great interest we have followed the discussion in your valuable journal as to what properly constitutes "The Practice of Architecture" and the means whereby the profession might be made more useful to, and given a better appreciation by the public in general. The article composing a five point analysis, published in the November 27th issue, is interesting and instructive and should be read by every architect.

It is to be regretted, however, that up to this time there appears to have been no concentrated effort in bringing before the public at large (the people who it is desired should understand) the need of master builders, by means of suitable and timely articles published in the daily press. Granting that the great majority of the architects of to-day are able to qualify according to the standard set by the leaders in the profession, it is, after all has been said and done, a matter of making the public understand the true meaning of architecture, and that the name signifies not only an art, but also a business. We would suggest that a press committee be selected by the A. I. A., or some other body, whose duty would be to originate timely and interesting short articles for our daily press and popular magazines along this line. Call this propaganda if you like, but we believe this would be a factor in making the issue, "Why Employ an Architect," a live one. Articles of this sort, no matter how good, published in our architectural journals, we believe will fail to bring the required results, because they are not read by a sufficient number of people outside the profession.

One requisite for a better and more thorough appreciation of building as an art and as a business by the public, we believe, is that the architect himself must be in possession of the highest artistic ability, a technical and business training, and training as a mechanic. The man who cannot qualify on the following four points should not in our opinion practice by himself, but should work with or for another so qualified:

1. The inborn quality of true artist.
2. A thorough technical training, including designing, mathematics, history of architecture, etc.
3. Adaptability, experience and business training.
4. Last, but not least, a thorough training as a building mechanic in one or more branches.

The architect of to-day must be a master builder

in the highest sense of the word, or he cannot consistently be called a worthy representative of the profession.

We sincerely hope that out of the many theories and fine suggestions there will soon come a practical application, such as will give representative men and women of our nation a true perspective, and a more thorough appreciation of the greatest and most important of all arts, "Architecture."

The thought that an architect, in order to be successful, must be a skilled mechanic, may be new to many, but we are fully convinced that this fact must be recognized by the profession sooner or later. It does not mean that he must be skilled in all the different trades, but the fact that he is skilled in one trade will add tremendously in his efficiency, both in the planning and supervision of the work in charge.

HENRY C. ECKLAND & CO.

Moline, Ill.

The Editor, THE AMERICAN ARCHITECT:

To condense within the limits of five paragraphs the essentials of the practice of architecture is quite an undertaking, and yet as far as that is possible you seem to have accomplished this in your article of November 27th issue. In fact, our own practice is conducted largely along the lines stated in your "five principles of practice," and whatever success we may have had is due to this. Therefore, we can recommend to the careful consideration of every architect the article mentioned.

JONES & FURBRINGER.

Memphis, Tenn.

The Editor, THE AMERICAN ARCHITECT:

In the January 1st issue of your paper I ran across a sentence in Mr. Corbett's article which, as an advocate of the Quantity System, I must comment on. In the third paragraph from the end he says, "but he (architect) need not assume responsibility in the sense in which a contractor does, for the simple reason that he is not obliged to take a gambler's chance nor permitted to share in the gambler's profits."

I would like to ask what it is that obliges a contractor to become a gambler. An analysis of the conditions that have prevailed will show that all bidding has been speculative. Not only the contractor, but the building owner, and one could al-

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most say, the architect has speculated on the kind of workmanship and material that would go into a building under the so-called competitive bidding plan of taking contracts. Contractors have been forced to gamble on both the kind and quality of work to be required under a contract. No two contractors would have the same data on which to base their bets.

There can be no true competition until the exact requirements are known to all. Put competition on the basis of constructive ability and management and the contractor will cease to be a gambler. You cannot get the benefits of competition until uniform guaranteed quantities are made the basis of bids.

Another question I would like to ask is, What is the moral justification of an architect who allows his client to become a party to a speculation when there is a way to provide equitably for the protection of both the contractor and his client?

WM. GRAVES SMITH,
President, The Quantity Survey Co.
New York.

The Editor, THE AMERICAN ARCHITECT:

Referring to your editorial dealing with an International Federation of Architects, it is an interesting appeal and we sympathize with the idea of a closer union among architects of all nations.

The questions which are being put to architects now involve so much of town and city planning in addition to our old fashioned architectural problems that your proposition for a federation seems all the more important.

We, therefore, concur with you in your wish for a conference at an early date.

Boston. KILHAM & HOPKINS.

The Editor, THE AMERICAN ARCHITECT:

I am very much in sympathy with the idea of an international architectural conference which you have brought forward at a very opportune time. Great changes appear to be at hand for the individual and for the organization for the conduct of architectural practice. I would like to join in working along the lines that you express. In my own business, I am already reorganizing.

Pittsburgh. EDWARD B. LEE.

The Editor, THE AMERICAN ARCHITECT:

The three things necessary to make an architect are, correct design, correct administration and correct construction. There is no success in the practice of the profession unless these three things are well done and these three things must be recognized

by architects as their duty and demanded of them before the profession will be well balanced. We have to deal with a constructive art which is an applied art and the art depends on good construction and depends on good administration for its crystallization and consummation. W. A. EDWARDS,
Atlanta, Ga.

The Editor, THE AMERICAN ARCHITECT:

I regard the idea of an international architectural conference a capital one and should like to see it carried out. ELMER GREY,

Los Angeles, Cal.

Personal

J. G. Ralston, architect, has moved his office from the Syndicate Building to the L. & J. Bank Building at Waterloo, Iowa.

A. G. Zimmermann, architect, announces the removal of his offices from 10 South La Salle Street, Chicago, to 85 Ninth Avenue, near Sixteenth Street, New York City.

Magney & Tusler, architects, formerly of the Metropolitan Bank Building, Minneapolis, Minn., have moved into new offices at the Builders' Exchange Building.

H. W. Buemming and Alexander C. Guth, heretofore practicing architecture independently, have formed a partnership and will have their offices at 521 Jackson Street, Milwaukee, Wis.

The entrance into the architectural profession of the new firm of Burge & Stevens at 802-3 Atlanta Trust Building, Atlanta, Ga., has been announced by Flippen D. Burge and Preston S. Stevens.

Andrew O'Connor, Jr., of Worcester, Mass., has been one of the sculptors commissioned to make the allegorical figures for the spandrels of the Arch of Triumph which New York is to erect for the return of its victorious soldiers.

It is announced that Mr. Willis Irvin will succeed the firm of Bleckley & Irvin, Architects, and will continue the practice of architecture at 1404 Lamar Bldg., Augusta, Ga. Mr. Irvin desires that manufacturers' catalogues and samples be sent to him.

The firm of Lang and Witchell, architects, at Dallas, Tex., has consolidated with the firm of B. F. and C. M. Davis, construction engineers. Otto H. Lang, who is also Street Commissioner of Dallas, is to be the senior member of the firm. The office of B. F. and C. M. Davis has heretofore been located at Fort Worth. The consolidated firm will have offices in Dallas and Fort Worth.



PLATE 35

WAREHOUSE BUILDING FOR WASHINGTON UNIVERSITY, ST. LOUIS, MO.
EAMES & YOUNG, ARCHITECTS

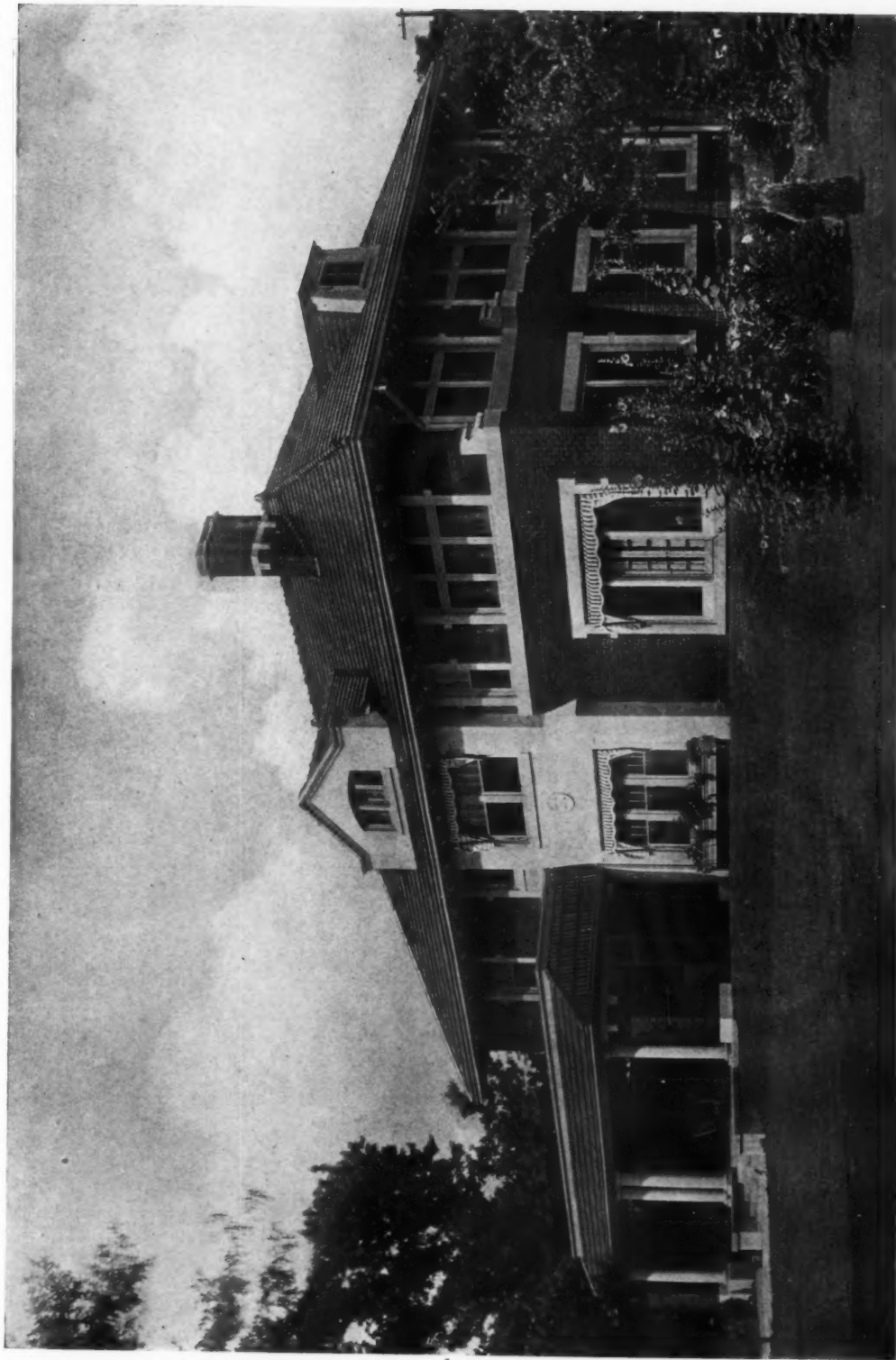
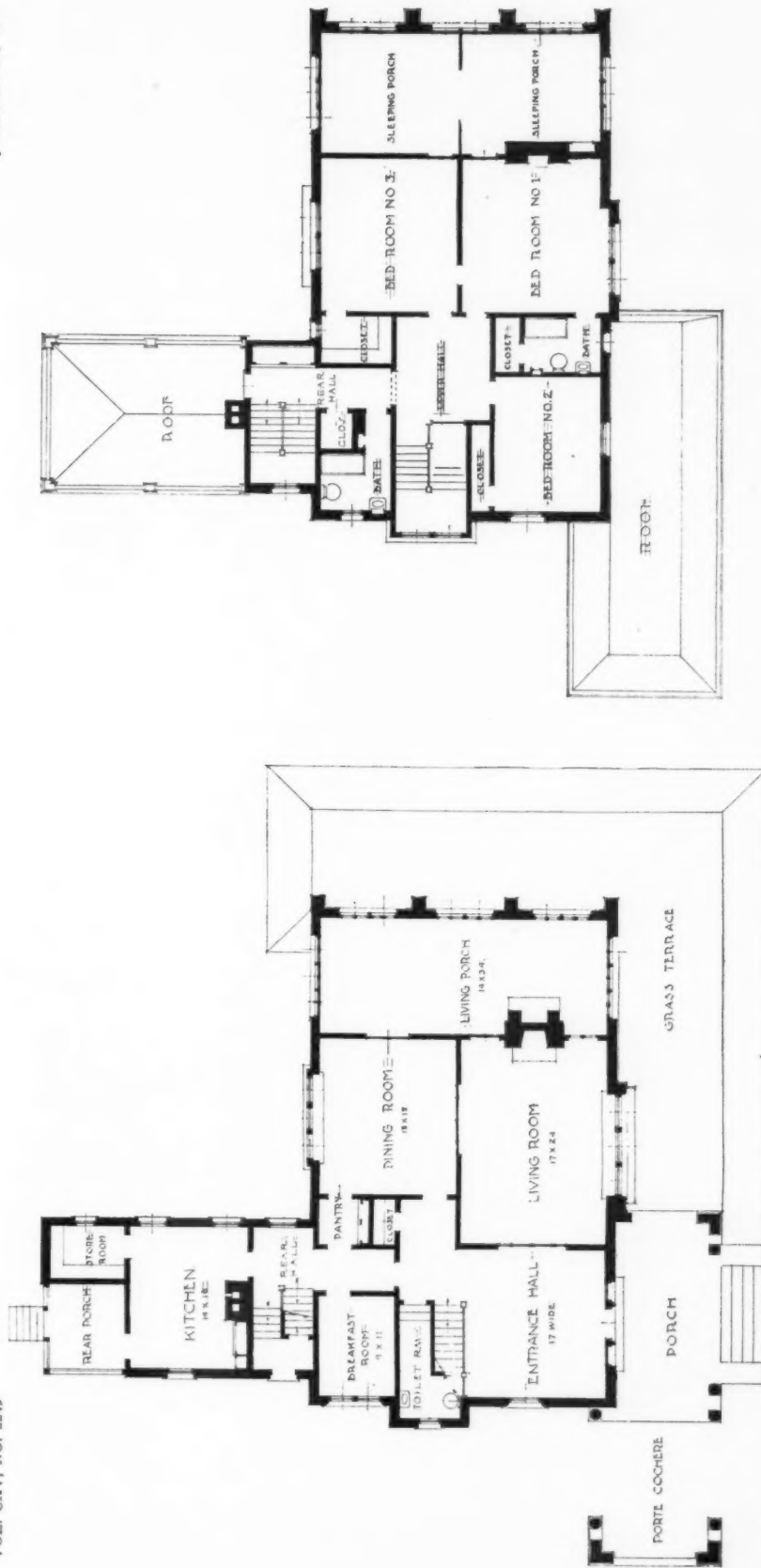


PLATE 36

HOUSE OF J. W. WYATT, MEMPHIS, TENN.
JONES & FURBRINGER, ARCHITECTS





HOUSE OF J. W. WYATT, MEMPHIS, TENN.
JONES & FURBRINGER, ARCHITECTS





LIVING PORCH

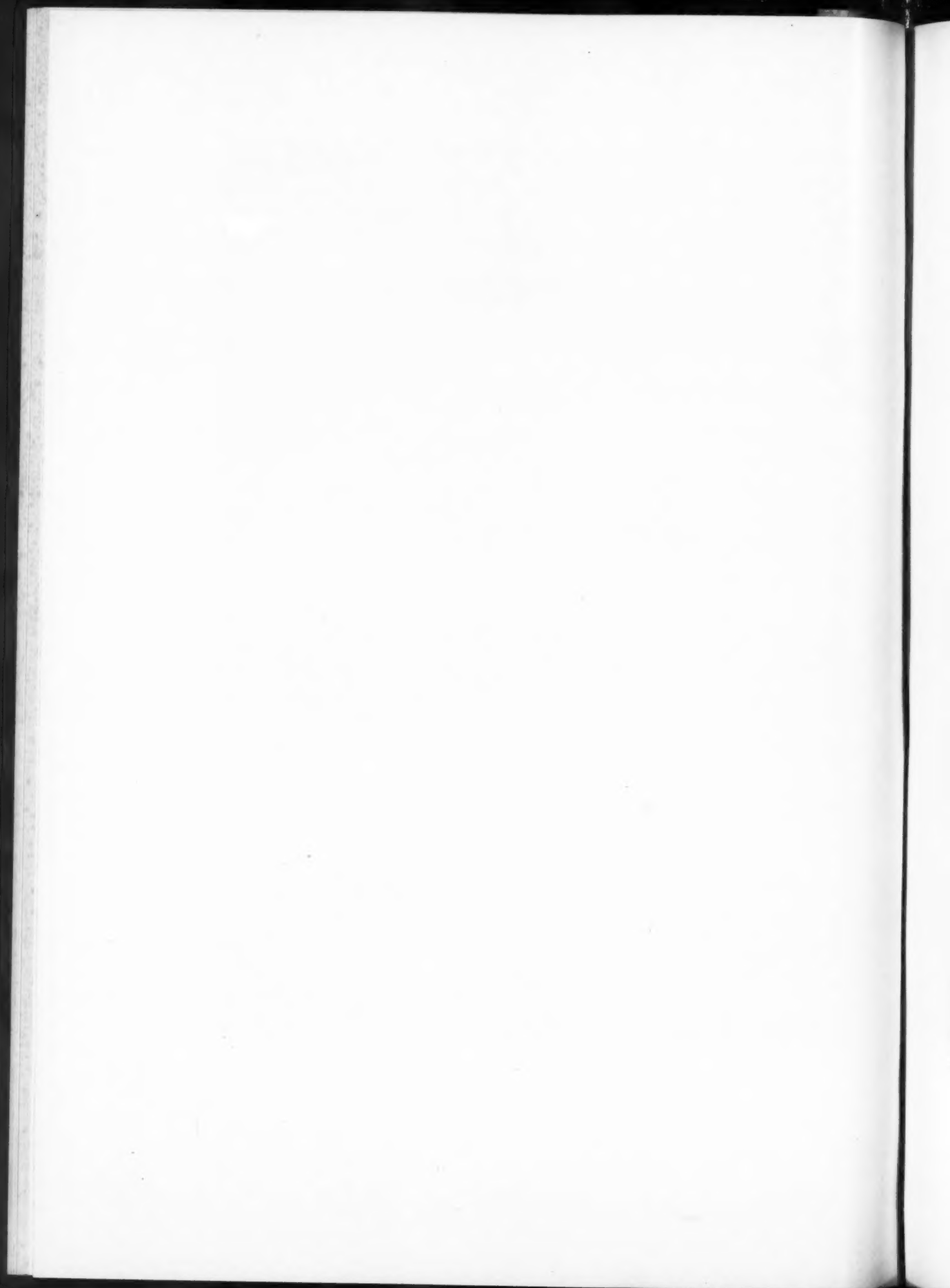


PLATE 38

LIVING ROOM

HOUSE OF J. W. WYATT, MEMPHIS, TENN.

JONES & FURBRINGER, ARCHITECTS



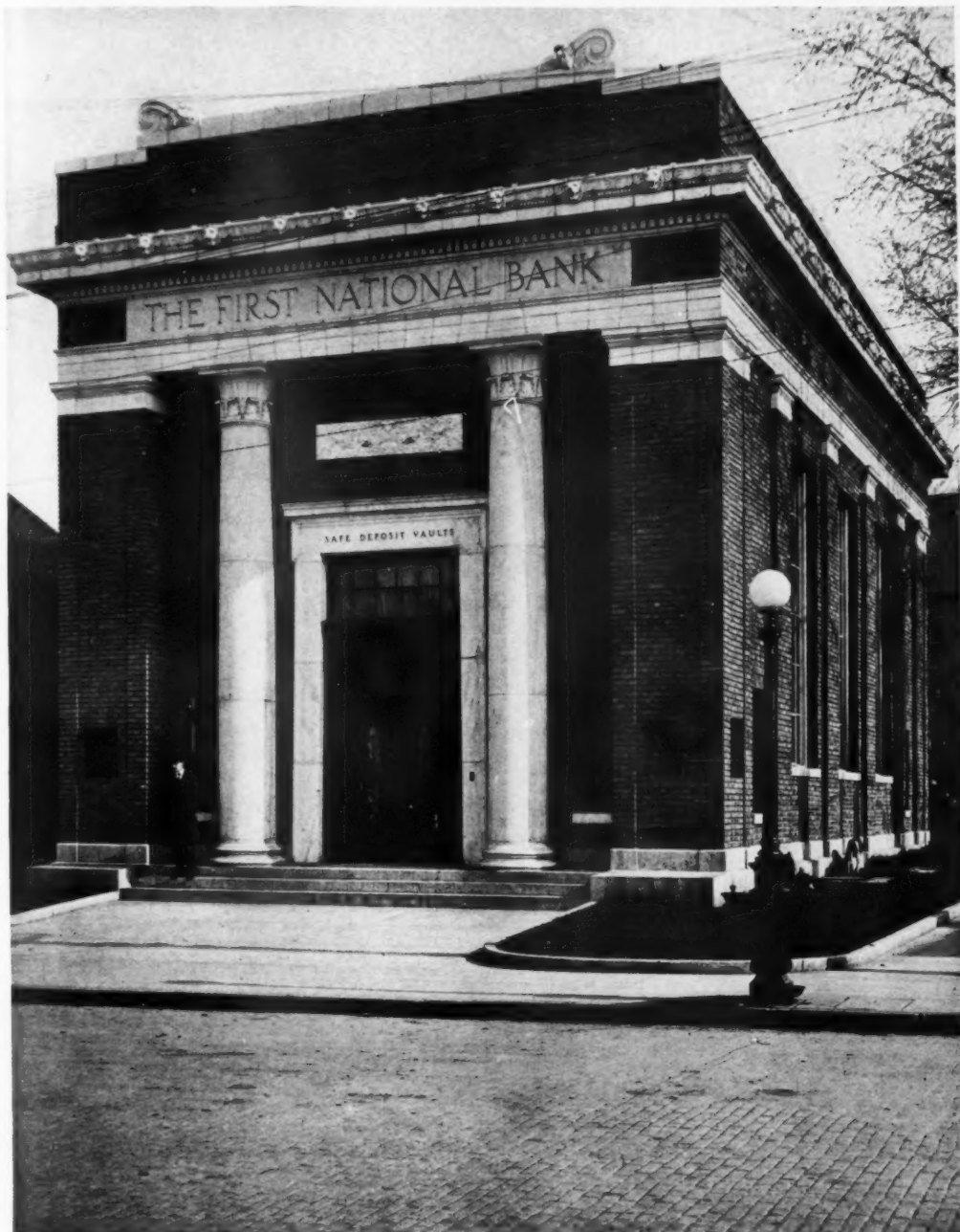


PLATE 39

FIRST NATIONAL BANK, ST. JOHNSVILLE, NEW YORK

DENNISON & HIRONS, ARCHITECTS



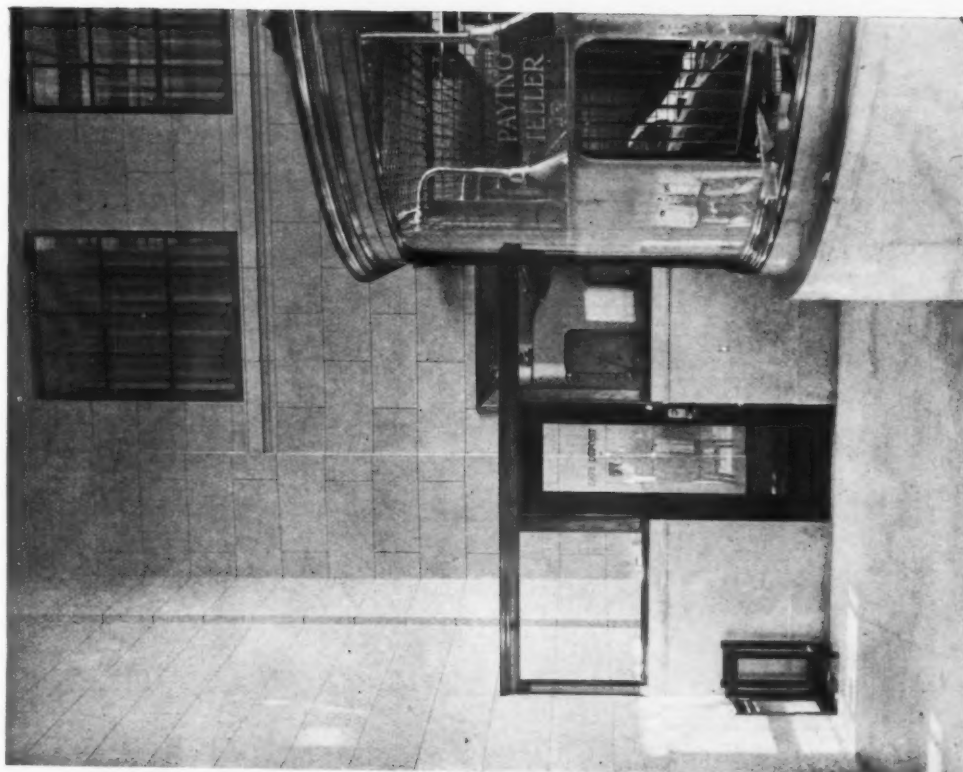
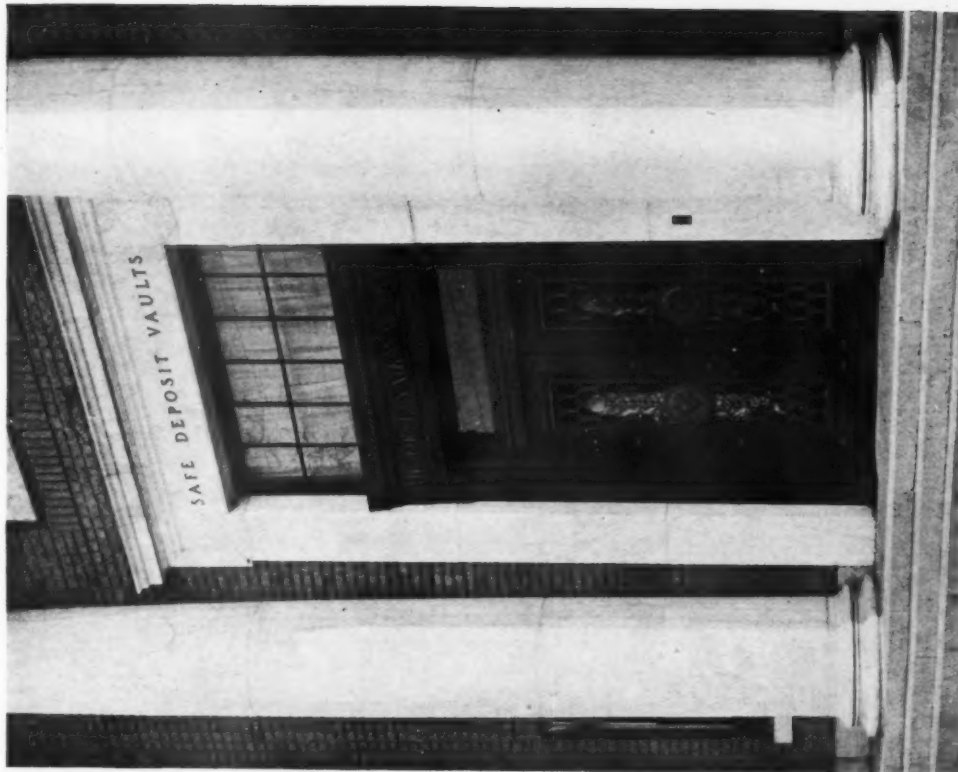


PLATE 40



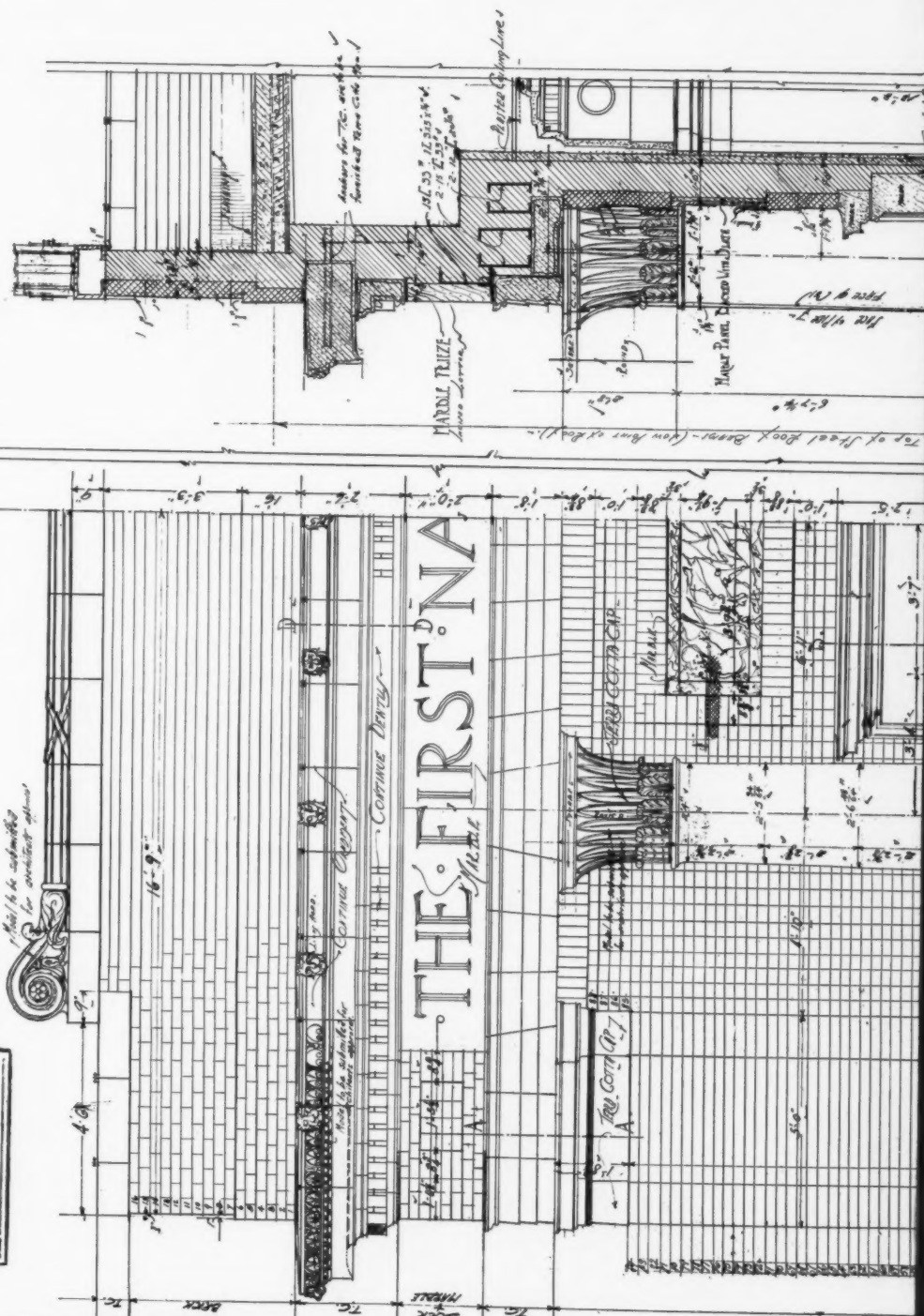
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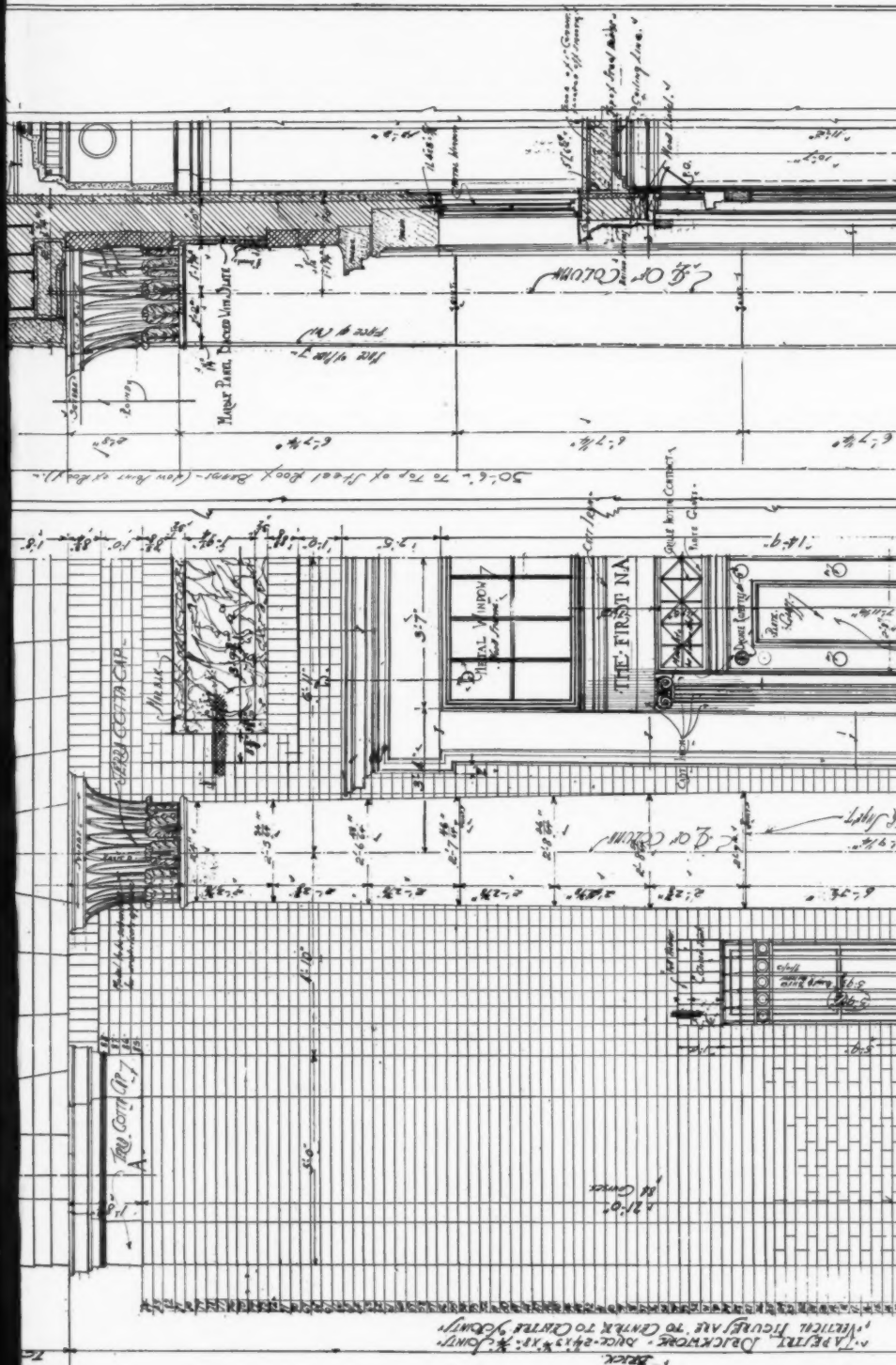
• $\frac{3}{4}$ SCALE • DETAIL OF
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DENNISON & HIRONS
...ARCHITECTS...
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Made by Phoenix Checked by
Date Nov 20 1913 Transd by
Scale 3/4" = 1'-0"

NOTE.
THE DUCKING OF THE JOINTS.
ALL VERTICAL TIE RODS ARE CENTRE
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9/10/11/12 to be submitted
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Financing the Expected Boom in Building

A Digest of Opinion Gleaned by THE AMERICAN ARCHITECT Conclusively Proving that with the Readjustment of Wage Scales and the Lowering of Material Values Construction Will Have a Marked Impetus

LARGE loaning interests have entered the new year in a very optimistic frame of mind, confident that the financial problems brought about by the transition period will be met just as successfully as those induced by the war. While readjustment from a war to a peace basis may take longer than at first supposed and unsettlement in finance and the building trade may be expected to continue for some time, confidence is expressed generally among banking institutions that all situations will be satisfactorily handled. A thorough canvass of both banking and building circles unequivocally reflects the determined attitude of business leaders that, with the readjustment of wage scales and reduction in the cost of materials, there is bound to be great building activity and that it will come by Spring.

Undertakings that will call for construction, building and enlargements which have been held up during the war, will be launched as soon as the factors of price, labor and materials have become more stabilized. While it is true that many of the large loaning institutions are out of the market for the present on account of the heavy Liberty Bond purchases, it is generally realized that the financial and industrial condition of our country is fundamentally strong, and that after a short period of readjustment the building industry will prosper. The necessity of another Liberty Loan is the only thing that will prevent readjustment from taking place more quickly, and, while banks will give all possible aid to industry, capital will be conserved for the next Loan. However, these two seemingly opposed conditions will soon be welded together for the benefit of the Nation.

While the builder must be patient a little longer, as the readjustment will be gradual, he can clearly see the country looking forward to the biggest construction era in its history. As yet the effect of lifting the Government's restriction on building has not been felt. But he knows full well that there is an immense amount of necessary construction which must be taken care of as soon as the financing can be arranged. When this is under way the industry will be kept busy until labor and price conditions have again become more stabilized.

Realizing that the mortgage market is the main

factor and influence in bringing about this expected boom in construction activity, the attitude of the banks and other large loaning institutions must be watched closely. During the war these interests naturally withheld loans for new building because many depositors withheld their surplus earnings from the banks in order to buy Liberty bonds in response to the call from the Government. But since the armistice was signed, these institutions are all issuing statements showing their deposits to be doubled and in some instances to exceed the past withdrawals. This points absolutely to prosperity, and the financial situation in this direction is most reassuring.

E. M. Treat, president of the American Credit Indemnity Co., when asked what would be the consequences of the restoration of peace, replied:

"There is everything in the present situation to encourage and inspire the intelligent preparation for future conditions, to take every precaution against loss of every species, and thus avert serious harm to business."

Banking interests generally feel that the first construction to be taken up will be the care of the housing of commercial enterprises, which have become unduly crowded and congested during the war, and naturally mortgage loans for such projects will be considered most desirable. They feel that there should be little money loaned for the construction of apartment buildings for some time. The feature of this, they assert, is that it will have a strong tendency to hold values up in increased rentals in certain sections, which in turn will create more confidence generally and tone up the strength of the market.

There is a strong feeling that of the money to be loaned for building operations in the near future a large part must be held out for the improvement of the country's industrial facilities, and the further development of suburban housing improvements which are in dire need of expansion.

Take the case of New York City, for instance. Every builder knows only too well the shortage of business space of every character in that vicinity. Experts have declared that the city is several years under-built. The floor space of over a million square feet taken over by the Government for

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war needs will easily be absorbed when it is released from its present use, as the demand for it is great. It is only to be hoped, however, that all the space will not be released for commercial purposes at once, so that it may be taken care of without undue loss to the property owners.

But the question of most import at this moment is just what financial arrangements can be made to take care of this revival in building activity. One of the most practical suggestions so far advanced, in view of the present financial condition of the banks and loaning institutions, is that of Walter Stabler, comptroller of the Metropolitan Life Insurance Company, and outlined in a previous issue of *THE AMERICAN ARCHITECT*, who suggests as a possible solution the bond issue, which has been successfully tried out in other municipalities.

Close followers of the mortgage situation today see in this suggestion the only means by which new money will steadily flow into the market for reinvestment. The plan is certainly worthy of trial, for the placing of long-term mortgages, to be reduced gradually through the serial payment system, has advantages that are needed to aid in the solution of the present situation. With a sound demand that is sure to come, and with satisfactory basic conditions, in less than two months after the signing of the armistice, there is nothing in the way of a satisfactory solution of the situation. Reports from commercial centers all over the country are evidence that the gradual upward movement has started in force.

The situation is decidedly aided by the attitude of the Government, which, according to despatches in the daily press, announces the formation of a new bureau to conduct an organized campaign to encourage new building projects in order to give employment to men just leaving military service and to thwart any business depression. In answer to the argument of high prices, records show that in the past almost all big construction projects have been launched at times when values were high, rather than when building activity was at a low ebb and prices resultantly off.

That the revival of building will be well under way by Spring is evinced by the fact that various states all over the country are planning a resumption of their building programs, interrupted for three years by the war ruling restricting construction. In New York State a sub-committee on housing has been appointed with the following personnel: John Alan Hamilton, chairman; Dr. Felix Adler, Mrs. William Good, Henry Evans, Peter A. Brady, Mrs. Lewis S. Chanler, V. Everit Macy, Arthur Williams, Alfred E. Marling, and M. Samuel Stern.

It is explained by those in authority in regard to

the state's building program that there is no intention on the part of the Legislature to appropriate vast sums of money for either new buildings or highway purposes. The leaders declare, however, that certain work must be done, and that although materials and labor are high, it is essential for the state to furnish employment for its discharged service men on needed improvements.

A brief outline of what new construction is necessary in New York state may not be amiss, for in other states work of similar character must necessarily be done. It is expected, news despatches from Albany state, that work on the new state office building, which is to occupy two city blocks in the rear of the capitol, will be begun shortly. Salvage from the present buildings will more than pay the cost of demolition. The new building, which is to house all state departments that cannot be accommodated in the capitol, will cost more than \$2,000,000. It is to be a memorial to the soldiers, sailors and marines who served in the world war.

A decided impetus will be given hospital construction. In his message to the Legislature Governor Smith directed attention to the fact that hundreds of returned soldiers suffering from shell shock and other mental afflictions must be cared for in state institutions, which are already overcrowded. On September 1st of last year the overcrowding in state hospitals amounted to 22.6 per cent, or 6546 patients in excess of the total certified capacity of the thirteen institutions, figures compiled by the state commission show.

And this state of affairs in institutions brings all the more forcibly to our attention the belief that conditions would have been bettered, in view of the demand for material and labor abroad for reconstruction purposes, had more attention been paid to the movement to alter and remodel older buildings and fit them for occupancy in order to meet the change in conditions. For there is no question but that there is a certain class of buildings—all substantial structures—which are of no use as they stand, but which could be changed into either business or dwelling places if properly altered. Then, instead of being a drag on the market, they would be revenue producing as well as an aid in the solution of the housing problem.

One of the valuable lessons taught by the war and one that is bound to make itself deeply felt during our period of readjustment is offered by the city of St. Louis, where, it may be recalled, enterprising citizens after making a survey of the city and finding that there were numerous ramshackle structures that could well be spared, tore them down, salvaged the material, and built new ones on their sites. The St. Louis Chamber of Commerce pushed this movement to make the city a better, healthier

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and more attractive place in which to live, even while building was necessarily at a standstill on account of the war. This organization is now behind a movement to pass laws that would give the building commissioner power to remove all useless and undesirable buildings.

Not only are the banking interests enthusiastic over the revival of great building activity by Spring, but the larger construction firms also feel that much big work is to be brought to them. G. Edward Escher, president of the White Fireproof Construction Co., New York, whose words of counsel are always looked up to by the trade, believes that if a reasonable readjustment of conditions can be made during this winter, considerable building activity may be anticipated during the Spring and Summer months. He feels that the proposition will be largely guided by the cost of materials and commodities entering into building construction not actually under Federal regulation and control, which have advanced to a figure prohibitive for work not

absolutely essential and for which cost is no object.

The question now is whether or not the high prices caused by an abnormal demand of the past few years, before the entry of the United States into the war, will be helped by the likelihood of a demand for materials in the rebuilding of devastated Europe. It is known that already there has been some export call for both manufactured articles and raw materials and this business is likely to be a feature in the manufacture of building materials in this country for some time to come.

On the other hand, the enormous demand for supplies, as well as for labor in many lines, ceased on the signing of the armistice. The return of competition as a result of the lessening of activity in munition plants may turn the trick and cause a recession in prices. This slackening in the demand for labor can only result in the further lowering of the cost of manufacture of supplies for building construction.

(To be concluded)

The Law of Supply and Demand

Business Conditions After the War is the mooted question of the moment. In connection with which there seems to be in the air an indefinable dread of the Bolshevik, the I. W. W. and the revolutionist. Such revolutionists should no longer inspire fear. The war itself has been the greatest revolution in history—a revolution against autocracy, tyranny and kaiserism—a revolution against the very things that the little revolutionists, sincerely or insincerely, have always relied upon as a justification for their propaganda. The revolution has succeeded. The world is free. Long live the revolution.

But, queries Mr. Capital Investment, can we build now? What about the cost of labor? What about the high price of material?

Some employers yearn for a decrease in wages. They hope that the eight-hour day will be abolished and that wages will recede from their present level; but labor contends that its motive is not to destroy but to construct, and that all may just as well understand now as at any other time that the advantages which the workers of America and the allied countries have gained, and which may even extend to

the peoples of the conquered countries, shall not be taken away.

It might appear that this sharp divergence of opinion would be irreconcilable. But if we stop to consider, the most potent and really determining factor in the situation, namely, the basic law of supply and demand, is the only point in question.

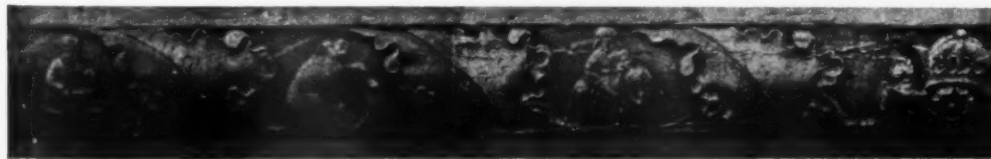
Increased production and competition will regulate prices. Under any other course employers would suffer as much as employees, and capital suffer as much as labor.

In the meantime the great investing public twirls its thumbs. It waits, it hopes, it studies, it will (the smartest of them) be quick to seize the opportunities of the moment.

The pending organization of the next Congress, if it leads to stability and definiteness of policy (no matter what kind) will open the flood gates of investment. Prosperity, activity, employment, contentment and happiness will follow, and be the reward of the industrious, the serious minded and the upright; these in the individual, if coupled with capability, will spell success.

WILLIS POLK.

San Francisco.



Financial and Commercial Digest

As Affecting the Practice of Architecture

Housing Appropriation Not All Used

Not more than \$45,000,000 of Congress' appropriation of \$75,000,000 to provide housing accommodations for workers in war munition plants will be spent, according to Otto M. Eidlitz, director of the United States Housing Corporation. The amount of contracts outstanding, Mr. Eidlitz's statement shows, is \$63,491,146.65. The director said that it is proposed to proceed and complete contracts amounting to \$23,073,961.11. Contracts amounting to \$17,330,957.29 will be reduced to \$11,297,471. Projects that have been contracted for to the amount of \$17,627,952.50 will be canceled, at a loss of \$4,053,483 to the Government. Contracts to the amount of \$5,458,275.75 will be canceled without financial loss.

Contracts that will be completed are for housing projects in districts where housing facilities are greatly needed, and this work is nearing completion. The largest single contract for a project that will be completed is for the housing of war workers, other than shipyard employees, in Philadelphia. This contract is for \$2,612,270. The large housing projects at Bethlehem, Pa., have been reduced one-half, while projects for the Pittsburgh district, including a \$5,673,354 one for Neville Island and building operation at Eddystone, will be canceled.

The final cost to the Government of the contracts for work the housing commission will proceed with and the loss to the Government through the abrogation of contracts amounts to \$38,429,915.11, leaving a net saving of \$25,061,231.54 on contracts awarded.

Favor Coal Export Co-operation

The Foreign Trade Committee of the National Coal Association in a report just issued recommends the establishment of an export coal association under the Webb-Pomerene Law, open to all bituminous coal exporters in the United States and designed to work as a medium through which the country's foreign trade may be handled. It is understood that the proposal has met with the favor of leading bituminous coal exporters of the United States.

"The problem of supplying at the present time American coal where it is most needed abroad,"

says the report, "is almost wholly one of obtaining the necessary vessel tonnage. Indications are that in the near future an increasing number of vessels will be available for the transportation of this tonnage. The desire to use economically whatever ocean transportation is available, coupled with the desire to maintain in foreign markets a high standard of product, is another factor upon which the recommendations that an export association be formed are based."

Mineral Products Score Record

Preliminary estimates of the United States Geological Survey, Department of the Interior, for 1918, combined with the known figures for 1917, show the remarkable record of over \$10,000,000,000 in mineral production. The total estimate for 1918, including unspecified products, is \$5,160,000,000, a goodly increase over the total of nearly \$5,011,000,000 for 1917 and a vast increase over \$3,513,972,000 in 1916.

The output of metallic products, chief of which are pig iron, copper, ferro-alloys, lead, zinc, gold, silver and aluminum, are estimated at \$1,895,000,000 for 1918, as against \$2,091,825,000 in 1917. The non-metallic products, principal of which are coal, petroleum, clay products, cement and natural gas, were placed at over \$3,265,000,000 in 1918, against about \$2,889,000,000 in 1917.

Building Manager Condemns Tax

Declaring that the 10 per cent so-called "war tax" on fire insurance policies was costing the owners of buildings and of their contents in New York City alone about \$2,000,000 annually in extra premiums, Arthur W. Warner, chairman of the insurance committee, New York Building Managers' Association, has come forth with a protest, urging that a discontinuance of the tax should now be considered.

"The flat extra charge was never justified by loss experience in New York and is not a tax at all," Mr. Warner added, "but a war profit for the insurance companies, which was levied under cover of the Black Tom explosion, while public imagination was aflame with the incendiary threats and doings of spies and other German sympathizers."

"Whatever merit may have existed in the plea that the additional 10 per cent was needed to strengthen the resources of these companies to meet unknown wartime risks, the occasion for the fear is now happily over. The fire insur-

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ance business is unique in that it enjoys the protection virtually of the State against any competition to reduce selling prices, and for that reason it is particularly unfair for the fire insurance companies to sit tight and keep on collecting their toll of extra profit masquerading as a war tax, while all other business and building owners are straining to make ends meet.

"Another phase of the situation is that some insurance companies are willing—although naturally not anxious—to forego making this charge, but dare not do so for fear of punishment by the New York Fire Insurance Exchange, of which all insurance companies are members, and which fixes all rates in New York City, with the more or less complete approval of the State Superintendent of Insurance. Before the war there was some talk of generally reducing fire insurance rates in view of the city's fire record, and it is to be hoped that this too may now get the consideration it deserves by the Exchange, its members, the premium payers, and the proper public officials."

A Note of Optimism Predominates

The expected foreign demand for certain American products is already manifesting itself and this is one of the main factors in locating the note of optimism that dominates business conditions. Another big factor is that conditions are fundamentally favorable. Crops of all kinds are uniformly reported good. An earnest effort is being made by the large employers of labor to maintain wages. Factors not on the boom side of the ledger include the prospect for long drawn-out peace negotiations with the certainty that business will be affected thereby and the quandary that war work industries are still in as to the status of their contracts.

A review of last year by the Federal Reserve Board shows that concentration of the country's monetary stock of gold held at Federal Reserve Banks amounted to \$2,090,300,000 as against \$1,671,100,000 at the close of 1917. Much of this was taken in exchange for Federal Reserve notes, which increased from \$1,246,500,000 to \$2,685,200,000 during the year and at the close represented about 70 per cent of the total paper circulation of the country, not counting gold and silver certificates, as compared with 54 per cent at the close of 1917. The paid-in capital of banks increased from \$70,-

142,000 to \$80,681,000, representing an increase of \$341,300,000 in the aggregate capital and surplus of member banks. Gross deposits of the Reserve Banks show an increase from \$1,771,000,000 to \$2,312,500,000.

World's War Debt a Vast Sum

A review of the war obligations of Europe made by the Mechanics and Metals National Bank shows that the total indebtedness of the seven great nations chiefly engaged in carrying on the world war was increased in four years from \$27,000,000,000 to more than \$194,000,000,000, while the total indebtedness of the nations of the world has increased to more than \$200,000,000,000. The bank's compilations show that Great Britain and Germany have the heaviest debts of any of the belligerents, that France comes third, and Austria-Hungary, Russia, the United States and Italy follow in order.

The bank's estimates show securities now outstanding against the seven chief nations which were in the conflict are greater than the developed wealth of any single nation of the world, other than the United States. These securities represent a sum six times as large as all of the bank deposits of the United States, twelve times as large as all the gold and silver mined since the beginning of the world and twenty times as large as the value of the annual foreign trade of this country.

Steel Industry Slowing Down

As further evidence that the steel industry is slowing down, reports from the Youngstown section show that many large plants are halting production and working at 80 per cent capacity. This is the first recession from high production which has been forthcoming from this iron and steel section since early in the war. Generally speaking, Southern plants seem to be holding nearer to capacity than those of other sections of the country.



Cities Deciding on War Memorials

While cities and towns all over the country are considering the erection of memorials to those who have served in the war, very few municipalities have as yet decided just what form their tributes will take. Buildings, arches, sculpture and tablets are being discussed, but public sentiment generally seems still to be in an uncertain stage, the daily press in most cases urging that "haste be made slowly" and that mature and deliberate discussion be given suggested projects.

There is a remarkable similarity in the plans under consideration in most cities, each one including in its possibilities a public building, a park or memorial arch. In the smaller towns which would be unable to finance expensive undertakings, sentiment seems to favor bronze or steel tablets which would bear the names of the men and women who have been in the service for any period during the war. Public buildings seem to be leading in point of popularity.

Various cities in New England have been active in formulating plans. Worcester, Mass., has definitely decided to build an auditorium. It seems probable that Lynn, Lowell, Pittsfield and Brockton will also erect public buildings. Lowell and Lynn have prepared committee bills for the Legislature which strongly intimate the trend of the public building idea. The Lowell bill has been prepared to get legislation to remove its old public hall and erect a new one as a memorial. One of the Lynn representatives will place a bill asking for the right of cities and towns to erect memorial halls.

The proposal of Pittsfield, approved heartily by its citizens, is for a Liberty building to be erected by popular subscription. The building would include an assembly hall, quarters for military organizations, and would be a center of community activity. One feature of the interior would be a set of bronze tablets giving the name and record of the 2,700 Pittsfield men in the service. Brockton, Mass., would spend \$100,000 on a memorial building. Manchester, N. H., has also selected an auditorium, although public sentiment strongly favored an artistic stone bridge over the Merrimac River at a point made historic in the early days of the city. The idea was voted down, however, because of remoteness of the bridge from the city and the limited number of people who would see it daily.

In Waterbury sentiment favors waiting until the boys return and letting them have a voice in what they would like to have done for them. Bronze tablets, however, have been placed in the Waterbury City Hall.

Two architects, Charles W. Oakley and Stockton B. Colt, have submitted designs to the City Council of Elizabeth, N. J., for proposed memorials to soldier and sailor heroes of that city. Mr. Oakley's idea was for a permanent memorial arch, while Mr. Colt suggested that the memorial for the fighting men take the form of a "Temple of Love."

The principal speaker before the Municipal League of Seattle, Wash., when the proposition of erecting a suitable war memorial was taken up at this organization's weekly meeting, was Carl F. Gould of the architectural firm of Bebb & Gould. Mr. Gould's address was on the great war memorials of Europe and was illustrated with stereopticon views. The suggestion to erect a great public hall was decided to be most suitable. The will of the late James Osborne provides \$85,000 for use in building such a structure, and trustees of the estate stated that the city might use this amount, together with other funds, should this type of structure be decided upon.

The Des Moines, Iowa, City Council has purchased a site on West First Street, that city, for the erection of the new municipal museum and memorial. It is planned to erect a \$500,000 museum, with a \$200,000 endowment for the maintenance of the structure.

Following the indorsement of the committee of one hundred and of the trustees of the Rhode Island School of Design, similar action has been taken by the Rhode Island Chapter of American Institute of Architects on the proposal to build an auditorium in memory of heroes of that State in the world war.

Speaking of war memorials that are worth while, the Philadelphia *Public Ledger* says:

"The artificers of Ephesus who made the little images of Diana were not more wroth with St. Paul, whose new-fangled doctrines threatened to ruin their very lucrative business, than are the stone-cutters of New Jersey, who are furious because Governor Edge has suggested that the war memorials that are planned might as well take on a practical form. And it does not call for any deeper insight than that afforded by their outburst to assume that Governor Sproul has been similarly chided in Pennsylvania because he believes in memorial bridges, and supervised by competent art experts at that; or that, in general, all over the country the minor craftsmen are rallying to oppose any "interference" with the home-made memorials which will bring shekels to their pockets, if not artistic fame to their home town.

"Well, as the phrase goes, we shall see what we shall see. A good deal of water, however, has run under the bridge since the crop of Civil War memorials and the Spanish-American War monuments

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were set up. We do know that most of these local monuments are an indictment of good taste and are absolutely without inspiration. And, despite the outcry of the craftsmen, who are ready to fight the artists, architects, engineers and the civic experts, the country as a whole will not return to the inartistic wallow of other days. For when it is remembered that the walls of the humblest public schools, in print and photograph, now reveal those things that are glorious for all time in art, and, too, when it is also recalled that the moving picture theatre shows daily in its instantaneous and universal views, the country over, interiors that are beautiful, gardens that are magnificent, and public and private art that delights and transports, it is certain that the mass of the people have no such gradgrind attitude toward the artistic memorial as the objecting statuaries and stone-masons would suggest.

"And the absurdity of these protests is that the business of all artificers will be increased, not diminished, if the plans of the specialists succeed. At all events, it is to be hoped that both the State and local authorities will not rush permanent memorials into execution until the question of their artistic value is threshed out. The American Federation of Arts, for instance, has called a convention for May to discuss this war memorial problem, and in the meantime it is advising all its members to see to it that any question of a war memorial be taken up judiciously and that all aspects of the problem be studied out before any community is committed to any given project. In fact, in this issue, the best rule for all communities is to make haste slowly."

The Boston *Transcript* voices a similar sentiment in urging communities to make haste slowly in selecting permanent memorials as follows:

"It would be much better to wait for years for our memorial to the soldiers who have died for us in this great war than hastily to erect one which afterward we should desire to see removed. The finest existing sculptured tribute to heroes of the Civil War, the Shaw Memorial, was not dedicated until the year 1897, thirty-four years after the heroic assault on Fort Wagner, which it commemorates. It was assuredly worth waiting for. 'You can hear them breathing as they march,' said William James, of the bronze figures in relief. If haste had been made to raise this memorial in the days or years immediately following 1863, the beauty and distinction of the present Shaw memorial would never have been attained, for the work absolutely awaited the genius and the leisure of Saint-Gaudens for its accomplishment."

The building of "Liberty Halls" throughout the country instead of monuments of stone or metal to the soldiers who gave their lives in the war, is urged by George W. Coleman of the Department of Labor.

U. S. Engineers Build World's Biggest Dam

American engineers are responsible for the construction of the largest dam in Europe, just completed in the Barcelona consular district of Spain. *Scientific American* describes how the concrete dam, which is built across the chasm through which the Noguera Pallaresa River flows, is 330 ft. in height and 700 ft. in length, and abuts almost perpendicular cliffs. The thickness is 230 ft. at the base, gradually decreasing to 14 ft. at the top. The dam has a twofold object, to produce electric power and use in irrigation. The water passing through the power house yields an electric current of 40,000 horsepower. The water is carried by a system of canals into an arid district, where it irrigates a surface of nearly 100 square miles. The cement-making apparatus was brought from the United States, while the cement used in the construction was made on the spot from limestone and marl found within a short distance and transported by a temporary railroad.

Immigration at a Low Mark

Statistics announced by the Bureau of Immigration at Washington show that immigration almost ceased during the war. From April 1, 1917, to Sept. 30, 1918, a total of 178,362 immigrants arrived in the United States and 123,676 departed.

Resolution of the Illinois Chapter of the American Institute of Architects, Passed Jan. 14, 1919

"Whereas, It is the sense of the Illinois Chapter of the American Institute of Architects, in regular meeting assembled, that the successful inauguration and consummation of a war memorial will call for the highest character of architectural service and advice; therefore, be it

"Resolved, That, in his appointment of the commission provided for in the resolution of Alderman Joseph O. Kostner and ratified by the City Council, the Mayor of the City of Chicago be, and hereby is, requested to include in the personnel of this commission five practicing architects, of whom not less than three shall be members of the American Institute of Architects; and be it further

"Resolved, That it is the sense of this meeting that the memorial should be located in conformity with the 'Plan of Chicago,' and that its principal

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functions should be to keep green the memory of those in whose honor it is dedicated, to inspire our people with the spirit of patriotism and sacrifice, and to be an everlasting and worthy addition to our heritage of beauty and art."

Seattle Builders Elect Officers

Officers and trustees of the Seattle Master Builders' Association have been elected for the ensuing year. They are: Charles W. Carkeek, president; P. A. Harrington, vice-president; J. E. Shoemaker, secretary, and E. J. Rounds, treasurer. The newly elected trustees in addition to the officers are: James Murdock, M. Arveson and C. C. Cawsey. The auditing committee will consist of O. N. Finne, C. W. Clist and C. A. Lohman.

Mr. Carkeek succeeds E. S. Booker as president, who was presented an engraved clock as a memento of his services and a mark of appreciation.

Montana Architects Hold Convention

An interesting convention was held by the Montana Association of Architects at Helena, Mont., last week, which featured short talks and reading of addresses of topics of the day by members. Thirty members were in attendance and elected O. S. Wasmandorf of Lewiston, president, and Frank Bossout of Harve, secretary. No proposed legislation was brought up for discussion.

Rhode Island Chapter, A. I. A. Elects Officers

At the annual meeting the Rhode Island Chapter of the American Institute of Architects elected the following officers: President, George Frederick Hall; vice-president, F. Ellis Jackson; secretary, Norman M. Isham; treasurer, Robert C. N. Menahan; executive committee, in addition to officers, Prescott O. Clarke and Eleazer B. Homer.

The committees appointed included: Admissions—president, secretary and Messrs. Clarke, Robertson and Jackson. Entertainment—Messrs. Adams, Henshaw and Burleigh. Competitions—president and Messrs. Hoppin and Isham. Public Information—Messrs. Cady, Hill and Fontaine. Civic Improvements—Messrs. Homer, Jackson, DuFais, Burlingame and Burleigh. Education—Messrs. Howe, Jackson and Hoppin. Auditor, Mr. Almy.

\$2,000,000 for Extensions Is Asked

Senator Lester of San Francisco has introduced in the Senate a bill asking for an appropriation of \$2,000,000 with which to erect buildings in San Francisco and Los Angeles (\$1,000,000 each) for use of the University of California extension classes and administrative use. The text of the measure refers to the fact that inside of four years, starting with a class of fifteen, the work has grown to 15,000 persons who take the various extension courses.

Heating and Ventilating Engineers to Meet

The annual meeting of the American Society of Heating and Ventilating Engineers, which will be held at the Engineers Building, New York City, on January 28-30, will constitute a celebration of four events in the development of the society, namely, the twenty-fifth anniversary, the attainment of 1000 members, the success of the research bureau, and the organization of two new chapters.

The sessions will include discussions on mechanical ventilation, the boiler testing code, and automatic heat control.

Redwood District to be Known as Roosevelt National Park

The Senate Public Lands Committee has unanimously approved Senator Phelan's bill designating the Giant Redwood District at the crest of the Sierras in California as the Roosevelt National Park. Director Mather of the National Park Service and others indorsed the plan to create the new National Park and give it the name of Roosevelt instead of Sequoia.

Pope's Statuette for Pershing

Alexander Pope, the Boston sculptor, has produced a spirited equestrian work of General John J. Pershing. General Crozier assisted Mr. Pope by "sitting" for the figure on the horse. The statuette is 18 inches high.

Many Cities Adopt Zoning System

The lead of New York City in establishing a building zone system is being followed with success by other cities all over the country. The three phases of restriction, including height, area and use, are becoming quite generally accepted as stand-

ard, and guide municipalities in the drafting of their codes. St. Louis has just prepared and adopted a zone system, which in many respects follows the New York system that has been in operation for more than two years.

Philadelphia has nearly completed a zoning plan, while Cleveland has appointed a commission to zone the city and has secured the services of Robert H. Whitten, who helped prepare the New York system, to oversee the work there. All cities taking the matter in hand are using the two voluminous reports of the New York City Building Heights Commission as the basis of their work.

Waste Reclamation Section Made Permanent

The work done by the National Waste Reclamation Section of the War Industries Board in the salvaging of materials needed by the Government in the prosecution of the war has been taken over by the Department of Commerce, which will direct its work to the end of saving the wastes of material in the industries of the country in time of peace. This was found to be the logical move following the presentation of statistics in *The Waste Trade Journal* estimating the values of the waste materials reclaimed during the year as follows: Scrap iron, \$600,000,000; scrap metal, \$300,000,000; old waste paper and rags, \$200,000,000; woolen rags, \$75,000,000; cotton and wool waste, \$100,000,000; old rubber, \$300,000,000; second-hand bags, \$25,000,000; and cotton linters, \$50,000,000.

Soldiers for Suburban Development

The co-operation of New York State with the National Government has been urged by Governor Smith in his message to the State Legislature to create farm land for soldier farmers. *The Engineer News-Record* sees in this war reconstruction plan the nucleus of a peace-time measure that would give impetus to better agricultural conditions through the East and calls attention to the remarkable development at Durham, Cal., of the State Settlement Board that can be duplicated if existing agencies are called upon for help.

Governor Smith in outlining his plan said:

"It is becoming more and more apparent that the ability and the experience of our agricultural leaders should be mobilized to create a planned rural development which will include co-operative organization for buying and selling, a system of credit that will give broader opportunities for men of small capital to become farm owners, and a better social life."

Report of Royal Commission on Housing in Scotland

A copy of the special report, with relative specifications and plans, prepared by John Wilson, F.R.I.B.A., on the design, construction and materials of various types of small dwelling houses in Scotland, has been received.

These matters are considered and presented in Great Britain with such complete thoroughness as to make reports a source of the most valuable information. While of necessity this report has special reference to specific housing problems, it nevertheless contains suggestive matter of the utmost value to every architect making a study of these important problems.

The findings in this report refer particularly to post-war housing schemes, and as the question of housing in England is just now, owing to a pronounced shortage, one of first importance, a document so filled with the most valuable matter, all based on far-reaching investigation, is helpful in the highest degree.

The report can be secured by addressing H. M. Stationery Office, 23 Forth Street, Edinburgh, Scotland, or through any international book seller in this country.

The price is one shilling net.

Airplane Boxes Big as Cottages

Boxes used for overseas shipments of United States Navy seaplanes require enough lumber to build a small cottage. The packing box for the hull usually is 8½ x 10 x 46 ft. and 3620 ft. of lumber are necessary to build it. Except for windows and doors, which would have to be added, that lumber would build a comfortable little house. The Navy Department in a recent statement emphasized the importance of the "wooden packing box," and went into detail as to the manner of its construction.

Weight of New York Skyscrapers

The combined weight of three of New York City's largest office buildings, the Equitable, Woolworth and Municipal, totals 1,086,800,000 pounds, or 490,000 tons. The heaviest structure is the Equitable, which is also the world's largest office building, its weight being 203,000 tons. The Municipal Building is the next heaviest, totaling 188,000 tons, while the Woolworth, which ranks as the tallest skyscraper in the world, weighs 103,000 tons.

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Loans Sought Here by Other Nations

Views now being exchanged by bankers indicate that serious consideration is being given the floating of foreign Government bonds in this country in the near future. It is reported that both Belgium and Chile have felt out the investment situation here, and it is admitted that there has been some discussion on the question of a substantial loan to China.

Carter Glass, Secretary of the Treasury, has verified the proposal of the Belgian Government that a loan be launched, either by means of a public offering through bonds or through banking channels. He has also confirmed the report that a public offering of the British and French obligations held by the Treasury as security for loans advanced by the United States Government might be made. Both propositions were still in a tentative stage, he said.

It is generally conceded in banking circles that no further loans to Great Britain and France will be attempted until after the Fifth Liberty Loan in April. It is understood that when Belgian representatives were engaged in the preliminary discussions looking toward a loan, the indemnities owed to that country by Germany were considered as collateral.

Considerable speculation as to the amount of the next Government loan has been occasioned by the reference made by Secretary of the Treasury Glass in a recent address that the interest rate would be higher than $4\frac{1}{4}$ per cent. Banking firms closely allied in floating previous loans believe that the forthcoming loan can be floated at $4\frac{1}{4}$ per cent, a belief based on the assumption that the offering will be of not more than five years' maturity, and will be prepared so as to offer particular attraction to banks as a desirable bank investment. If this is the case it might reduce the appeal to the buying public. This is just what the Treasury Department does not want to do.

Reviving the Industries of Belgium

To assist in the reconstruction of trade and industry in Belgium, the Comptoir National pour la Reprise de l'Activite Economique en Belgique, has been organized under the form of a commercial organization, aided by the Government. The initial capital of the bureau, limited to 1,000 francs per stockholder, amounts to 519,200 francs, and is contributed by Belgian manufacturers just outside of invaded Belgium.

The income of the Comptoir National will consist of a commission sufficient to cover its general

expenses and insure an interest of five per cent on the capital paid in. Profits over this will be distributed among the buyers in proportion to the amount of their purchases. The Belgian Government will render aid other than financial by putting the bureau's purchasing plan before the inter-allied commissions in order to obtain for Belgium her share of the raw material coming under the control of these commissions. The organization will also purchase for account of individuals who do not require State financial aid.

Club House for Discharged Officers

A million-dollar club house, to serve as a home for discharged commissioned officers of the United States Army temporarily sojourning in New York City, will be erected at a central location in Manhattan within a short time, according to Capt. George Aitken of 1881 Broadway. The proposed club will be one of the largest in the city and will contain all conceivable conveniences and attractions, including a gymnasium, convention hall and theater. Many wealthy New Yorkers who served in the army during the war are said to be behind the project. While the new building is being constructed temporary quarters will be provided for the officers.

Baling Saves 50 Millions in Shipments

By the substitution of baling for casing or boxing in the shipment of clothing and equipment for the use of the American Expeditionary Forces savings amounting to \$51,678,000 have been effected, according to statistics furnished by the Packing Service Branch of the Domestic Operations Division. The savings include material, labor in packing, handling and cargo space. Since October, 1917, when baling was begun in the New York depot, there have been over 1,000,000 bales made.

Los Angeles' Area Now 337.92 Square Miles

Since the annexation of Westgate and Occidental, the city of Los Angeles, Cal., is now the largest city in the United States in point of area, forcing New York City to second place. Los Angeles' area is 337.92 square miles and New York City's, 314.75. Chicago is third with 198; Philadelphia fourth with 129.

Department of Architectural Engineering

Roof Construction for Factories with Excessive Moisture

By FREDERICK J. HOXIE, *Mem. Am. Soc. M.E.**

THE wooden roofs of highly humidified weave sheds, paper mills and bleacheries, filled with steam, are prone to rot rapidly and therefore special consideration should be given to their design with a view to preventing this trouble. In addition to the expensive up-keep resulting from the rot, there is damage to goods and machinery, caused by water dripping from cold roofs, which is the more troublesome feature and causing the greater damage.



Fig. 1. Four inch longleaf pine roof planks, rotted through the centre, taken from a paper mill in Maine.

Both the rotting and the sweating are caused by the same conditions, and they can be prevented by the same remedy. This remedy is found in the reduction of the relative humidity of the air at the roof, to be accomplished by the most practicable

means available. This can be brought about by designing for increased temperature, either by putting more heating pipes near the roof or by preventing the escape of heat through thin and poorly insulated roof planks, the ventilators, skylights,



Fig. 2. A normal fruiting plant of *Lentinus Lepedius* growing on the roof planks at the valley of the saw-tooth skylight in a cotton weave-shed, from which the sheathing has been removed.

roof drains, etc., care being taken to prevent the penetration of moisture into and its precipitation within or above the roof planks. The fungus plant, which causes the rot to start in the center of the plank, grows where sufficient moisture has penetrated to make this possible, as shown in Fig. 1.

Three or four varieties of the wood destroying fungi appear to be most active in the destruction of roofs. The true dry rot fungus or *Merulius Lachrymans* is not among these, doubtless owing to the fact that it cannot live in the high temperature to which roofs are commonly subjected. This fungus and its frequent associate, the *Coniophora Cerebella*, while very destructive, generally confine their ravages to basements, bottoms of lumber piles and new buildings into which they have been introduced with the lumber.

The varieties of fungus found in factory roofs fortunately have moisture requirements which limit the field of their ravages quite narrowly to the parts of the roof which are practically at the dew point. Slight variations in the moisture and temperature favor one or another variety. The *Len-*

*Engineer and Special Inspector, Associated Factory Mutual Fire Insurance Companies, 31 Milk St., Boston.

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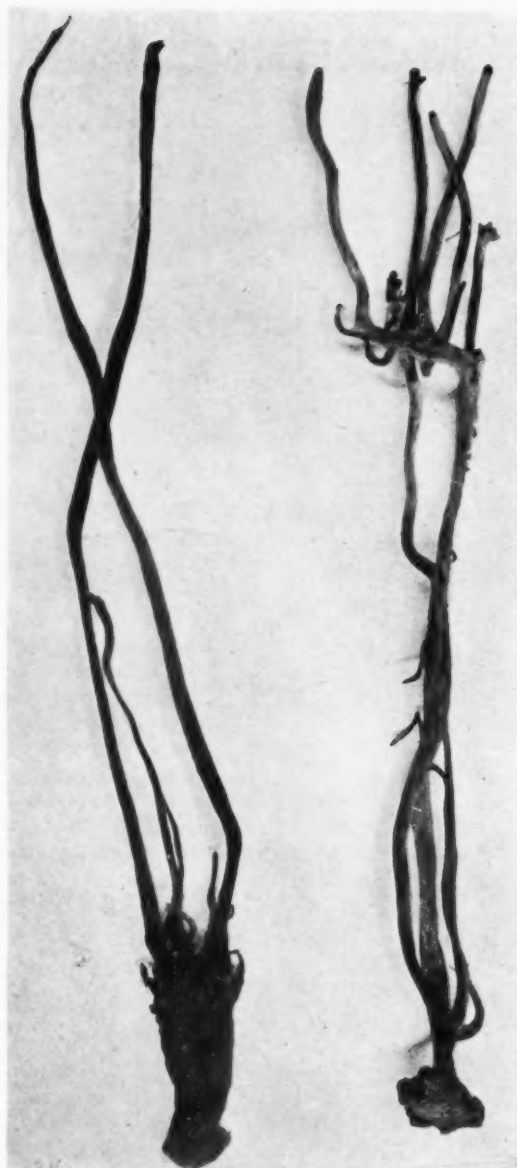


Fig. 3. Abnormal fruiting plants of *Lentinus Lepedius*, two feet long, which grew between the roof planks and sheathing of a cotton mill weave-shed. This abnormal form is probably due to excessive moisture, and darkness may be also a factor.

timus Lepedius, shown in Figs. 2 and 3, when fruiting normally has gills and looks very much like a common toadstool and is generally found in the more moist locations at the base of the sawtooth skylights or near humidifiers. The *Lenzites*, shown in Figs. 4 and 5, is the most common and destruc-

tive of the roof destroyers. They grow through a wider range of moisture than some of the others and can withstand a comparatively high temperature. The *Fomes Officinalis*, shown in Fig. 6, appears to be more exacting in its requirements than the others and is not as common. It is found more often on the beams than on the roof plank.

All of the wood destroying fungi require conditions very near if not quite at the dew point or



Fig. 4. Fruiting plants of *Lenzites Seperia* growing on southern pine roof planks of a cotton mill weave-shed after the sheathing was removed for some time. They are of a brown color.

atmospheric saturation for their best growth, and this limit may be inside the roof plank, as shown in Fig. 1. Upon this most important fact is based several essential details in the design of roofs. It is always to be noted, in removing a rotted roof, that the destruction is more complete over the beams than elsewhere. At these points the rot frequently has not only destroyed the entire plank, as shown in Fig. 9, but it has extended some distance into the beam. This clearly indicates that the above mentioned moisture limit, or point at which the water is absorbed by the wood, is the place that is in the condition most favorable to fungus growth. This can probably be more clearly shown by an example of conditions commonly found in weaving mills. The room temperature is 70 deg., the outside temperature 30 deg. and the dew point of the air in the room 60 deg. Assuming a uniform heat conductivity for the roof material, it would be expected that the dew point, that is 60 deg., would be found one-quarter through the roof plank however thick it is. If rotting begins at the dew point, that is where the moisture is first precipitated, it will begin somewhere between one inch from the inner surface and the outside of a four-inch plank, following an irregular line dependent upon the thickness or insulating power of the roof, and, therefore, when a thick supporting beam is encountered the rot line will be brought down below the lower surface of the plank and into the beam itself, often entirely

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rotting off the planks at their bearing ends as shown in Fig. 9.

That the actual limit is followed with definiteness is demonstrated in Figs. 11 and 12, showing sec-

end of the plank, thus completely destroying the supports before the remainder of the plank is deeply affected, as shown in Fig. 14. Sheathing acts in a similar manner by keeping the heat of the room

away from the plank and bringing the rot line down below its lower surface, thereby causing the rapid destruction of the entire roof plank as shown in Fig. 15. It would be logically concluded from this that the place for the insulation is on the outside of the roof instead of the inside. Anything which would prevent the penetration of aqueous vapor into the roof plank or remove this vapor from the interior of the roof more rapidly than it could penetrate would increase the life of the roof, therefore a double roof suggests itself. The outer part of such a roof to be of rot-resisting materials and the inner part having sufficient strength to support the load as well as having the necessary qualities for the fin-

ished ceiling as shown in Fig. 16.

Between the two roof planks there should be a layer, impervious to aqueous vapor, to prevent moisture from penetrating the outer plank and

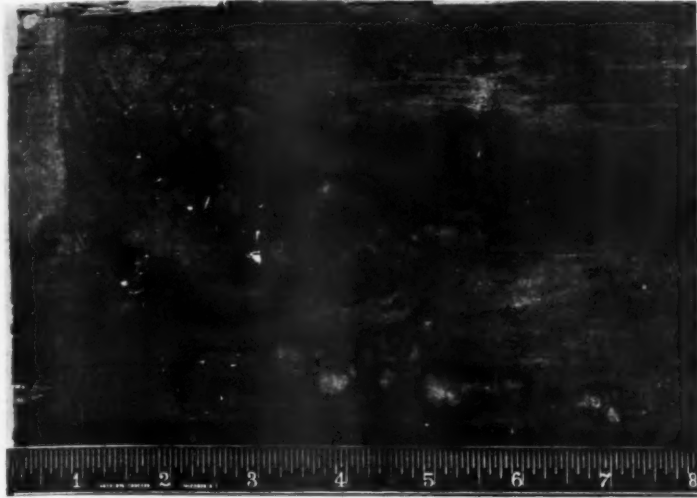


Fig. 5. Abnormal *Lenzites* plants growing on roof planks under sheathing of a worsted spinning mill. This abnormal form is probably due to excess of moisture, and light may be also a factor. They are of a brown color.

tions of roof planks removed from two Massachusetts factories.

The obvious remedy is to make the bearing no wider than the thickness of the plank. This can be accomplished, when wide beams are required, by chamfering off their upper corners as shown in Fig. 13. This should increase the life of the roof

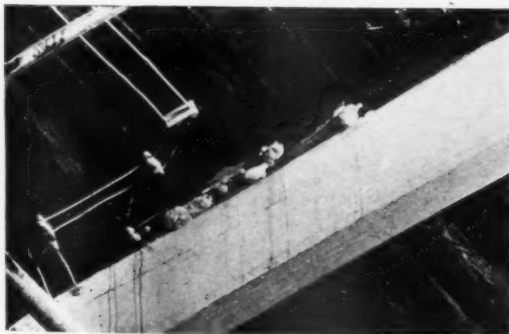


Fig. 6. *Fomes Officinalis* plants growing on the side of a beam under a weave-shed roof from which the sheathing has been removed for some time.

plank and protect the beams. The not infrequent custom of placing ornamental mouldings at the upper edge of the beam, accelerates the destruction by bringing the rot line entirely outside the bearing

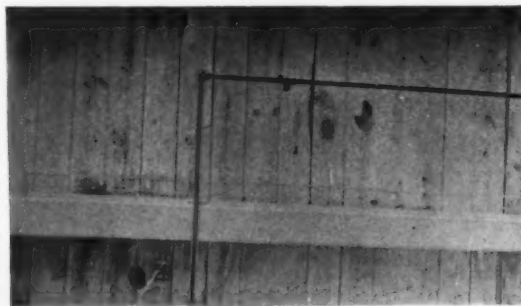


Fig. 7. Roof of a weave-shed destroyed in 9 years by *Trametes Seralis*.

reducing its heat insulating power. The outer part could consist of partially rotted planks removed from a previous roof or low grade new lumber. The more sap wood it contains the better, as this absorbs antiseptics better than heart wood. Of whatever kind of wood the outer part of the roof is, it should be completely penetrated with hot creosote so as to sterilize it and prevent the de-

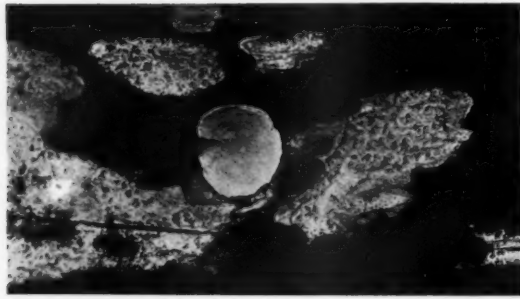


Fig. 8. Normal fruiting plant of *Trametes Seralis* growing in a weave-shed basement. This fungus is found both in basements and on roofs, although rather more frequently in basements.

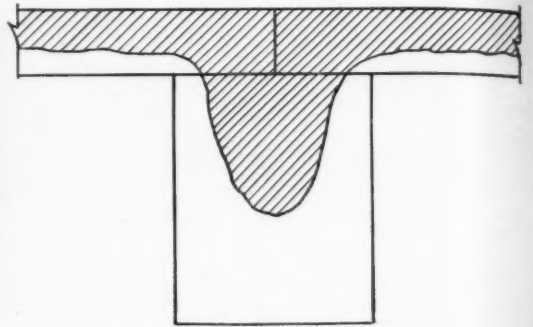


Fig. 10. Section of roof plank and supporting beam showing the line of moisture limit at which fungus growth will stop.

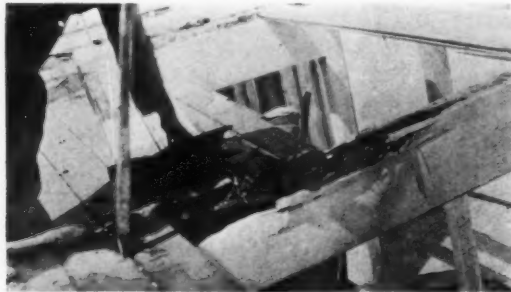


Fig. 9. Ends of roof planks rotted over the supporting beam. The rot has also extended three or four inches into the beam.

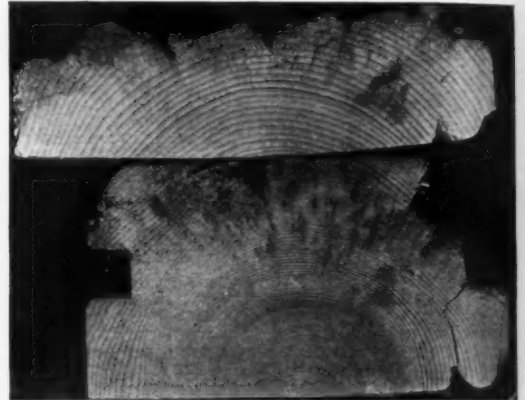


Fig. 11. Section of roof plank from a highly humidified Massachusetts spinning factory, showing definite line of limit of fungus growth.

velopment of fungus. Such an outer insulating covering will be found as practicable for a concrete roof as for a wood roof. The poor heat insulating power of concrete makes it necessary to thoroughly insulate it to prevent sweating in moist occupancies.

In some cases rotting has been discovered, in its

early stages, in sawtooth weave shed roofs, sheathed underneath. Experiments are now under way with

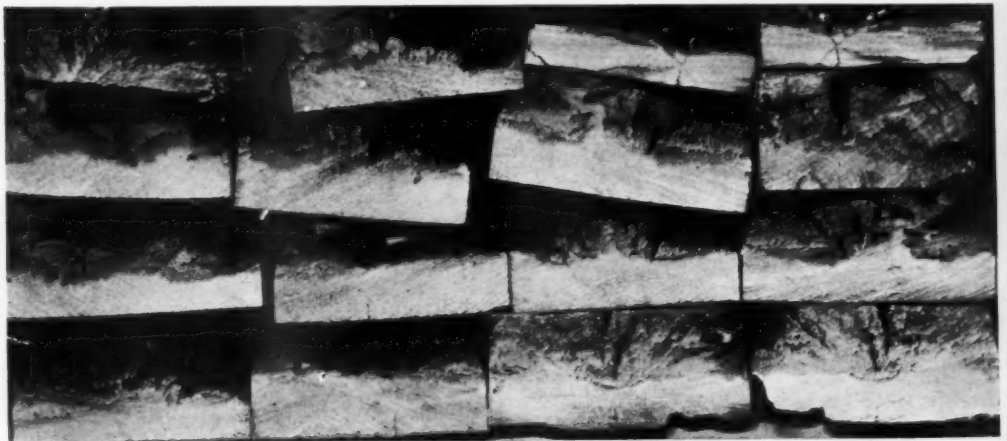


Fig. 12. Roof planks from a bleachery roof, showing definite moisture line limiting fungus growth.

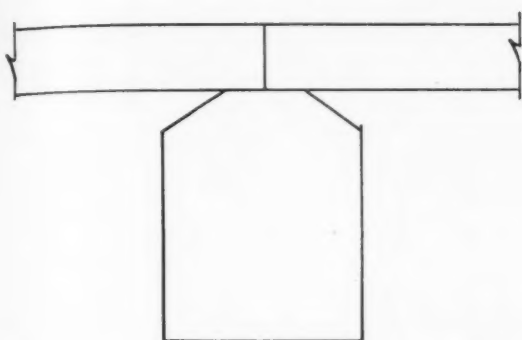


Fig. 13. Section through roof plank and beam showing a method for retarding rotting over beams.

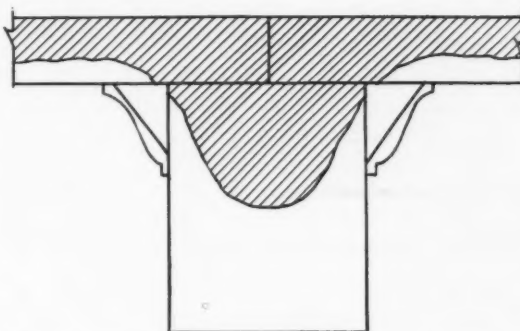


Fig. 14. Section through roof plank showing effect of a moulding in bringing the moisture line, limiting fungus growth, outside the edges of the supports, resulting in the rotting off of the ends of the planks.

a view to removing the moisture from the space between the sheathing and roof plank of such a roof, by making small holes from this space to the outside air. The idea is to allow the aqueous vapor in this space to escape by the breathing caused by variations in temperature and barometrical pressure as recommended by Mr. Arthur N.

Sheldon* for double factory windows. These experiments have not been under way long enough to warrant any positive conclusions. There seems to be no reason why they should not, somewhat at least, increase the life of the roof.

*See THE AMERICAN ARCHITECT of June 5, 1918, page 777.

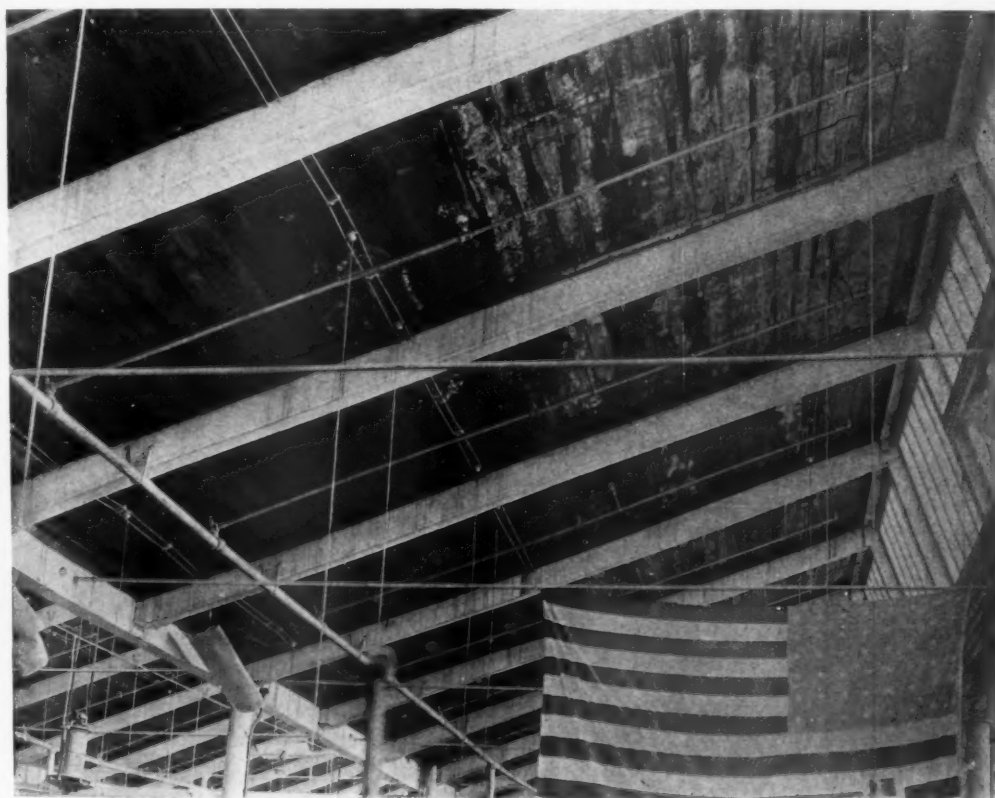


Fig. 15. Roof planks of a New Bedford weave-shed from which the sheathing has been removed. The planks were destroyed in nine years.

It is evident that if the wood-destroying fungi require a certain amount of moisture for active growth they may be as effectively killed, or at least put into a harmless resting state, by depriving them of this moisture as by poisoning them with antisept-

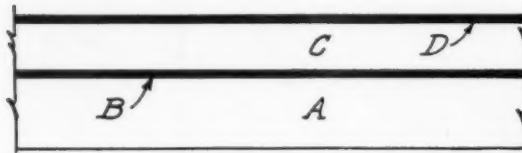


Fig. 16. A—Good plank suitable for carrying the load and forming the finished ceiling. B—Three thicknesses of tarred paper saturated with tar. C—Thoroughly creosoted low grade plank. D—Tar and gravel roofing or equivalent.

tic mixtures. Experiments are in progress with a view to testing the practical application of this theory by placing a heat insulating roof, similar to that previously described, over an old roof in which rot has already made considerable progress, although it still has sufficient strength to carry the additional covering. If this method proves effective it will be simply necessary to apply such an insulating outer covering to a roof, in which rot has been discovered in its early stages, while there is still sufficient strength in the old roof to carry

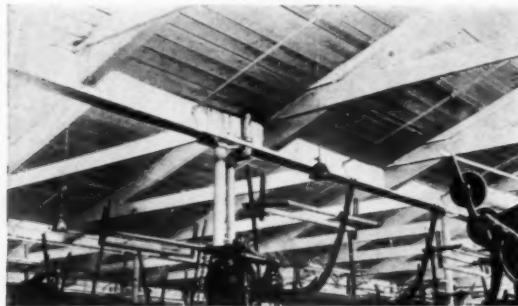


Fig. 17. This iron pipe, for carrying away rain water from the roof, has absorbed sufficient heat to precipitate water on the nearby roof, causing the roof to rot.

itself and the added load. This insulating covering can be applied much more cheaply and conveniently than the old roof can be removed and replaced, the old roof still retaining its original usefulness.

Some of the most serious cases of dry rot have occurred in comparatively new mills, doubtless due to the fact that the new lumber was infected throughout with living plants of actively growing fungus, which had entered it at the saw-mill or lumber yard. In many cases, but for such previous infection, the conditions in the building were not

such as to have caused fungus growth. In new buildings *Lachrymans* and *Coniofora* have been more frequently the cause of damage than the rotting fungi previously mentioned. These fungi can be destroyed by heating the building a few days to about 115 deg. and this procedure is undoubtedly worth its small cost in any new building in which



Fig. 18. Cast iron columns used as a drain pipe for rain water has precipitated water on and seriously rotted the beams which enclose it.

lumber more than two inches thick has been used. Heating, however, will have little or no value in saving roofs of buildings in which high humidities are to be used.

An important cause of local rotting in roofs is ventilating pipes, roof drains and skylights or parts which radiate heat more rapidly than other parts of the building, thereby keeping the nearby lumber



Fig. 19. Beam rotted for some distance from column, serving as rain water conductor, which it enclosed.

at the dew point. An example of this is shown in Fig. 17 in which a roof drain has absorbed sufficient heat to rot the roof for some distance. This is much more serious when columns are used for

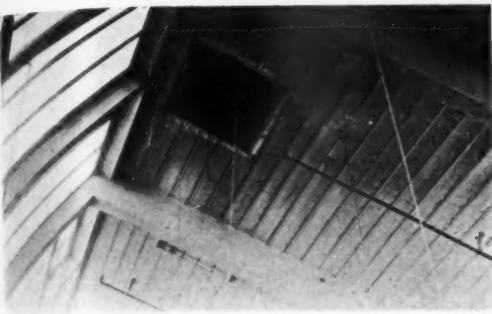


Fig. 20. Roof rotted for 10 or 15 feet from a ventilator, owing to the escape of heat, reducing the temperature and causing moisture to precipitate on the roof planks.

conducting rain water from the roof and the main supporting timbers surround them at their bearing ends. In this case the water precipitated on the cold pipe is absorbed by the beam, which is rapidly rotted, thereby weakening an important support of the structure. Such a case is shown in Fig. 18. Sometimes this water is conducted through season

cracks the entire length of the beam, weakening it for 20 or 30 feet, as shown in Fig. 19.

Ventilators or skylights are particularly pernicious in this respect, almost always rapidly rotting the roof for 10 or 15 feet from them, as shown in Fig. 20.

The remedy for this defect in design is to provide sufficient heat insulation to reduce the escape of heat to that of other parts of the building. Roof drains and closet vent pipes can be covered with insulating coverings such as are commonly used on heating pipes. Drain pipes should be kept separate from important structural supporting beams of wood. Ventilators should be protected by heavy wooden covers in cold weather when not in use, and double windows should be used. Near skylights and other windows, where it is impracticable to reduce the radiation, additional heating pipes should be provided to compensate for the excessive transmission of heat. Such heating pipes should be carefully arranged to avoid setting up air currents which will continuously deposit moisture on the ceiling or windows.

Useless Waste in Concrete Construction Due to Legal Requirements*

By W. STUART TAIT, *Assoc. M. Am. Soc. C. E., Assoc. Mem. Inst. C. E.*

The Strength of Materials

IT was pointed out in a previous article that laboratory tests and investigations have shown that with reasonable care and proper supervision we now know what steps it is necessary to take in order to produce a concrete which can be relied upon for a crushing strength of 2,600 lb. per sq. in. at 28 days. It is also known that this material will develop a strength of approximately 3,900 lb. at 90 days. Existing design methods are all based on a strength for 1-2-4 concrete at 28 days of 2,000 lb. per sq. in. These design methods take no account whatever of the increase of strength developing in the concrete with additional ageing. Now, in few cases is a floor subjected to any other load than construction loads before the concrete in it is 90 days old, and, with careful supervision, as outlined in a previous article, the loading of floors with materials for construction can be held down to a point which would be well within the safe carrying strength of the partially developed concrete. It seems to the writer, therefore, that engineers should

consider the construction as it exists when occupied rather than at an age of 28 days. In establishing design methods and stresses it also would seem that the designer should develop his design on the basis of the strength of the materials which can be expected at a period of 90 days after the concrete is placed. In doing this, due account should be taken of the ratio of moduli of elasticity of the steel to the concrete at these stresses.

Design methods in use at present, covering 1-2-4 concrete, provide that the ratio of moduli of elasticity be taken as 15, and it appears from the limited data of this nature available that this ratio is approximately correct if we consider only developing a stress in the concrete of 2,000 lb. per sq. in. The stress strain diagram for 1-2-4 concrete, shown in Fig. 7, shows clearly the change in the value of E for concrete, as the stress on the concrete is increased up to 2,800 lb. per sq. in. It will be noted that at a stress of 2,600 lb. per sq. in. on the same concrete E becomes 1,300,000 and that in consequence N would become 23. In Table 1 is given the percentages of steel resulting from the use of certain values of f_s , f_c and N . In the third row the stresses developed at the bending moment used in

*Continued from our issues of December 11-18, 1918, and January 8-22, 1919.

the design are given in case $N=10$ instead of the values given at the head of the various columns. In the fourth and fifth rows will be found the stresses developed in the concrete where f_s is limited to 60,000 lb. per sq. in. and N has values of 20 and 25 respectively. In these columns will also be found the values of R which, being equal to M/bd^2 ,

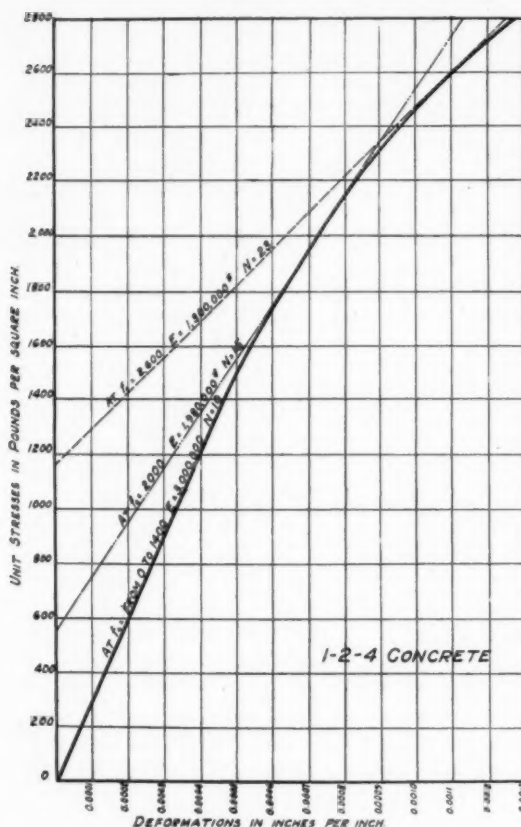


FIG. 7.

are the measures of the resisting moment of the construction at or about its elastic limit. The writer decided to use $f_s=60,000$ lb. per sq. in. for the reason that the tensile resistance of the concrete below the neutral axis would probably have the approximate effect of raising the elastic limit of the reinforcing steel generally used from 50,000 to about 60,000.

Attention is called to the fact that the relations between the concrete stress and the steel stress developed by any given bending moment depends entirely upon the percentage of steel used and upon N , thus, as in the case of a design prepared using $f_s=18,000$, $f_c=700$ and $N=15$, we obtain a percentage of steel of 0.716. Now, if the bending moment is increased so that f_s becomes 60,000 and

N changes to 25, then, from the fixed percentage of steel in the member, f_s becomes 1,930 lb. per sq. in.

In the sixth row is given the values of "d" for a bending moment of 86,500 in. lb. obtained by using the various stresses and values of N given at the head of each column. The seventh row shows the number of pounds of steel per square foot required in these slabs for the same bending moment. The eighth and ninth rows give the cost per square foot of a concrete slab of the thickness shown in the sixth row and containing the amount of steel shown in the seventh row. In the eighth row the cost of steel in place is taken at 3c per lb., while in the ninth row it is taken at 4c per lb. The concrete in each case is taken at 30c per cu. ft. While these steel costs do not directly apply at the time this article is written, it is probable that, in a short period of time, the cost of steel in place will lie between these two figures. The cost per square foot, of course, takes no account of all the constant items such as formwork, finishing and fireproofing. In the tenth row is given the factor of safety, considering stresses only, and obtained by limiting the steel stress to 60,000 lb. per sq. in. and assuming that at the concrete stresses developed and shown in the fourth and fifth rows that the value of N lies between 20 and 25 when the concrete is 90 days old. Since the factor of safety does not vary much as N changes from 20 to 25, average values are given. It will be observed that with the concrete stress in the design ranging from 700 lb. per sq. in. to 1,600 lb. per sq. in. and the value of N varying between 8 and 15 that the factor of safety based on a limiting steel stress of 60,000 lb. per sq. in. varies only between 2.82 and 3.25. It also will be observed that using stresses of either 1,200 or 1,600 lb. per sq. in. on the concrete and 20,000 on the steel has little effect on the cost of the construction. Of course, if a value of $N=15$ were used with these concrete stresses, slightly more concrete would be used and a little less steel. The factor of safety, however, would be reduced and the cost of the construction again would not be materially changed. It is not believed that sufficient data has been published at this time to allow a determination of the combination of stresses and value of N which would give us a reasonable factor of safety and at the same time produce the most economical structure. It would appear, however, that the present concrete stress used is too low, provided, of course, we have reasonably good supervision. An examination of this table would seem to indicate that the use of $f_s=20,000$, $f_c=1,200$ and $N=10$ would result in concrete stresses well within the strength of the construction at an age of 90 days. A design made on this basis, with the bending moments suggested in a previous

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article, would make a sufficient saving in the cost of the construction to largely offset the increased cost of materials, and this construction would have a theoretical factor of safety of about 3, and an actual factor of safety of more than this. The stresses shown in Table 1 are all calculated on the basis of the straight-line formula. While this formula is not strictly correct, the use of it tends slightly to

days, or to a value of 120 lb. per sq. in. Provision is also made that two-thirds of the total shear be provided for by the introduction of stirrups. Tests now being carried on by the Emergency Fleet Corporation in the development of concrete ship design show that this limitation is unreasonable, provided the diagonal tension is properly provided for by reinforcement. In the design of concrete ships,

TABLE I

Case	1	2	3	4	5	6
1 Design stresses	$f_c = 18,000$ $f_s = 700$ $N = 15$ $R = 113$	$f_c = 18,000$ $f_s = 1,200$ $N = 10$ $R = 208$	$f_c = 20,000$ $f_s = 1,200$ $N = 10$ $R = 197$	$f_c = 20,000$ $f_s = 1,600$ $N = 10$ $R = 340$	$f_c = 20,000$ $f_s = 1,200$ $N = 8$ $R = 174$	$f_c = 20,000$ $f_s = 1,600$ $N = 8$ $R = 271$
2 Per cent of steel	0.716	1.34	1.13	1.79	0.975	1.56
3 If $N = 10$ For B. M. figured in design	$f_c = 800$ $f_s = 17,600$ $R = 113$	$f_c = 1,200$ $f_s = 18,000$ $R = 208$	$f_c = 1,200$ $f_s = 20,000$ $R = 197$	$f_c = 1,600$ $f_s = 20,000$ $R = 304$	$f_c = 1,100$ $f_s = 20,200$ $R = 174$	$f_c = 1,490$ $f_s = 20,200$ $R = 271$
4 If $N = 20$	$f_c = 2,100$ $f_s = 60,000$ $R = 372$	$f_c = 3,140$ $f_s = 60,000$ $R = 665$	$f_c = 2,800$ $f_s = 60,000$ $R = 570$	$f_c = 3,850$ $f_s = 60,000$ $R = 880$	$f_c = 2,540$ $f_s = 60,000$ $R = 493$	$f_c = 3,480$ $f_s = 60,000$ $R = 766$
5 If $N = 25$	$f_c = 1,930$ $f_s = 60,000$ $R = 369$	$f_c = 2,930$ $f_s = 60,000$ $R = 665$	$f_c = 2,600$ $f_s = 60,000$ $R = 560$	$f_c = 3,590$ $f_s = 60,000$ $R = 862$	$f_c = 2,350$ $f_s = 60,000$ $R = 490$	$f_c = 3,250$ $f_s = 60,000$ $R = 753$
6 $d =$	8 in.	5.9 in.	6 in.	4.85 in.	6.45 in.	5.17 in.
7 Steel per sq. ft.	2.34 lb.	3.22 lb.	2.76 lb.	3.55 lb.	2.56 lb.	3.29 lb.
8 Cost per sq. ft. conc. 30c per cu. ft. steel 3c per lb.	27c	24 $\frac{1}{2}$ c	23 $\frac{1}{4}$ c	22 $\frac{3}{4}$ c	23 $\frac{3}{4}$ c	22 $\frac{3}{4}$ c
9 Cost per sq. ft. conc. 30c per cu. ft. steel 4c per lb.	29 $\frac{1}{2}$ c	27 $\frac{3}{4}$ c	26c	26 $\frac{1}{4}$ c	26 $\frac{1}{4}$ c	26c
10 Factor of safety	3.25	3.2	2.87	2.85	2.82	2.82

increase the factor of safety, and the writer feels that, since the results obtained from it would not vary materially from those obtained by the use of the parabolic formula, the straight-line method of analysis should be retained.

Under the various building ordinances and committee rulings now in existence, 1-2-4 concrete is considered in the design as safely resisting an extreme fiber stress of from 500 to 800 lb. per sq. in. Many entirely satisfactory buildings are in existence to-day where the actual extreme fiber stress, occurring when the building is subjected to its design load, exceeds materially the 1,200 lb. per sq. in. stress developed under the method of design suggested. These stresses are generally those resulting from negative bending and occur simply as a result of engineers having become accustomed to providing more carefully for the positive bending moments than for the negative.

Most ordinances limit the shear in a reinforced concrete beam to 6 per cent of its strength at 28

shear as a measure of diagonal tension is limited to 500 lb. per sq. in. on concrete having a crushing strength of twice that assumed in building construction. This would seem to indicate that with correct diagonal tension reinforcement the shear limitation might be increased to about 12 per cent of the strength of the concrete.

The floor constructions now in general use have been developed to produce economical structures conforming to the design methods and stresses now required. The revised methods of design suggested in these articles and the increased stresses would, of course, result in modifications of our present more or less standard forms of construction to meet the new conditions involved. Paying more attention to negative bending moments and reducing the positive bending moments would, for instance, lead designers to use haunches on beams instead of the flat bottom beams now in general use. The same remark might apply also to concrete slabs.

(To be continued)

Industrial Information

In this Department there is published each week information as to the development of materials and methods derived from reliable sources.

Pee Gee Paints

A volume of comprehensive and convincing character has been prepared by the Peaslee-Gaulbert Co., Louisville, Ky., describing "Pee Gee" paints, stains and varnishes.

The many common uses of paint and paint products are discussed in distinct departments. In each instance exact color charts accompany the text, from which architects may select exactly what they require, with the assurance that that and nothing else will be obtained. Directions for using and price schedules make this book of particular value in permitting intelligent specification.

Under each division, helpful suggestions are given as to the proper functions of paints, stains and varnishes and analyses of the elements which make one kind of product superior to others for the accomplishment of a particular purpose.

Mastic paint as made by the Peaslee-Gaulbert Co., it is stated, is used with great success on the exteriors of suburban houses. Many effective examples of these are carefully illustrated in typical colors, each with proper identification.

For wall covering, "Pee Gee" Flatkoatt has a wide range of possibilities; these are also illustrated in the original colors, and suggestive stencil borders are added. A logical and interesting exposition of the advantages obtainable by paint as a wall decoration is also presented. Many well-designed interiors, both of dwellings and public buildings, are reproduced in colors prepared by this company.

Pee Gee Dyestain makes possible practically every color or combination of colors known in finishing modern interior woodwork, floors, or furniture. Its use does not raise the grain of the wood, but strikes into and brings out its natural beauty, leaving a perfectly smooth surface for finishing. This material contains depth of tone and richness, covers a large surface, dries quickly, and will not rub up. The results of its use are again illustrated by color charts of excellent quality.

Several pages are devoted to Pee Gee wood fillers and varnishes for both interior and exterior use. Pee Gee China enamel for interior wood, plaster, brick or metal work, and Adamant floor paint, which apparently fills every requirement for such an article are also produced by this company.

Porch paint, furniture paint, roof paint, galvanite for use on galvanized iron, flat brick colors, Pee

Gee Portlanite for concrete surfaces, Pee Gee black insulating paint, a product for sub-surfaces, said to be waterproof, acid and alkali-proof and not affected by steam or gaseous fumes; Pee Gee Ferronite, a rust preventive for structural metal—these are some of the materials furnished by the Peaslee-Gaulbert Co. and shown in this book.

Architects are commended to the acquaintance of a volume so complete in its discussion of one of the commonest needs and best assets of any building.

Self-Sentering

"Self-Sentering" is a type of expanded metal reinforced for concrete construction, which is in itself a combined reinforcing and centering—a one-piece steel lath and stud. In describing this, The General Fireproofing Co., Youngstown, Ohio, who manufacture it, state that the heavy ribs of Self-Sentering are cold drawn, a process which increases tensile strength and elasticity. The diamond mesh used is an efficient form of expanded metal reinforcement, the parallel sides make for maximum rigidity, and the beaded edge, where rib and diamond mesh are joined, still further stiffens the whole sheet. It is stated in the folder on Self-Sentering, issued by this company, that the diamond mesh fabric gives an excellent bond for concrete and plaster. At the same time its peculiar construction provides great reinforcing value, diffusing strain from concentrated loads, and by its perfect continuity insuring that every ounce of metal is in tension. There are no breaks at right angles to the line of stress.

Self-Sentering may be used advantageously for concrete roofs, floors, walls, ceilings, partitions, columns and beam protection.

Reinforced concrete, at once fire resisting and enduring, makes an estimable roof. The only hindrance in its wider use for roofing purposes has been its comparatively high cost and weight. Self-Sentering, the makers claim, overcomes both these obstacles, first, because no forms are required, the heavy ribs giving ample rigidity to support the weight of the wet concrete; second, because the large sheets permit rapid erection with minimum labor; third, because the slabs need be but 2 in. thick, thus reducing the dead load, and not only saving material and labor on the roof itself, but permitting the use of lighter supporting members.