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H. E. HARMAN, President. E. R. DENMARK, Editor.

THE EDITOR'S PAGE

A PLEA FOR AMERICA'S GREATEST ARCHITECTURAL MONUMENT.

ELSEWHERE in this issue will be found an article on the Fine Arts Building of the World's Columbian Exposition, Chicago, and which is a plea for its preservation and rehabilitation.

While we are not inhabitants of Chicago nor have we anything to do with the affairs of this city, yet as Americans and with the interest of the Fine Arts of this country deeply at heart we feel that we should have something to say in behalf of those loyal Chicagoians who are working to preserve and rehabilitate this building, which is the world's second greatest architectural monument in classic style.

To hold our thoughts in reserve and our hands still while this masterpiece goes to rack and ruin would, we feel, show a most ungrateful spirit towards that genius Charles B. Atwood, the architect, who is now dead. It was his one inspiration that developed into a masterpiece and gave to America the second most beautiful architectural monument in all the world. Jay Hambridge of Yale University, an authority on Greek architecture, has pronounced the Fine Arts Building as being surpassed only by the Parthenon at Athens, which is the most beautiful building in the world, although it is now in ruins. Augustus Saint-Gaudens, the famous American sculptor, is authority for the statement that this building is the most beautiful classic building since the days of Pericles.

Realizing that when this building is gone, that not only America, but the world, loses one of its greatest treasures of art it is imperative that some step be taken whereby this building can be preserved and protected from the ravages of the elements during the years to come.

If this building were restored to its original beauty as at the time of the World's Columbian Exposition in Chicago, the students of architecture and of the fine arts from Europe would be coming to America to study and find inspiration in this masterpiece. America could then say with pride that she posesses an architectural monument that equals the most beautiful in the old world.

We hope that the people of Chicago will awake to the necessity of preserving and rehabilitating this art treasure and that the efforts of the committee of loyal citizens who are working for its restoration will meet with every success.

RECOGNITION OF AMERICAN BUILDERS.

A most unique recognition of the American builders by the older countries of Europe is contained in an invitation to Frederick Culver, president of the Joint Ownership Construction Company, Inc., to visit France and England to explain the working out of the co-operative building system, which is a plan of building joint ownership apartments and other buildings.

While this is chiefly on the commercial side of building, rather than the art of construction, it has been deemed an important enough building idea to command the time and attention of important financial interests in Paris and of Sir Maurice Fitz-Maurice, of London, who wish to confer with Mr. Culver in an effort to master his idea of joint ownership building. It is further stated by good authority that the French interests also hope, through the assistance of Mr. Culver, to introduce the modern construction methods of American builders to replace antiquated French construction, and it is expected that the new volume of building interests thus created in France will be the means of attracting many of the American contractors and builders.

Sir Maurice Fitz-Maurice, of London, who has asked to confer with Mr. Culver, is a former president of the London County Council and an engineer of note. He was very prominent in the construction of the Assouan barrage, and was also constructing engineer of the Quebec bridge. His interest in the joint ownership idea is at least a marked tribute to American commercial ingenuity in building, as well as her economic shrewdness in the co-operative plan.

Last year Mr. Culver was in London and conferred with a number of active builders, who at that time demonstrated that they were very favorably impressed with the joint-ownership plan—and it is a well established fact that the English people as a whole are deeply interested in co-operative enterprises.

CORRECTION.

We wish to inform our readers that in the March issue, The Milwaukee Corrugating Company illustrated in their advertisement on the back inside cover page a view of the Dixie Terminal building, Cincinnati, Ohio, and that Gustave Drach was given credit as the architect for this building when the credit should have been given to Garber & Woodward. We wish to make this correction in justice to the firm of Garber & Woodward, Architects.

This garden of classical beauty with its dignity and stateliness overlooking the lake while in the background rises the peaks of the mountains some distance away has a charm that we will long remember.

SOVTHERN ARCHITECT & BVILDING NEWS

BERRY HILLS PLANTATION

HALIFAX COUNTY, VA.

BERRY Hills Plantation in Halifax County, Virginia, the estate of Malcolm G. Bruce, is without doubt one of the most beautiful and notable estates in old Virginia, and this state is well known for its many places of historical interest.

Berry Hill dates back to the time when the Indians roamed the highlands of Virginia and perhaps many wild game were killed upon the spot where this fine old house now stands. The estate was first claimed nearly two hundred years ago, for it was in 1728 that Colonel William Byrd, of Westover, first laid claims to the land which he later developed into this large and beautiful country estate.

The place first came into possession of the Bruce family about 1785, being conveyed through several hands after being first sold by Colonel Byrd. The Bruces trace their ancestry back to Scotland and it was James C. Bruce who bought the place first. Before the War of 1861 the Bruce fortune was considered one of the largest in this country.

The present house that is here illustrated was built by James Coles Bruce, son of James Bruce, of Woodbourne, Halifax County, about 1839.

While the history of this old estate is very interesting and the story would not be complete without it, yet we are perhaps more interested in discussing the architecture of the house or houses than of the estate.

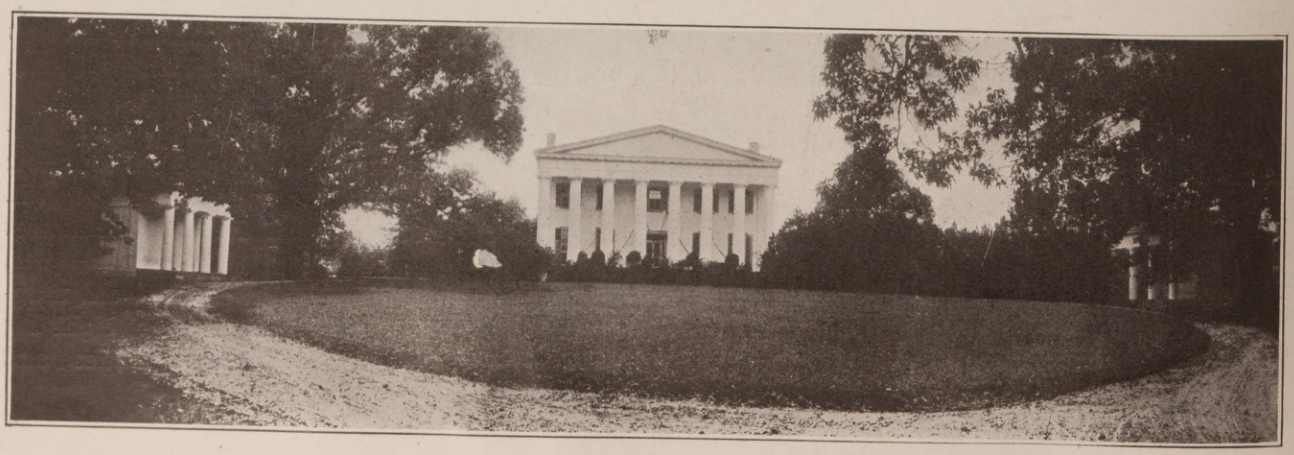
When we look upon this beautiful old mansion with its Grecian lines and note its eight big Ionic columns upholding the front portico, and

with its wide spacious veranda we look upon one of the finest pieces of Colonial architecture, in the Grecian style in this country. The walls are three feet thick, extending from basement to roof, and are of white cement brick. The stone steps of the front are seventy-five feet wide, from which rise the eight massive Ionic columns as can be seen in the picture.

The most striking feature of the interior of this old house is the entrance hall, which is twenty-five feet wide and forty feet deep, a graceful stairway rising to the second floor on either side. The staircase is of solid mahogany with hand turned balustrades. Other notable features of the interior are the beautiful marble mantels of hand carved Italian marble in the drawing room and also in the library.

The furnishings of this old mansion are perhaps among the finest in America and Berry Hill boasts a most valuable collection of silver of the finest and heaviest design.

Apart from the main building are the office and billiard rooms, and we find in these small houses the same style of architecture as the main house, attractive boxwood hedges connecting them. For artistic



One of the faithful old servants of the Bruce family is shown in an accompanying view standing near the stables. Like all old Southern families the pure bred stable horses were among the finest treasures of the Bruce family and like their Scotch ancestors fox hunting was one of the most enjoyable sports.

The lawn about the house contains some twenty acres and the landscape is one of beauty, the house being approached through a long avenue of Ailanthus trees. Perhaps one of the most beautiful and attractive features of the grounds is the lilac hedge, which presents an unsually beautiful scene during the season when in bloom. There are numerous driveways and walks throughout the estate which are bordered with trees of every description such as Oaks, Maples, Lindens, Elms and Sycamores. All varieties of flowers are to be found in the many gardens about the grounds.

The whole estate comprises some three thousand six hundred acres, the greater protion of which is now being cultivated, as the soil is among the best of the state.

This old estate is truly one of the finest and most beautiful in this country and as an example of Colonial Architecture in the Grecian style the main house has no superior.

grouping of the out houses about the main house we will find no more pleasing effect anywhere in the country. As can be seen from the illustrations the main house occupies the central position facing a large round court of green turf, about which circles a driveway that leads up to the entrance of the house. On each side, somewhat to the front, and equal distance apart is the office and billiard room. The other out houses including the stables and servants' houses are situated in the rear of the house. It might be interesting to know that before the war there were more than three thousand slaves employed on this plantation.

The Fine Arts Building, World's Columbian Exposition, Chicago

A Plea for Preservation and Rehabilitation.

FEW of us realize that the second most beautiful building in the world is in America—in Chicago. It is the Fine Arts Building constructed in Jackson Park at the time of the World's Columbian Exposition to house the world's priceless art masterpieces that were loaned temporarily by foreign nations to be exhibited at that great exposition.

This building is generally conceded by architects, artists, and connoiseurs to be one of the most beautiful classical buildings in the world. According to Jay Hambridge of Yale University, an authority on Greek architecture, the Fine Arts Building in Chicago is surpassed only by the Parthenon at Athens, which is considered the most beautiful building in the world, although it is now in ruins. Augustus Saint-Gaudens, the famous American sculptor, is authority for the statement that the Fine Arts Building is the most beatutiful classic building since the days of Pericles. This authority substantiates the assertion that America—in fact, Chicago—possesses the world's second greatest architectural monument in classic style.

There is little doubt that if this building were located in a foreign country, and if its beauty were exploited, Americans would travel far to see it.

UNDER THE CENTRAL DOME OF THE FINE ARTS PALACE

BANQUET OF THE AMERICAN INSTITUTE OF ARCHITECTS, FIFTY-FIFTH ANNUAL CONVENTION, JUNE 9, 1922.

But, since it happens to be in our very front yard we do not appreciate the full worth of this treasure. Because of the lack of knowledge and appreciation of its true worth, this building has been neglected since the World's Fair. Its outer coating of plaster, which was merely a temporary covering, has been allowto deteriorate and fall away. The building is still intact and sound but its exterior architectural beauty has been sadly marred by the elements and by neglect.

It may surprise many to know that the Fine Arts Building is a permanent and practically fireproof

Crunelle Photo

SOUTH PORTICO—PRESENT CONDITION

building in construction and that it can be restored to its full usefulness and original beauty at comparatively little expense. The walls are of brick, two and three feet in thickness, resting on solid foundations of brick and concrete. Over 13,000,000 bricks were required for this building. The roofs are supported by iron columns and steel trusses. A moment's serious thought makes one realize that foreign governments would never have permitted their priceless art treasurs, sent over for the Wold's Columbian Exposition, to be housed in a fire trap.

Only the untiring efforts of a few public spirited citizens and organizations have prevented an irreparable loss. Under the guidance of the Chicago Chapter of the American Institute of Architects, and with the financial assistance of the Second Congressional District of the Illinois Federation of Women's Clubs, who raised $7000, one corner of the building is being restored to prove that restoration work can be done, to emphasize the great architectural beauty of this structure and to arouse public interest and support.

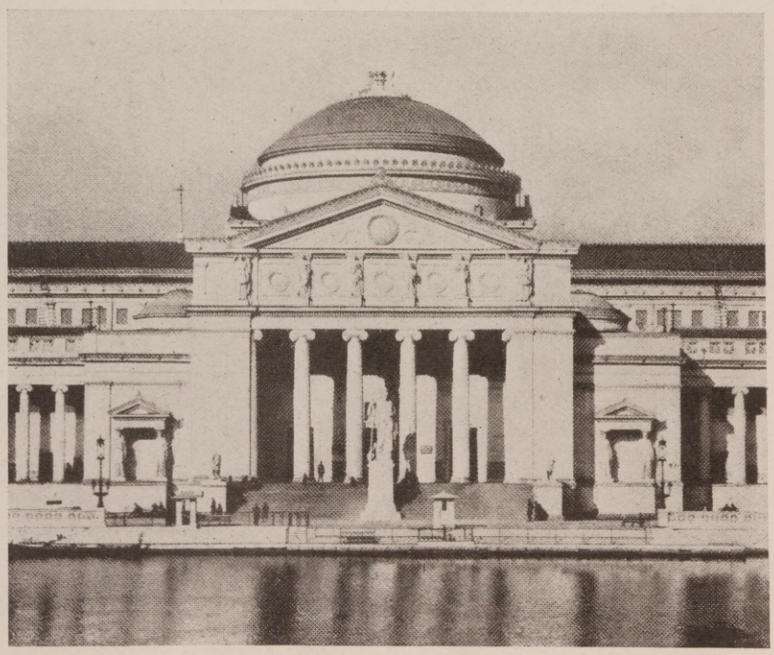
This corner is being resurfaced by the John J. Earley process in which a combination of quartz, Portland cement, and reinforced concrete is used, presenting a permanent beautiful texture and a rich old marble effect of color. This cement composition, used on the Fountain of Time on the Midway, is pronounced by experts more permanent than stone or marble.

This process makes possible sculptural effects heretofore unattainable. When the building is restored no joints or seams will show as would be the case if marble or granite blocks were used. The structure will resemble a heroic monolithic monument cut from one massive rock. There will be nothing like it in the world. Only an inspection of the corner now being restored will give an adequate appreciation of the artistic possibilities.

It is very doubtful if this building could be duplicated. It was the work of a genius, the eminent architect Charles B. Atwood, who is now dead. It was his one inspiration that developed into a great masterpiece. That it should be preserved all are agreed. It would be as though we destroyed a Rembrandt or a Corot and then commissioned a modern artist to produce a duplicate without the original canvas to work from.

When restored, this building will be an appropriate memorial to the World's Columbian Exposition and an art treasure without equal. Even for the moment if no practical use could be made of the building it would be well worth preserving merely as a monument of intrinsic art value. But in addition it is a needed asset to a metropolis such as Chicago.

It can be used as a great art museum, similar



Reil Studio

SOUTH PORTICO—AS IT WILL LOOK WHEN REMODELED

to the Trocadero in Paris, or for many useful public purposes affecting the community life.

It could be advantageously used to inagurate a national school to encourage American art and architecture. America is fast becoming one of the great cultural nations of the world, and it is therefore, necessary to stimulate native ability so that the spirit of this great democracy may be adequately expressed in its art and architecture. The Fine Arts Building is a fitting place to inaugurate this auspicious movement. The very fundamentals of enduring art are an integral part of this grand structure, representative of the culture of the past.

One reason why the United States has always been handicapped in competing successfully with France, England and Germany, in the manufacture of creative and artistic merchandise, has been the shortage of trained designing artists.

Little does the average person realize how this matter of art enters into his or her life, but if one will stop a moment to think of the things of art and utility which call for taste and design, one quickly realizes the importance of an industrial art training for those who are to create these designs. As a concrete illustration, the glasses on the table, the pattern on the linen, the design of the silverware, first had to be conceived by master designers.

The reason that European countries have excelled the United States in this particular field is because of the exceptional opportunities afforded art students to study this specialized department of art which requires training of a distinct order. Such an industrial art school in Chicago would assist manufacturers not only in domestic but foreign markets as well.

The Fine Arts Building, due to its great height, size and skylight facilities could easily accommodate full sized reproductions of the great masterpieces of all periods, such as the art and architecture of Egypt, Greece and Rome, as well as of modern times. Such a museum would form a much needed supplement to the Art Institute which has already had to decline many rare and beautiful works of art because of lack or housing space. Some conception of the enormous size of this building may be gained when we realize that its floor space covers six and one half acres.

This building should by all means be preserved and it is up to the people of Chicago to see that this structure is preserved forever as a monument to American Art.

HIGH SCHOOL, FORT WORTH, TEXAS.

ARCHITECT—R. A. NICOLAIS, FORT WORTH

VIEW FROM LAWN

ENTRANCE DOOR

HOUSE OF JAMES L. DICKEY, JR., ESQ., ATLANTA, GA.
HENTZ, REID & ADLER, ARCHITECTS.

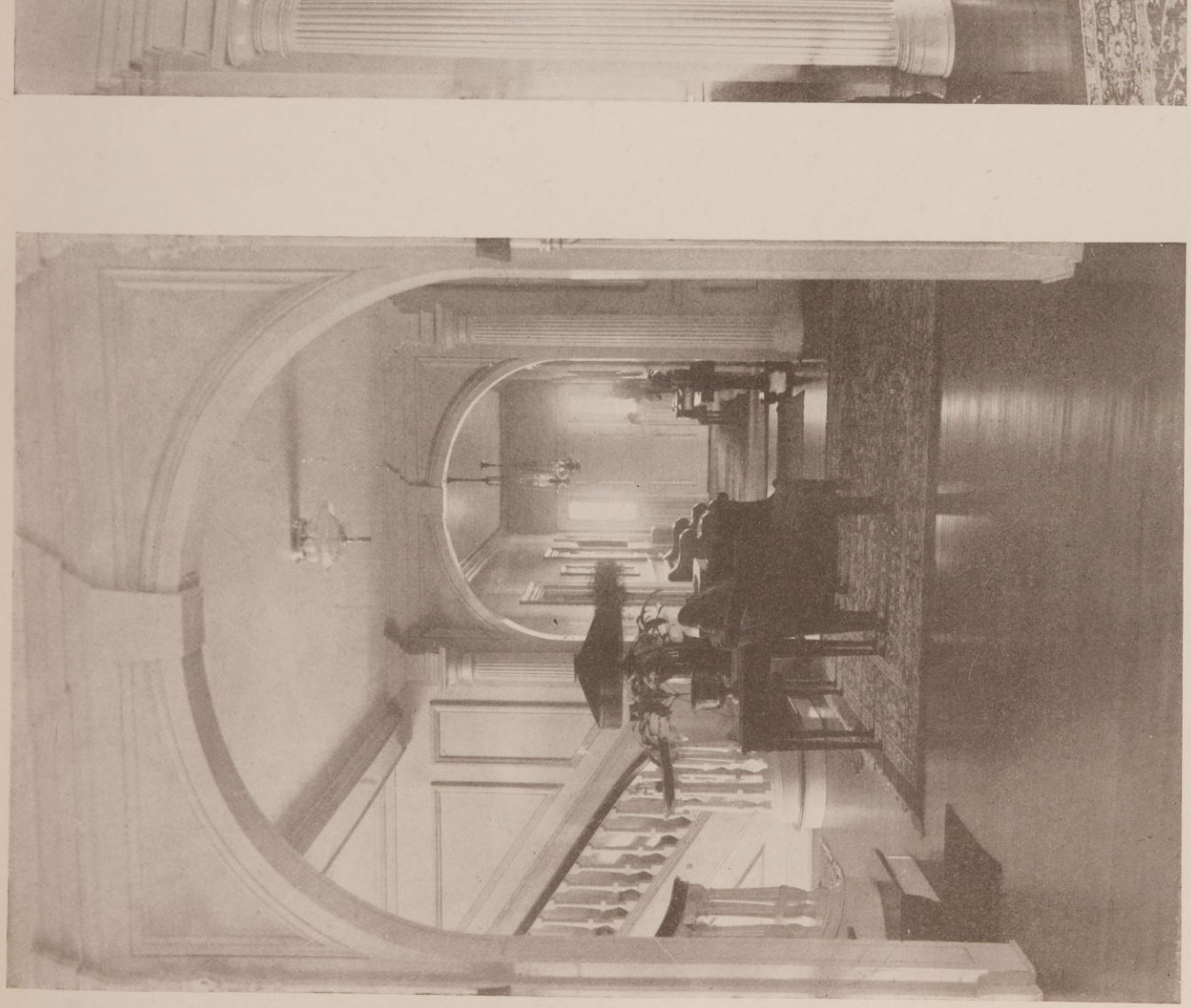
LIVING ROOM

DINING ROOM

HOUSE OF JAMES L. DICKEY, JR., ESQ., ATLANTA, GA.

HENTZ, REID & ADLER, ARCHITECTS.

VIEW INTO LIVING ROOM



VIEW INTO HALL

HOUSE OF JAMES L. DICKEY, JR., ESQ., ATLANTA, GA.
HENTZ, REID & ADLER, ARCHITECTS

ENTRANCE FRONT

DETAIL OF ENTRANCE

THE U. M. ROSE SCHOOL, LITTLE ROCK, ARK.

JOHN PARKS ALMAND, ARCHITECT.

See Page 55 for Plan

ABILENE COUNTRY CLUB, ABILENE, TEXAS.

WILLIAM NICHOL, ARCHITECT.

SOPHIAN PLAZA, KANSAS CITY, MO.

SHEPARD & WISER, ARCHITECTS.

NORMAN, OKLAHOMA, CHURCH BUILDING

R. H. HUNT CO., ARCHITECTS.

THE HOTEL KANSAN, TOPEKA, KANSAS.

SHEPARD & WISER, ARCHITECTS.

DETAILS OF AUDITORIUM

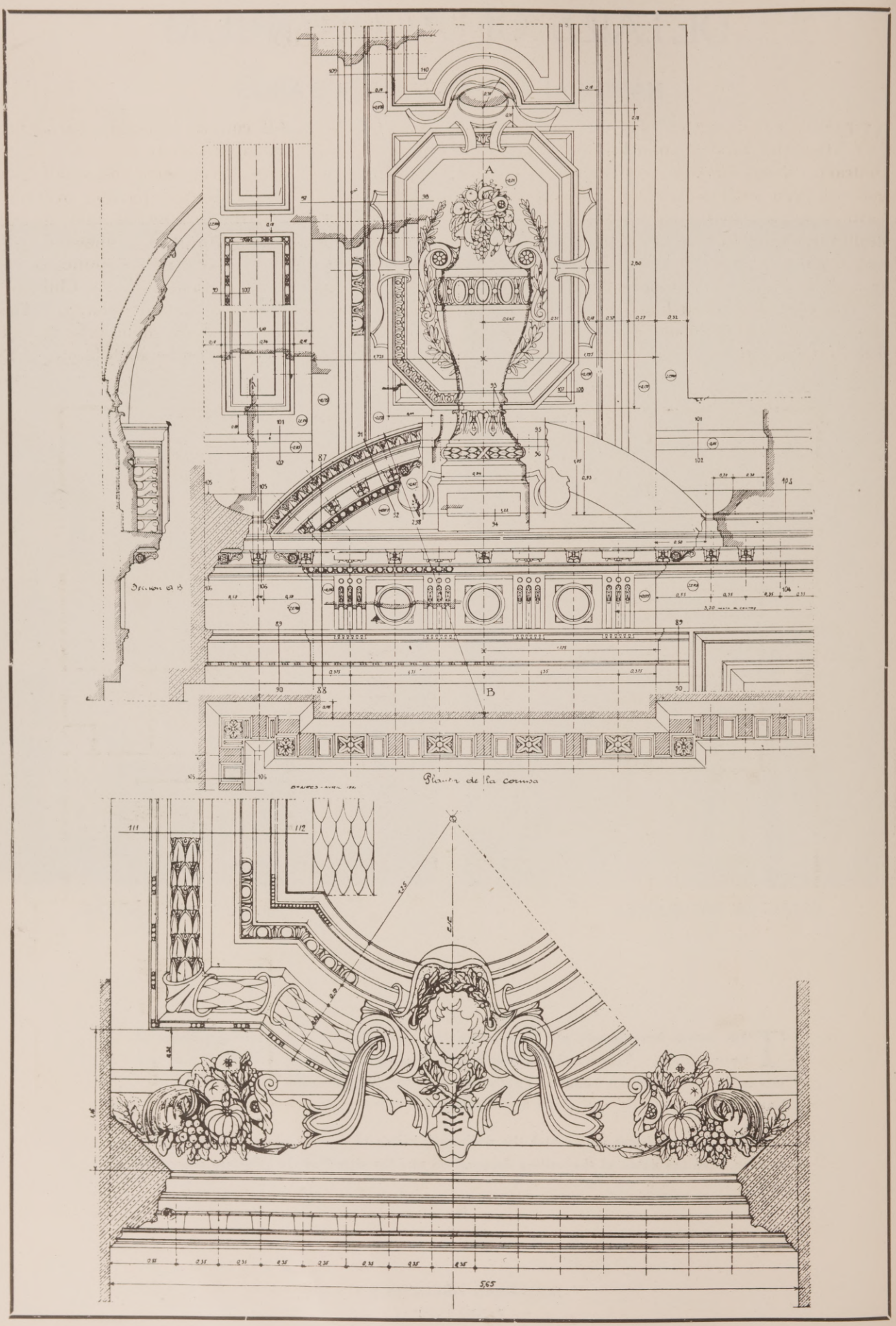
NATIONAL COLLEGE, BUENOS AIRES

DETAIL OF DECORATION

DETAIL OF PILASTERS

THE details here shown are views from the auditorium of the National College of Buenos Aires. This wonderful city boasts of some of the finest architecture of any city in the world and this building is perhaps one of the most beautiful in any South American city, and certainly one of the finest in Buenos Aires.

The elaborate scheme with which the walls and ceiling of this room are carried out can be seen from the detail of the ceiling decorations and the detail of the pilasters along the walls.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Plan de la corniche
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The Small Golf Club

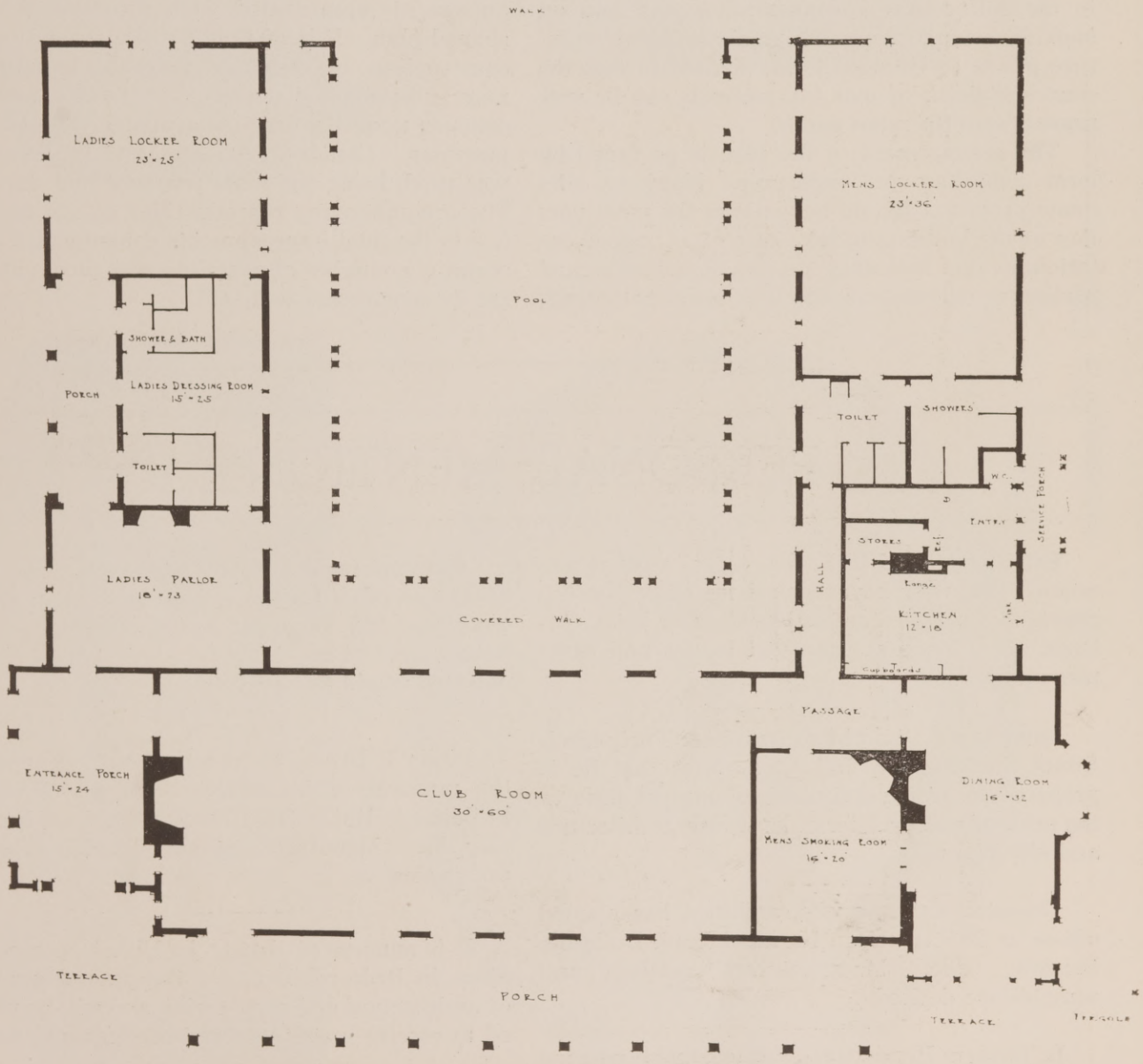
BY W. J. NICHOL

WHILE golf has been played since the "time that the mind of man knoweth not to the contrary," it has not been until recent years that golf has been universally taken up as a national pastime. It is a game that creates an interets in healthful recreation for women and men alike, and where the busy business man can escape from daily routine to outdoor play.

This general interest has brought about a demand for golf clubhouses which opened a new field to the architect. It gives him an opportunity to combine golf course, landscape gardening and clubhouse design effectively.

This brief article deals with the small golf club where funds are limited, passing over the large clubhouses with dormitories and special features which would hamper the financial success in operating the small club economically.

In the case of the Abilene Country Club the membership was limited to two hundred. The stock listed at $250 per share made a budget of $50,000. Thus sum was divided as follows: land



PLAN

COUNTRY CLUB - ABILENE, TEXAS

WILLIAM J. NICHOL - ARCHITECT

(160 acres) $7,500; fence $3,000; nine hole golf course $4,500; swimming pool $5,000; building $27,500 and furnishings $2,500.

No attempt will be made here to discuss the laying out of a golf course, this should be left to golf experts; however, the location of fareways, putting greens, tees and hazards should be given careful consideration. The architect must not lose sight of the fact that the golf course is the predominating feature and everything else must be subordinated to it.

The country club should be located on a good road and not too far from town. Tennis courts, picnic grounds and automobile parking space should be included in the layout.

The building should be placed conveniently to the golf course and swimming pool and set back far enough from the public highway to insure privacy. It ought to be situated so that the start and finish of golf tournaments can be witnessed from the main porch.

The arrangement of the plan is governed by local conditions and exposures. However, adequate provision should be made in the main portion of the building to take care of all indoor entertainments, including dances, banquets, card parties, receptions and all other social gatherings and activities. There should be a ball room and lounging room, usually combined; ladies' parlor; men's smoking room; dining room with adequate kitchen facilities and plenty of porch space. The ladies' and men's locker rooms should connect with main part of the building and are usually placed in wings or below the main floor. These locker rooms should be sanitary, well ventilated and large enough to contain lockers equal in number to the membership. Ample shower and lavatory accommodations should be provided. The "Pro" requires a repair shop near the locker rooms and quarters should be provided for the keeper either in the main building or in a separate dwelling.

In the Abilene Country Club building the requirements enumerated were provided in a U-shaped plan. It is of Colonial design and frame construction, of course, a fireproof building of more substantial materials is preferable, but this depends upon the amount available for building purposes. Genuine reed and leather furniture was used, being the most practical and durable. The accompanying reproductions do not do justice to the final improvements contemplated as it requires a number of years to carry them out and for the newness to wear off.

PERSONAL MENTION

Ernest Ivey and L. E. Crook, Jr., wish to announce that they have opened an office for the practice of architecture at 507 Candler Bldg., Atlanta, Ga. Manufacturers catalogues and samples requested.

Lawrence V. Sheridan, 323 East Forty-ninth Street, Indianapolis, Ind., announces that he is prepared to devote a limited amount of time to the professional practice of landscape architecture and city planning.

Grayston C. Musgrave, architect has opened offices at 207 American National Bank Building, Bristow, Okla. Manufacturers' catalogs and samples are desired.

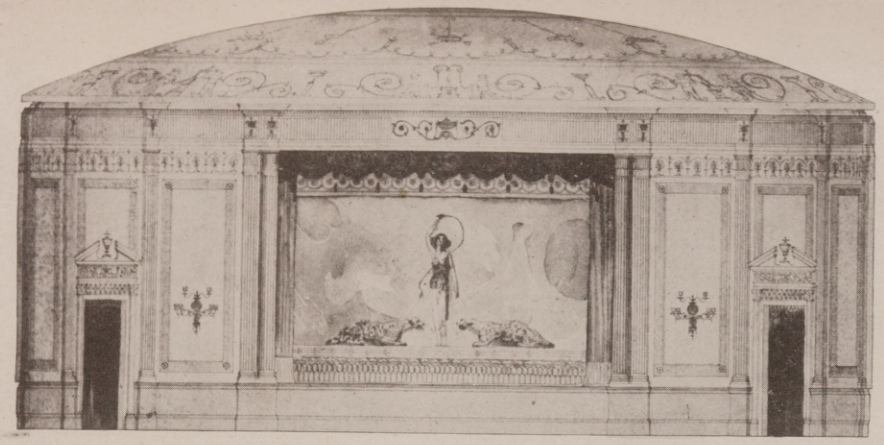
L. Twinem Henderson, architect and landscape gardener, announces his establishment of an office on East Woodrow Avenue, St. Clairsville, Ohio, for the general practice of architecture and landscape gardening. Manufacturers' samples and catalogs are desired.

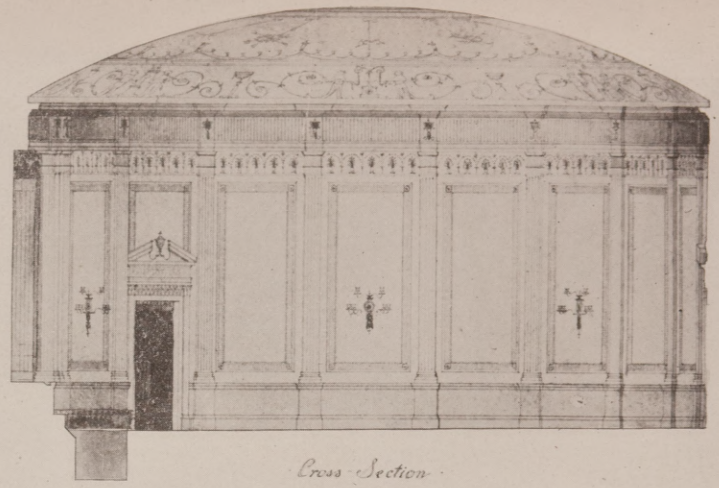
Announcement is made that T. L. Sorey has opened an office for the general practice of architecture at 233 Terminal Arcade Building, Oklahoma City, Okla. Manufacturers' samples and catalogs would be appreciated.

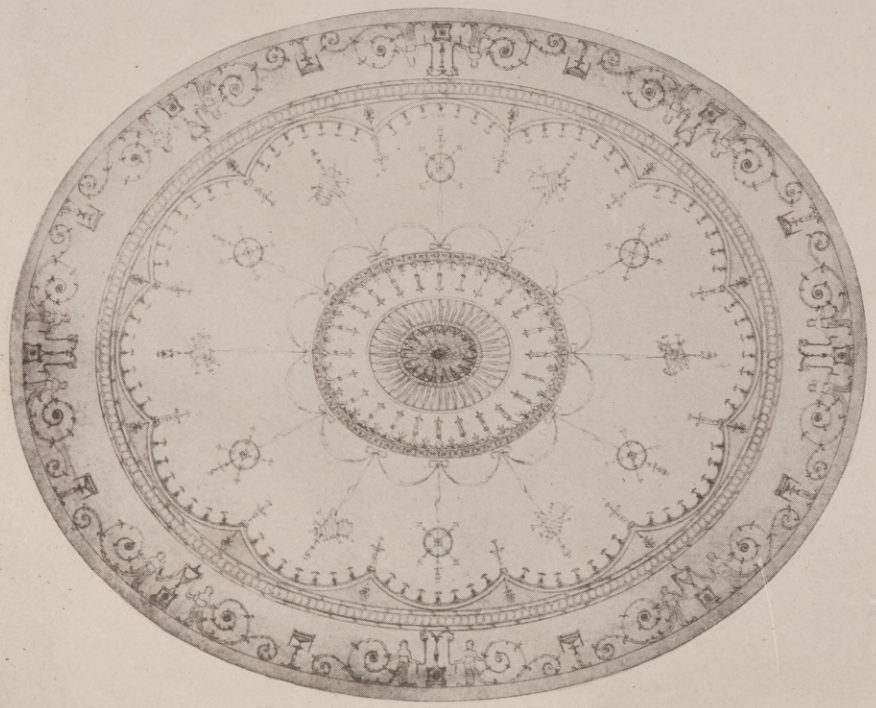
Philip T. Drotts, architect, wishes to announce the removal of his offices from 623 Reliance Building to Room 300 Reliance Building, Kansas City, Mo. Manufacturers' samples and catalogs are requested.

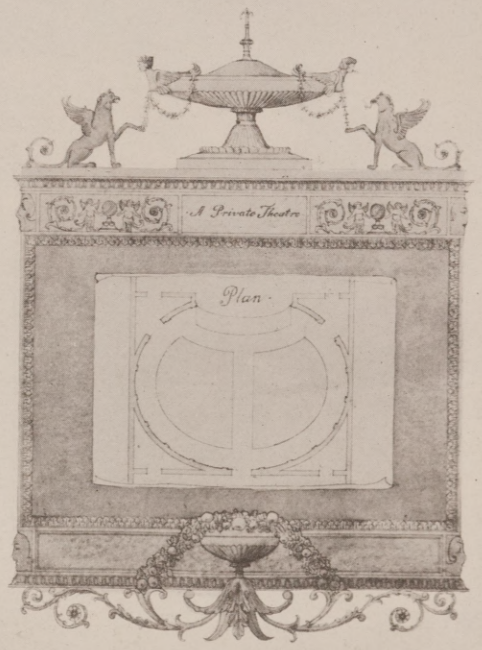
It is announced that O. L. Hill is opening an office in Bedford, Ind., for the general practice of architecture and engineering and will be pleased to receive manufacturers' catalogs and data.

L. T. Bengston is practicing architecture at Room 510 Travelers Building, Richmond, Va., the partnership of Benton & Bengston, architects, having been dissolved.









Class A I Project
The Interior of A Private Theatre
W. P. Graydon . . . Ga. Tech
Jan. 1 1923

SENIOR DESIGN

Problem No. 2

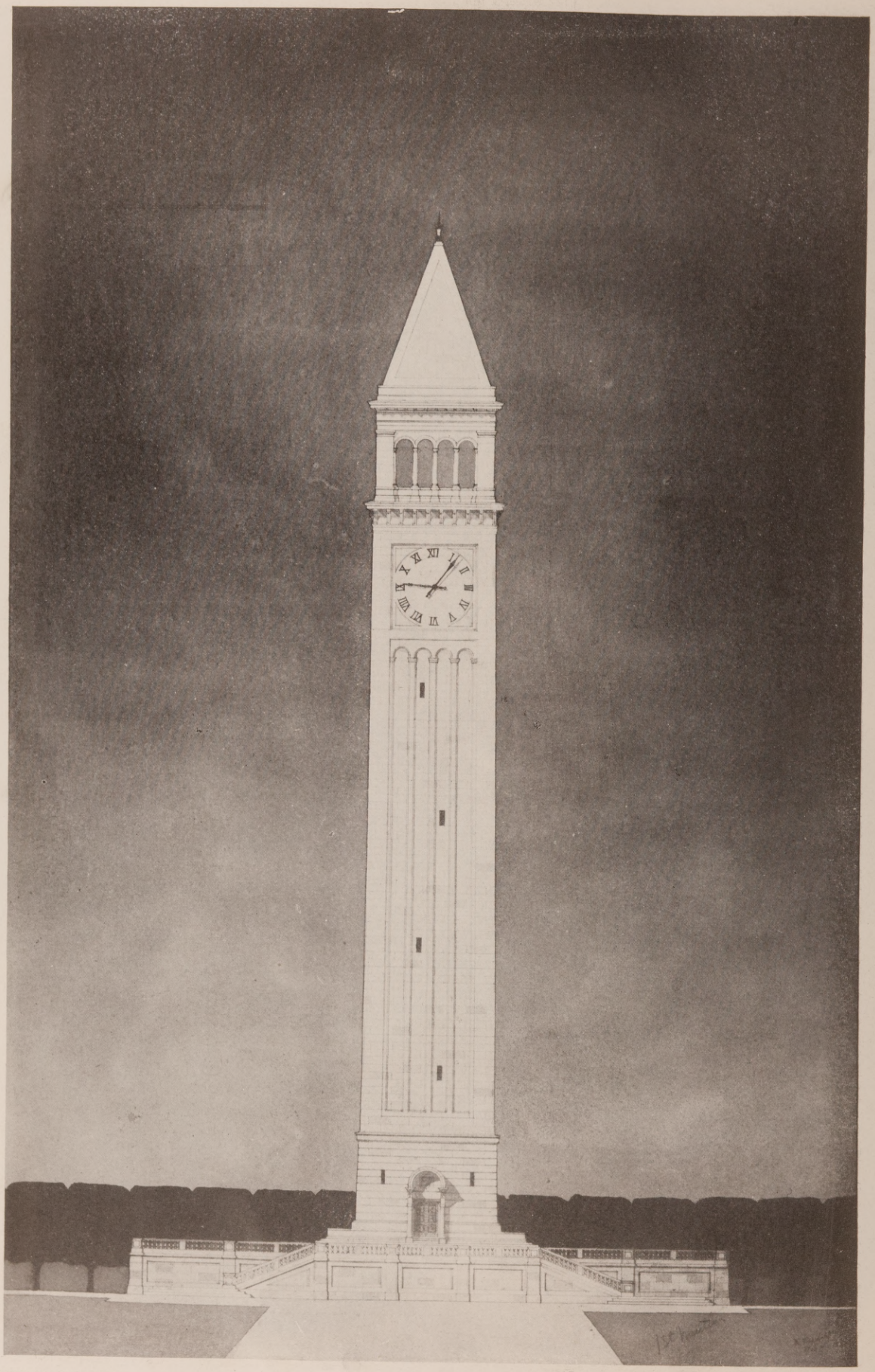
FIRST MENTION

THE INTERIOR OF A PRIVATE THEATRE

WALTER P. GRAYDON

Georgia Tech

Attached to the main body of a private residence the owner wishes to build a wing containing a private theatre for the entertainment of his guests. The theatre is to accommodate approximately 150 people. The problem is the interior arrangement and decoration of the audience room only. It should be borne in mind that the residence is of a luxurious character.



JUNIOR DESIGN
Problem No. 1

FIRST MENTION

K. ESPIDAHL
Georgia Tech

A CLOCK TOWER

A Clock Tower is to stand as a landmark for a town. Its setting and style is left to the imagination of the designer. A diversity in ideas is to be desired. The clock face should be 125 to 150 feet above the ground level.

SOPHOMORE DESIGN
Problem No. 3

FIRST MENTION

J. B. COTHRAN
Georgia Tech

AN END PAVILION

It is supposed that the facade of a large public building constructed in stone is composed of a series of bays terminated at either end by projecting pavilions. It is one of these end pavilions that forms the subject of this program. An order is to be employed in the design. The choice and character of the roof is left to the discretion of the student. The second floor is to be the principle one of the building.

EDITORIAL COMMENT

COMPETITION FOR TRAVELLING SCHOLARSHIP.

A traveling Scholarship in architecture with special emphasis laid upon the use of interior marble has been announced. This scholarship is to be financed by the Alabama Marble Company and conducted under the guidance of the Committee on Education of The American Institute of Architects.

This scholarship is offered in the belief that such a course of study will result in a better understanding of marble as an available material for interior finish and the opportunity this scholarship affords to study master pieces of architecture and particularly the wonderful marble interiors abroad is an extremely attractive one. It is to be hoped that many men of unusual ability and good educational equipment will enter this contest, as a winner so equipped will profit most from such an opportunity.

The idea of this scholarship is a highly commendable one for it shows an appreciation of the fact that more an architect knows about a material the more creditable will be his use of it, not only to himself but to the material. What more certain way can there be to promote the proper use of interior marble than to give a well equipped man a travelling scholarship that will enable him to see the best examples?

Details of this contest may be had by applying to Walter D. lair, Architectural Advisor, 154 East 61st Street, New York City.

Summer Session, American Academy at Rome.

For the first time in its history the American Academy at Rome will conduct a Summer session, a course of lectures and archaeological exercises for graduate students, it is announced. They will be under the charge of Professor Grant Showerman, Professor of Latin of the University of Wisconsin, who is the Annual Professor of the school and has resided in Rome for five years. The course will consist of three lectures a week on the history of the City of Rome from its origin to the present time, the work of a grade to entitle to credit at American universities.

Lectures will be given at the academy building, and students will have free use of the library and other facilities for their work. The fee is $50. Facilities for the study of the Italian language and literature are available. Application shou'd be made to the American Academy in Rome, Summer Session, Rome 29, Italy.

International Competition for Government Palace in Montevideo, Uruguay.

The Pan American Union now has in hand the rules governing the international competition for plans for the Municipal Palace to be erected in Montevideo, the capital of Uruguay. The Palace will not only contain the offices of the municipal government, but those of the national government as well. Competitors are requested to utilize, if possible, the foundation already existing upon the site, which has a dimension of 337′ by 505′. It is the intention to have the building constructed principally of stone quarried in Uruguay. The architects are asked to provide for a bell tower as a part of the general plans.

The competition will close on August 8 of this year. The winner of this competition will receive a prize of 10,000 pesos (the peso is equal to $.85 United States gold). The second prize will be 5,000 pesos, and the third 3,000 pesos. The Jury of Awards has been authorized to divide an additional 5,000 pesos among other competitors, should their work merit this recognition. The erection of the Palace will be in charge of the successful architect, who will receive 3 per cent of the total cost as additional compensation for this work. A plan has been worked out to keep secret the names of the competitors until after the awards have been made, and even then only the names of the prize winners will be known to the Jury and to the public.

Copies of the ground plan and full details can be supplied by the Pan American Union, Washington, D. C.

Dayton Chatper, A. I. A.

It has remained for the Dayton Chapter of the A. I. A. to inaugurate a very practical scheme for the betterment of small house design. The members of the Chapter have each prepared a complete set of drawings for a small house and turned them over to the Chamber of Commerce to be sold for a nominal fee.

The plan has proven successful. A sufficient number of plans has been sold, and the example has been so good that it is believed the small house builder has become awakened to the value and perhaps necessity, of good design. This valuable effort has been supplemented by the preparation of suitable articles for publication in the daily press. A most valuable campaign of education in good architecture has been set afoot and good results are already apparent.

Building Construction

Fireproof Building Construction

By Van Rensselear P. Saxe, C. E.

Part I. Foundations.

THIS is the beginning of a series of articles by Mr. Van Rensselear P. Saxe, C. E., of Baltimore, Md., in which he will discuss fully the subject of Fireproof Building Construction. In this the first article the author takes up the subject of Foundations and gives both the architect and engineer some valuable information on the selection or proper test for suitable foundations. The author next month will go into the subject of the Superstructure, discussing this point fully.—Editor.

IN connection with articles descriptive of fire resisting and fireproof building construction it seems to be advisable to look into the foundation requirements of such styles of buildings as their permancy of construction demand that the greatest care be exercised in selecting the kind of a foundation to be used and the construction of this foundation itself is dependent on the kind of soil conditions existing at the site on which the building is to stand.

This calls for the architect or engineer who designs a building to visit its site and determine, if possible, from buildings recently constructed in its neighborhood what type of soil conditions their builders found and if this information is or is not available, the careful architect will make examination of the actual conditions that exist in the property on which his building is to be constructed for there is not anything more unsightly than a building cracked due to bad foundation design and uneven settlement, to say nothing of the practical point that a building of this kind is difficult to properly rent or sell and means a consequent financial loss to its owner and the reputation of the man who builds it. Often settled buildings have been shored and new footings installed but seldom can this be done in such a manner as to eliminate the original signs of settlement even though large amounts of money have been spent in attempts to remedy such signs of original failure.

As regards the determination of ground conditions at a property it may be possible to have to wait, in the case of property already built on, for the demolition of the buildings already in place, but in any event before a building is constructed, some one of the following tests should be made to determine what kind of material the building foundations will be constructed in and, more important still, what kind of material is under the material on which the foundation itself is resting, as it is well known that only in parts of the country does the original surface condition exist, but a few feet below the original ground level, as for instance, we have more than once found on excavating for a column footing a splendid hard pan bearing surface only to find on further excavation that this hard pan was but ten to fifteen inches thick, overlying a strata of poor clay soil which in itself was worthless for bearing of foundation loads so that the hard pan and clay both had to be removed to a lower level of material consisting of sand and gravel on which the foundation itself was placed, meaning, in one case, a further excavation of eleven feet below the original good looking hard pan material.

The tests themselves can vary from so simple a test as driving a crowbar some distance in the ground to determine the resistance to driving the bar and so determining the possible density of the soil, going even to use of a regular well boring apparatus from which samples and cores of the drilling are kept, illustrating exactly the kind of material encountered at each foot below the foundation itself.

The bar test itself is unreliable except in soil of known value to determine perhaps that there are no pockets or openings in the earth itself at least for a safe distance under the foundation to be placed in the ground over where the bar is driven. This type of test should only be resorted to in the most simple types of footings and for light loaded footings where settlement is a minimum possibility due to advance or other knowledge from past experience as to what the soil in question may be expected to stand.

The next most satisfactory method of making a test is to use an auger such as is used in making post holes. This auger test will enable the architect to get actual samples of the soil conditions out of the site and these samples serve as a very

valuable guide to his experience as to what he may expect from the soil in question and if the position of the samples below the ground is kept it is possible to determine to just what point the excavation will have to go to get a good footing condition. Another important feature of this auger hole test boring is that inspection of the holes from time to time after they have been completed will indicate by the condition of the soil forming the sides of the hole just how compact the soil is at the various depths of the hole, a condition indicated by the degree to which the earth forming the sides of the hole has fallen away from the original soil. In good earth condition the sides of these auger holes will remain in good condition for three or four weeks whereas, for a loose, soft earth condition, the holes will hardly stay open for twenty-four hours, if at all.

In testing of soils where it is necessary to go to some depth to determine the soil character, what is known as a wash boring is suggested. This type of boring is accomplished by driving two pipes in the ground in such a manner that one pipe is placed inside of a larger pipe, the smaller pipe being connected to a hose so that water will flow through the smaller pipe while they are being driven into the ground, the larger pipe always being kept a small distance ahead of the smaller inside pipe. The effect of this water in the smaller pipe is to wash up out of the larger pipe the earth which accumulates in this pipe as it is being driven down into the ground. By letting the water run through the smaller pipe at a certain rate it will be found that the earth accumulated in the larger pipe between the two pipes will be washed to the top of the larger pipe so that where it even flows over the top end of the large pipe samples can be taken every few feet, which will thoroughly indicate the character of the soil through which the larger pipe is being driven. This is a very satisfactory and safe method of determining sub-soil conditions. Sometimes the outer or larger pipe is omitted in making this style of test, and only the single pipe used, in which case the water flushes to the surface around the hole itself carrying with it the earth loosened at the end of the pipe carrying the water. This single pipe method is not, in our opinion, very desirable or safe, due to the fact that the water in coming up through the earth is apt to loosen samples of earth already gone through and so give samples at the surface which are of misleading character. The double pipe method is safest, at only a slightly greater expense of operation.

Of greater refinement than any method yet mentioned is the use of an apparatus similar to a well drilling outfit in which a core is kept and an accurate sample of each foot of ground gone through is brought to the surface in the core driven through the well drilling. In making tests through rock, what is known as a core drill is used, so that the rock core is brought to the surface in the drill so that the rock core itself exhibits the exact structure of the ground gone through by the drill. An ordinary well drill can be used if a core drill is not obtainable and the drilled rock is washed to the surface through the guide pipe and samples kept of this powdered rock as it is washed to the top in the same manner as outlined for the double pipe driven method of testing.

In any of these methods, care should be taken to see that any rock excavated is real rock formation and not a large boulder by making test at other points of the ground to be built on or drilling sufficient distance into the rock to be assured that the drill would have gone through any boulder that happened to be in its path.

There are times when none of the tests indicated are fully satisfactory in which case it is best to dig a test pit. If this pit is to go any distance it will be advisable to sheet pile the sides as the pit is taken into the ground. There are some soft alluvial soils in which the test pit is the only real safe way to see what one has to contend with and this also applies to foundations which have sand or clay underlying them as they are often of such variable character that wash borings as outlined above do not give one accurate enough information of the stratification of these materials and the possible water contect. This water condition in clay is especially important as we will see later. Test pits should always be back filled with a lean mixture of concrete and not with the original earth taken from them, as under ordinary soil conditions, it is not possible to replace the earth in its natural compact condition, which not being able to do leaves a possibility of settlement of the earth in the test pit or of earth around the test pit settling into the pit, and so endangering the foundation of some wall or column placed near where the pit wag dug. In some soils gravel and sand mixed in proper proportion may be used to fill a test pit provided the backfilling is done by use of water washing the sand and gravel into place. It might be well to mention here that as water wells and cess pools are often found on building sites they should be thoroughly cleaned and filled in the same manner as a test pit. On a building site some years ago, there were encountered twenty-one wells of this character all of which were filled with concrete and in cases of two of these wells the building columns came directly over the wells. Though these columns were heavily loaded, no settlement has ever oc-

curred even though they were built directly over the old wells. On the contrary some years ago, a speculative builder in Baltimore city built a row of eight houses on a piece of vacant land without making any soil tests of any character. After these houses had been up for twenty-two years, one evening at about six o'clock as families were eating supper, the rear walls and porches of four of these houses dropped completely out of sight, taking kitchen sinks and stoves with them. On investigation it was found that the original site of these houses had been occupied by a brewery especially devoted to the manufacturing of Lager beer. This brewery had large underground vats constructed of brick, with brick arches over the vats. The brewery, after a number of years, was destroyed by fire and never rebuilt so that in due time no evidence whatever was left of the original building beyond the vacant lot. After a few years, Mr. Builder came along and built his row of houses on the site so that years after when the rear walls collapsed, investigation developed the fact that the rear ends of these houses had been standing on filled ground which was carried by brick arches forming the tops of the cooling vats mentioned above.

It took over four hundred truck loads of dirt to fill in these vats which were forty feet below ground and cost more money than each house was worth to underpin its remaining walls and to build new walls and to build reinforced concrete foundations and columns in the bottoms of the old vats to support these houses on a safe foundation.

These stories are digressions given to illustrate the practical value of spending a few dollars on making tests to determine on what material you are building.

After the tests have shown what character of ground condition your building is to rest on then it is well to investigate the relative value of the different soils which are normally found.

Sand is, in most parts of the country, the underlying material most commonly found. It makes a good foundation if in a compact condition, as in such condition that buildings constructed on it should be properly protected from other building foundations which might run down alongside of the exterior walls in later years after the original building is constructed. Sand known as quicksand or running sand is usually in pockets so that it can be completely excavated through, by use of sheet piling, in order that the building may rest on good material below the soft sand.

Clay is material commonly found and used for foundations. If the clay is compact hard and dry, it makes an excellent foundation. Clay which is damp but still compact and solid will make a good foundation provided there is not danger of sub-soil being drained to dry out the clay as this drying out is apt to cause settlement in later years. Clay which is very wet is not satisfactory for building foundation nor is clay from which there is danger of getting more wet than its original condition after the building is constructed.

Loam as a material for building foundations should be avoided. Its structure being composed of clay and sand with decomposed vegetable matter is of such nature that it is very treacherous. It is never compact as sands and clays are and consequently has no real bearing value.

Hard pan which is a mixture of sand and clay with gravel varies in consistency from a soft muddy condition to a hard compact condition that many people believe to be rock. Hard pan in its hard condition even when wet makes an excellent foundation. It will stand a high pressure and most building codes allow it a bearing value of ten to fifteen tons per sq. ft. of foundation area.

Silt is a fine material generally found in bottom lands along river beds. It is very fine in structure and very poor for a building foundation. The only method of supporting buildings on it is by use of wood or concrete piles. (Wood piles should not be used if the silt is in anything but wet condition

Gravel is an excellent material for building foundations and is, next to rock, the best material on which to build. Gravel mixed with sand also is a good material for foundations.

Rock in its natural condition is the best material on which a building or other structure can be placed. It will stand a high load per sq. ft. and insures one of practically no settlement in the building.

There are times when the rock strata are inclined in such a way that a slip of rock might occur which would cause a settlement of a portion of the building and in making rock excavations, especially for column foundations, care should be taken to not shatter by excessive blasting, the rock on which building columns are to stand. Occasionally rock is found in which open pockets exist; if this condition is suspected, drill borings should be made to a distance of several feet below each column footing to make sure that no holes exist under the column footing itself. We have in mind a twenty story building constructed on a rock foundation in which this additional drilling disclosed a hole in the rock at a distance of two and one half feet below the footing excavation for the column foundation. This hole was so large that it took eighteen cubic

yards of concrete to fill it in order to make a safe foundation for the column above. As this particular column foundation was required to support a load of nearly one thousand tons, one can readily imagine what would probably have happened to the building in question had this column been placed on top of the two and one half feet thickness of rock which covered the hole directly under the column foundation.

This one instance clearly illustrates the necessity of drilling further than the actual bottom of the column foundation. Every architect and engineer of any experience has had these things happen and realizes the necessity of extreme care in these matters

The bearing values of the different kinds of soil are generally used as follows: wet clay, 1 ton; wet sand, 2 tons; compact fine clay, 2 tons; clay and sand mixed, 2 tons; dry sand, 3 tons; dry hard clay, 4 tons; coarse sand, 4 tons; gravel, 6 tons; soft or rotten rock, 8 tons; hard pan, 10 tons; medium hard pan, 15 tons; hard rock, 30 to 40 tons.

In soils which are silty and wet so that they have no bearing value for the ordinary methods of placing foundations in the shape of pads, etc., it is necessary to use wooden or concrete piles. These piles are driven into the soft soil and depend, except in cases where they are driven through to rock for their load bearing capacity, on the frictional resistance developed between the sides of the pile and the surface of the ground though it is driven up tight, is in such shape that care should be taken to be sure that the pile, even though it is driven up tigh, is in such shape that it will continue to support the load to be carried for an indefinite time. Care should be taken to see that the soil underlying the soil in which the piles have been driven to a refusal is of such nature that it will always continue to bear the load of the soil in which the piles are driven and the building above.

For instance, not long ago piles were driven for a twelve story building. Piles were driven to proper refusal and individual piles stood proper test load. After all of twelve stories of steel were erected and the concrete floors of the building installed to the eighth floor, it was discovered that the building in question was settling very rapidly so that in two weeks time settlement of as much as three inches were observed in various columns. Investigation by well borings revealed that four feet under the material in which the piles were driven up firmly there existed a layer of soft soupy silt about two feet thick. The weight of the building coming on these piles and the earth around the piles had caused this silt to be displaced in such a manner that the ground above the silt layer had settled so causing the piles to settle and so the building itself.

The case was corrected by driving new piles to a higher refusal point so that they were sent directly through the soft silt layer and then stopped in a hard bed directly underlying the silt. One can well imagine that this was an expensive operation as new girders had to be placed on the new pile foundations to support the columns and building already in place.

Most foundation failures have been caused by lack of proper testing precautions and with normal care in construction there is very little danger of foundation trouble in any building.

Expertness in Construction

By E. J. Mehren

Editor Engineering News-Record, New York

THE Associated General Contractors of America have erected a very inspiring slogan—Skill, Integrity and Responsibility—a mark to shoot at for you as individuals and a plane to which you are trying to raise the level of the whole contracting profession. On two of those items you have placed particular stress in your four years of existence: Integrity and Responsibility. It was well that you did so, particularly during the last two years when, as you well know, in some eastern cities at least, there have been vigorous attacks upon certain elements of the construction industry, on the ground of lack of integrity.

But, gentlemen, isn't it true that that which distinguishes you from other business men is the item of skill? This good town of Loss Angeles is filled with business men of integrity and responsibility, but by no stretch of the imagination could they pose as contractors, as constructors. They are able to qualify on 67 per cent. of your slogan, but they lack that which is your own special province—skill in construction. I think, therefore, that emphasis put on the item of skill, upon your ability and expertness in putting materials together in the field, is well warranted. I was glad to hear your President, Mr. Bent, state that Mr. Greensfelder had sounded the high note of

the convention in the report of the Committee on Methods. Certainly he has put his finger on that which distinguishes you in your capacity as contractors—skill, knowledge of methods, knowledge of costs, management—all of those things that are factors in putting together materials in the field.

But there is another reason why I wanted to emphasize the item of skill. I wonder if you have not to a large extent been in the position of the man who believes that everybody is picking on him, and that your chief efforts heretofore have been directed to removing the barriers put before you by outside interests. You have asked the railroads for more cars, for better transportation facilities; you are going to ask the Government for more labor, through immigration; you are asking the engineer and the architect for more equitable contract provisions; you are asking labor to reorganize itself into fewer crafts; you are asking manufacturers to standardize their equipment; you are asking material dealers to modify their practice.

I have no criticism of any of these requests. They are right and proper. There is no doubt that many of the things you have suffered have been imposed upon you from the outside. But frankly, have you not arrived at the time in your association life when a little introspection is needed; when you should turn the white light of analysis and study upon yourselves and say: "Can we qualify to 100 per cent. or to a high percentage, as experts in construction, and say to the public, 'We are the people qualified to take materials and put them together economically and efficiently?' "

I believe that, in addition to all of the excellent work you are doing in the directions shown by your committee reports, you would be warranted in far more attention to the activities of the Committee on Methods than has heretofore been given. In fact, this committee might resolve itself into two or three committees with added profit to the contractors of this country.

I am fully mindful of what you have already done on methods, in spreading a knowledge of the use of equipment, in standardizing estimate sheets and financial statements. What I am trying to do is to emphasize that the Association will immeasurably strengthen itself and benefit the contractor by further emphasis upon methods.

Take for example the matter of costs. Your profits are made on the other fellow's estimate sheets, and the greatest barrier to your success is the competition of ignorance. What better can you do than to spread the knowledge of proper cost analysis, aye more, of the actual costs of doing work. I understand that in one of the middle western States, a group of highway contractos has got together and because of destructive bidding by the newcomers, the guessers, has organized a committee for the interchange of data about the cost of doing work. If you can mobilize and disseminate a knowledge of costs so that the other fellow is not going to wreck you on his bidding sheet, you will eliminate to a large extent (you can never eliminate him entirely), the guesser, the man who takes a chance, the newcomer, it will be money in your pocket, it will help stabilize your industry.

I think that work along three lines, in addition to those pursued by Mr. Greensfelder's committee (Methods), would be well worthwhile. I have already touched on the matter of cost. I am sure that, with the versatility which his committee has shown, he can mature a plan by which you can work through local committees of your chapters to mobilize information about the costs of important classes of work. Certainly you can define the elements of cost, even as in your estimate sheet you have laid down the items that should enter into overhead. With such an analysis a man in estimating a job would be sure that he didn't leave out any of the items.

The second direction in which I believe you might well work—and again through local committees—would be in mobilizing data upon the proper use of equipment and upon the adaptability and limitations of different types of plant.

The third direction in which I believe you might work with profit is in connection with management, management of labor particularly. There is a tremendous amount of information on that subject in your membership; its proper mobilization and crystallization would be of great benefit. The mere suggestion of one plan of handling labor, of compensating your foreman, would immediately bring up counter-suggestions from other members.

I would say, then, that in those three directions at least, you are in a position to get together material that would be of tremendous advantage to your membership and to contractors in general.

You can never eliminate the guesser; you can never eliminate the man who thinks he knows it all, because he has a little experience. It looks easy to do a highway job. All one needs is a concrete mixer, a gang of hunkies, a little construction track or a motor truck, and one can build a highway these days—at least that is the way it looks to the man of immature experience. You men in this room will testify that no class of construction requires the cutting of corners more closely, of having your organization tuned to the highest pitch, of getting your material deliveries

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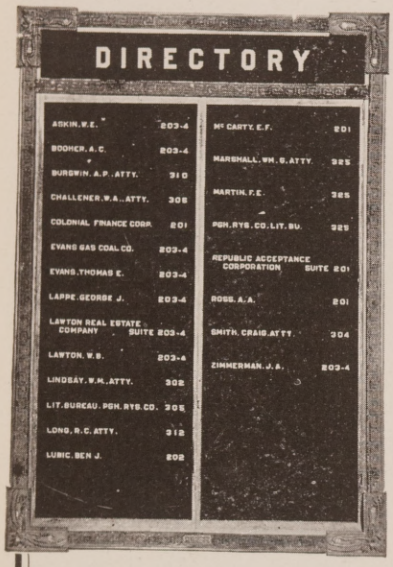

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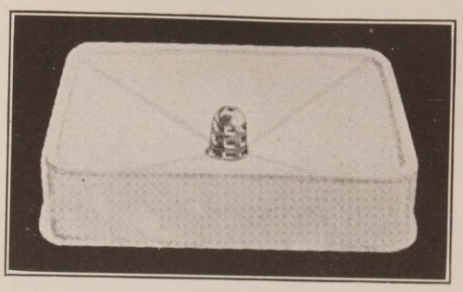

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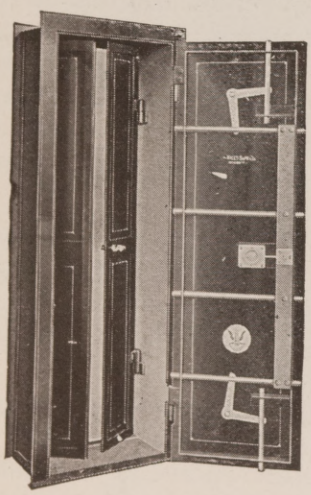

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through without interruption, than highway construction.

You can never eliminate entirely these self-confident inexperienced contractors; but you can reduce their number if you mobilize your experience in construction, if you can spread a knowledge of the elements of cost, of the uses of equipment, of the limitations of particular types of machines, of the elements of management that make for success in construction work. If you can help to eliminate the competition of ignorance, it will be money in your pockets—it will tend to stabilize your business.

There would be another benefit. Contractors do not stand as well with the public as they should —many people regard contracting not as a stable, mature sort of business, like manufacturing or even store-keeping, but as a gamble. The average man thinks the contractor is rich one year and poor the next. How could it be otherwise? The daily papers publish the results of bidding on public works. The variations run from 25 to 100 per cent. How can you expect the general public to get any other idea than that you are just guessing?

If that guessing can be eliminated; if the various factors that enter into the cost of the work can be refined, and broadly disseminated so that the margin of bidding is brought down, the public will get an idea that contracting is what it is, a stable business, a business for experts, and not the stamping ground of the gambler.

A third advantage would be that you would interest a greater number of the smaller contractors. You men here are leaders of the profession, contracting executives, business men engaged in construction. The smalled contractor is a constructor, not actually with his hands, it is true, but he is his own general superintendent. He is keen to know methods of management and the uses of equipment. He follows each item of cost with a hawk's eye. If you can give him information on methods and cost elements you will have a bait that will attract more of these smaller contractors into your organization, a consummation you all desire.

Let me say, too, referring to your budget discussion, that you have gotten a lot for your money. Whether you spend $125,000 or $200,000 next year the experience of the last four years would indicate that you are going to get every dollar back, tenfold at least. I have some knowledge of the cost of the work which an association does, for it bears a close resemblance to editorial work. I know what it costs to write reports, to collect data, compile statistics, to make the analyses involved in the work of this organization, and, with sixteen years of editorial experience, I want to testify that you are getting a lot for your money.

I have such faith in the A. G. C., however, that I want to see it expanded and take advantage of its opportunities in every direction. It is rather ungracious of me, knowing the discussion you are having about your budget, to propose other problems that will make deeper inroads into your pocketbooks, but frankly I believe you would profit greatly by expenditures on the subjects I have spoken about this morning. I should like to see the A. G. C. stand before the public not merely as the contractors' business organization, not merely as the contractors' defense organization, but also as the great organization of expertness in construction, of knowledge of all those things that are involved in building structures for the convenience and necessities of our people.

*Address before the Annual Meeting, A. G. C., Los Angeles, Jan. 31, 1923.

INVESTIGATION OF FATIGUE METALS.

Bulletin No. 136, entitled "An Investigation of the Fatigue of Metals, Series of 1922," is the second report to be issued of the investigation of the fatigue of metals carried on at the University of Illinois in co-opeartion with the National Research Council, Engineering Foundation, and the General Electric Company. Since the publication of the previous report in Bulletin No. 124 a considerable amount of additional test data has been obtained for specimens subjected to reversed stress. The tests of specimens in reversed flexure were made on the same machine as was used for the tests recorded in the earlier bulletin; no new kinds of steel have been tested since its publication, altho a number of different heat treatments have been used. Test data from the local laboratories as well as from other laboratories are given for the endurance limit for wrought ferrous metals under reversed stress, and the evidence for the existence of such a limit is summarized. Various miscellaneous tests and test results, such as tests under reversed shearing stress and the effect of speed of stress reversal, are reported. An extensive study, which includes a discussion of the Goodman diagram for the effect of range of stress on the fatigue of metals, has been made of the resistance of metals to repeated stress other than reversed stress. Several of the unsolved major problems in the fatigue of metals are enumerated and briefly discussed.

Copies of Bulletin No. 136 may be obtained without charge by addressing the Engineering Experiment Station, Urbana, Illinois.

Ernest Flagg, One of America's Greatest Architects, Devises New Scheme for Small House Construction

By Robert Carey

FOR this valuable article on the work of Ernest Flagg, one of America's greatest architects, in the field of Small House Construction we are indebted to Mr. Adam Ward, Editor of Collier's, The National Weekly. We believe that this article will prove of interest both to the Architects and Builders throughout the country and we hope that our readers will find in this article new thought on the Small House Problem.—Editor.

IN the face of rising costs of both materials and labor, Ernest Flagg, one of America's two or three greatest architects, is having houses built at a saving of one-third the cost ordinarily required. By the use of his methods of design and construction a builder can save 30 to 40 per cent of the cost price of a modern house of five to twenty rooms.

The figures are not merely on paper. Buildings are being put up of stone with large fireplaces, with all modern conveniences, for $10,000 which would cost you under present conditions, with ordinary methods, a full $15,000.

They are not ready-cut, or sectional, or poured concrete, or done on any large-scale factory-production scheme. They are individual, with walls of masonry a foot and a half thick, or more.

There is no need to cup hand at ear to hear a chorus of disclaimers. That chorus is always heard because, as human beings, we are so fond of that human phrase: "It can't be done." But it is being done and nothing prevents its being done almost everywhere in the United States except ignorance of the means, dogged stubbornness, conservatism, and the old belief that what was a good way for our fathers must be the best way for us.

It is against such prejudice that Ernest Flagg has gone ahead. His was the daring genius that erected the first great tower on Manhattan Island. For years it was the highest commercial structure in the world, rising 612 feet above the street. For years this skyscraper, the Singer Building, was a symbol of American business enterprise, and today it ranks among the most beautiful pieces of architecture in the world. So in a great new development of art, Flagg pointed the way and created one of the wonders of the world, yet the critics of architecture will not admit that the Singer Building, great as it is, is his real monument. They point to the sheer loveliness of the Corcoran Art Gallery in Washington, D. C., and are willing to stand on the belief that no structure in the world far exceeds it as a work of architecture and design. The Naval Academy at Annapolis is also from his board, as are many other private and public buildings of great worth. Unquestionably most critics would include Flagg among a choice of the three greatest American architects, probably bracketing this son of a Broklyn minister with Cass Gilbert and Stanford White.

There has been little advance in fundamental building ideas for generations. While design has been improving since the day of Mansard and his amazing roofs, while the telephone, electric lights, modern plumbing, the automobile, and countless other engineering improvements have been winning universal approval, we have stuck like a burr to old-fashioned ideas that are, indeed, completely outworn. You see, building a house is an enormously important undertaking in most family lives. It is the biggest investment of a lifetime. A mistake or a bad idea may be tragic. "Build 'er up in the good old-fashioned way!" you tell your contractor, and he proceeds to build it in the bad old-fashioned way.

To do anything new takes courage. Only a violent upset puts a mind in a receptive mood for something out of the ordinary.

But while Flagg was designing large public buildings he was playing and experimenting with small private houses. It seems probable that his deepest interest really lay in improving the dwellings of American householders. He was working out ways and means to strip them of sham; to make them cheaper, more substantial, and vastly better looking. He was, perhaps, working to overcome the fact that fully 90 per cent of American houses are built entirely without the aid of an architect: working against the prejudice that to have an architect is to increase greatly your cost of building.

When I visited Flagg in his architectural "laboratory," at Dongan Hills, Staten Island, I found this big, ruddy-faced, white-haired man bang in the middle of a new project. He was building a house for one of his friends and at the moment I hove in sight was chipping rock, trying to uncover a hidden beauty in the stone that was being used. He started right in, hammer and tongs, explaining rapidly and clearly those departures which were being used in this house and which

were already proved in other buildings to be a stunning success.

"The object of this work," he began at once, "is to improve the design and construction of small houses while reducing their cost."

Now I wanted so eagerly to know some figures that I could not wait, so I told him about the foundation wall which was being built for me up in Westchester County at a contract price of 45 cents a cubic foot. Before me was a Flagg foundation wall, a thing of real and permanent beauty. "How much is that costing?" I asked.

He called the foreman in charge of construction. "You figured the cost on that wall yesterday, didn't you?" Mr. Flagg asked.

"Yes, sir," said the foreman. He pulled a sheaf of papers out of his pocket. "Here they are, sir. It's just 6 cents a cubic foot."

And I think that it was from then on that I belonged to the group of admirers of Ernest Flagg.

Wood has been so cheap in the United States that we have used it almost everywhere. Stone has been little used because of its supposed greater cost. It is cheaper by far in the long run, of course, and now since wood is becoming scarcer and more expensive and since there are the new ways of utilizing it, Mr. Flagg is interested almost exclusively in using stone for walls.

He went on with a magnificent discourse about the need of applying the fundamental principles of art to design.

Why do houses have attics? They are frightfully expensive storage space. Mr. Flagg's houses do not have any. Many of his living rooms run to the peak of the roof. If second floors are to be used, then bedrooms run to the peak—and they are as cool and comfortable as any bedrooms with vacant attics above them. A little "ridge dormer" rides on the roof tree and keeps the room as cool as an attic air space, or cooler. It is windowed and screened and operated with a cord from within.

It looks well on the outside and adds light within. It is an invention which enables you to see all the space under the roof; which enables one-story houses to be built with walls only five feet above the ground; two-story houses with walls only twelve feet above the ground. It makes easy of achievement the low-lying house that every layman and architect dreams of and so rarely achieves. And remember that since the cost of modern frame buildings is nearly 45 cents a cubic foot, a full-sized attic in a medium-sized house of six or seven rooms will cost you somewhere near $1,800.

The houses built by Mr. Flagg have no cellars.

A cellar usually costs about 20 per cent of the total cost of a house. It was first used to "keep the house dry," and, scientifically speaking, kept it damp. It was also used as an ice box, and as such is used no more.

Unless thoroughly damp-proofed, all cellars are moist—who likes to live in a cellar?—and this wet air permeates the house, just the way escaped coal gas in the basement does. By having furnace and coal bins above ground a great deal of effort is saved in housework, and the mass of the house is increased to make it more impressive. The space between the floor and the ground, which Flagg covers with waterproofed concrete, is dead air space, and houses so built are as warm and dry as houses with big, damp-proof cellars. The cost of the layer of concrete on the ground is quite insignificant. These are facts, proved in use, scientifically correct. It is the conservatism of all of us, the prejudices, that make them hard to believe. As Mr. Flagg says: "When houses were first built in the Back Bay section of Boston without cellars, people were afraid to live in them, but experience proved them to be most sanitary."

The most spectacular and unbelievable innovation is the Flagg partition, another invention. The ordinary partition is built by putting up two-by-fours along the line. These are covered up with either metal or wood lath. Then three coats of plaster are applied, and on top of the last one is put the finish. The result is a partition which is a series of flues for fires. Once started in a wall, a fire quickly becomes disastrous, and it is in addition a fine nesting and hiding place for vermin. They are not sound-proof—why should they be since they have dead air space just like the sound box of a drum? Moreover, they take a lot of air space. They are six inches through, and space in almost any kind of a house costs at least $6 a square foot. In using up space alone ordinary partitions thus cost $3 a running foot.

The Flagg partition is all plaster and but an inch and three-quarters thick. It is fire- and vermin-proof, less subject to damage than ordinary ones because the plaster is thicker and quite as sound-proof.

Along a beam where the partition is to go are hung lengths of jute scrim like the material of burlap bags. The edges are basted together by twine with a bagging needle. At door openings and at walls, as well as at top and bottom, the scrim is attached with ordinary staples. Thus a curtain is formed. Now two plasterers, one on each side, go to work, facing each other, and put on the first rough coat, each working against the other. If only one plasterer is available, a laborer can hold a board up for him to work against. The curtain of plaster now must hang plumb, like a pendulum. The bottom hangs in the baseboard.

When the first coat is dry two more are put on in the regular way. And that is all there is to the Flagg partition, all lath and lumber and a great deal of labor being eliminated.

Partitions like these have been used for several years in New York apartment houses. They have been tested by the New York Fire Department under official test for the Building Department. They were made into the sides of a room eight by twelve feet, and the room was filled with cordwood soaked in kerosene to a height of two feet. The room was ignited and made into a roaring furnace and allowed to burn for an hour. Water through a fire hose at a pressure of forty pounds to the square foot was applied to the hot partition at a distance of four feet. One slight bulge and one short crack developed. How long would the ordinary partition withstand such a test?

For greater strength, to carry loads, a bearing partition can be made in exactly the same way except that Portland cement mortar is used for the first coat instead of ordinary patent mortar. Of course in the ordinary small houses the weight of floors above is carried by walls, beams, and floor joists. "Economy in building," said Mr. Flagg, "consists in the aggregate of a great number of savings, which when considered separately may seem trivial, but which when combined are important."

Neverless, there are a few more details that anyone can adopt, some of which are expressions of the fundamental artistic philosophy of this great architect.

The most important of these is the method of building a wall, the use of which to a large extent explains the difference in cost of the two buildings just mentioned, which, of course, are of stone. A rubble wall is built which Flagg calls "mosaic rubble," because the stone is set in dry, like mosaic work. It is constructed, not with masons at $10 a day, but with ordinary labor at $4 or $5. The wall is built in a form in much the way concrete is poured into a form. The flat side of the stone is laid flush with the outer face of the form and concrete is shoveled in behind. No mortar is placed between the stones, but they are laid in dry and mortar is squeezed into the joints afterward when the forms are removed.

In practice forms are made of four-by-four uprights with holes for toggle pins and three eight-inch planks are placed in position on the inside and outside of the proposed wall. Two feet of wall is constructed by the laborers placing stones and filling in with concrete and left overnight. The next morning the three planks are slid up and another height of wall built and so on until completion. Concrete corner stones or cut stone for the corners is used. The forms are all "take down" and can be used over and over again. As the wall grows in height a runway is built to carry the material up for placing.

When the wall is completed it is "pointed" or the chinks filled up. This is fast and easy work for a mason, who merely holds his board at right angles to the wall, and pushes the mortar off into the holes. The result is a perfect rubble wall as fine as one built by a mason in entirety. And then one thing more—perhaps you don't want a stone finish on the inside of your house. Flagg has found that it is not necessary to erect two-by-fours and then add lath before plastering. No, he simply applies plasterboard to the damp cement in his kind of wall on the inside, and the stuff sticks there. Then the plastering is done on the board in the usual way; the latter being a nonconductor prevents condensation and eliminates dampness inside from this cause. All trim —those ornate, molded bits of wood over and around doors and windows—is eliminated. The real members, such as the honest window frame, are made a little more carefully and then allowed to show.

American stairways, ornate and bulky, meet with Flagg's disapproval. They are one of the most expensive fixtures in a house, and to eliminate them he has designed a circular stone stairway made of cement blocks which is both beautiful and utilitarian. It takes up about one-quarter of the space and costs relatively little.

Fireplaces do not heat well. All the "B. T. U.'s" go up the chimney, it would seem. In the house which was building on Staten Island Mr. Flagg had designed the most original fireplace I have ever seen. It was recessed hardly six inches in the interior gable wall, and the only real chimney in sight was on the roof. The finished job, according to the drawings, was to form a hood out over a tile and brick flooring, so that the fire was open on three sides. The hood, resting on tile, is to be made of bronze, dull and rich, and is to extend clear to the roof tree, almost like half a cornucopia. It is going to be a stunning affair, and the chief motif of the room, but its purpose is utilitarian, not decorative. It is to be a hot box! It is really to heat the room as no fireplace I know of has ever heated a large room. This idea is an evolution from the Franklin stove and also from a little porcelain stove he once made use of in a German hotel.

Screens? Since he always uses casement windows opening inward, instead of using screen frames that are taken down once a year, Flagg tacks on a copper screen permanently. You can hardly see it from the inside, and it should last as long as the house. Used this way, it is cheaper

than ordinary framed wire screens. Leaders to catch the roof water? Not any. He builds a little cement walk close to the foundation wall all the way round to act as a safety, frost-proof blanket. It prevents the rain water from wearing off the ground. He says that leaders are ugly and often spoil the symmetry of an otherwise well-designed house. They are not really necessary, and he uses them only where absolutely necessary over a doorway or along a terrace and then as little as possible. Saves a lot of money too.

He makes one of the cheapest and best roofs you ever saw, and they are beautiful. He uses plain roll roofing. This he cuts into nine-inch strips, laid with only a two-inch overlap. But under the overlap is the nail, and running from each nail to the edge of the roofing strip above is a metal clip which holds down the edge of that next strip above so the wind can't lift it. The weather then makes streaks down the line of the clips and you have a stunning cross-barred roof, laid at half the cost of shingles. He showed me one in perfect condition that had been up for fifteen years.

To me there was a real thrill in seeing all this and in hearing this great architect! "People ought to know about the success of these things," he said to me. "The ideas and the working out of the plans are so simple. They mean so much. Anyone who will put his mind to it can think of many more. To work a real revolution that will so greatly lower costs doesn't require anything but a little daring to climb out of the old ruts and the application of a little horse sense. The old ways aren't necessarily best, and an agnostic attitude—the 'show me, I'm from Missouri,' point of view—doesn't hurt anyone."

But my thrill over Flagg and his work was like the thrill I had as a child when I read Huckleberry Finn," and had my first ride in an automobile and saw my first Shaw play at the age of nineteen—oh, yes, I got it too when I made my first long-distance telephone call.

That is the quality of Ernest Flagg and his work.

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