THE DELMONICO BUILDING, 44TH STREET AND FIFTH AVE., NEW YORK CITY.

JAMES BROWN LORD, ARCHITECT

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THE BRICKBVILDER

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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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THE BOSTON SUBWAY; A LOST OPPORTUNITY.

IT is the present expectation that the Boston Subway will be completed and in actual use early this fall, possibly by the first of September. About a third of it has been in operation now for nearly a year, and the public has had a pretty good opportunity to judge of its value. We believe that we are right in saying that the general consensus of opinion is that as an engineering structure it is well planned, well built, and that on the whole it fulfils all the practical requirements had in view at the time of its inception. The surface tracks which it was intended to supplant have not yet been removed, but the traffic on the streets above has been made very much more free, and there has been an almost entire absence of blockades in the subway itself. As a means of inter-communication between different portions of the city it is undoubtedly a success.

The subway has been built under the direction of a commission which was appointed by the Governor. This commission, as originally constituted, included three lawyers, one professor of engineering, and one gentleman who could, perhaps, be most fairly classed as a capitalist. The changes which have occurred in the commission have not altered the proportion of lawyers, nor have any other professions been represented. At no time has there been upon the board, either as member or adviser, an architect or any one with the slightest claim to trained artistic ability. It would be hard to select a commission composed of men more thoroughly matter of fact and business-like in every attribute. They have done their work admirably from a mechanical standpoint. They have drawn around them the very best of engineering advice, there has not been a suggestion of anything but the most strict, business-like proceeding from first to last, and as far as the commission has gone it is certainly deserving of the most hearty thanks for the manner in which it has conducted the work. If the subway were nothing but a big sewer, or a system of underground conduits to carry water, we should say that nothing more could have been hoped for or desired. Unfortunately it is a work of public utility which is constantly before the eyes of thousands of citizens, and it is a matter of the deepest regret that the commission, after having shown such unusual executive ability, and after having solved so satisfactorily the practical considerations, should have seen fit to so utterly ignore every consideration of art or beauty below ground. The interior of the subway is about as enlivening and cheerful as a second century catacomb. There is not one single redeeming feature about it in an esthetic sense, and it is the strongest sort of epitome of the unfortunate way in which the artistic element is so totally disregarded in our public work.

The average Philistine of the type which is represented by our able subway commission seems to be imbued with the feeling that art is a condition which can be tolerated, and within certain limitations grudgingly admired, provided it does not entail any expense; that the moment the artistic element begins to count as a factor in the cost it must be sternly suppressed. We, as a nation, are gradually developing into an appreciation of the educational value of good looks. We are not there yet, by any means, and the prospect is sometimes dreary, but we are not quite so badly off in this respect as we were two generations ago, and there are fortunately a few leading spirits who appreciate that a public work is not put up simply as a money-saving machine, that works of public utility may rightfully take to themselves a certain element of artistic appearance, and that the expenditure of a small added percentage in money is well repaid by the constant enjoyment which it can afford. We appreciate this sentiment in our public parks. Boston is spending millions of money every year to provide and maintain a park system which shall be not merely healthful, not merely afford good air to the poor, but shall be positively and appreciably beautiful and artistic. No one questions the wisdom of this expenditure, no one would have it restricted, and everyone enjoys the results. In exactly the same manner the Boston Subway should have been treated as an opportunity to not only accommodate the people in a thoroughly business-like manner, but also to accommodate them in surroundings which would at least not be distressingly ugly.

Specific comparisons may be dangerous, but we cannot forbear referring our readers to the issue of this journal under date of December, 1893, wherein was shown a possible arrangement for the subway which would have permitted of a very considerable display of taste, good proportions, and pleasing colors, without involving a decided additional cost. If any one doubts the possibility of the successful treatment of such a problem as the subway presents he has only to recall such a building as the so-called Mosque at Cordova, a structure the style of which could have been reproduced in our subway stations with extremely effective results and in a manner which would have been much more permanent than the ghastly painted white columns and girders and the absolutely uninteresting lines of the existing structures. We will venture to say that any one of fifteen or twenty architects throughout this country who could have been selected could have made the subway interesting, worth the going to see for itself, and every bit as valuable in a practica

sense without involving an added expenditure of more than ten per cent. We believe, as we have repeatedly stated in these columns, that the only material suitable for constructing a work of this kind is brick in one or another of its forms; that had the ceiling been vaulted throughout in substantial masonry, the construction would have been more permanent and would have allowed a better opportunity for pleasing effects; and even if artistic considerations must perforce give way to engineering judgment, and we are obliged to use the species of steel-skeleton construction which was followed in the subway for the walls, it at least might have been lined throughout with enameled brick, not necessarily a plain white, but in some pleasing colors which would rest the eye and give a little relief to the senses. The commissioners made some very careful investigations as to what material to use for lining these walls. They finally decided on a facing of Keene's cement, which has been put in the finished portion throughout, except at the stations, and when fresh presented a very pleasing appearance; but before the work had been in use a month it began to look disreputable, and is now simply an unsightly, blotchy plaster wall. We were told at the time that the reason for this selection was that to use enameled bricks throughout would involve an added expense of $300,000. This is simply an example of that thrift which is the curse of so many of our public monuments and for which our descendants will not rise up and bless us.

The unthinking passenger who rushes down the subway steps, buys his ticket, and rushes off through the swiftly moving cars, may reason that the tunnel as built is as good as though better looking, that as long as the work is done well and the cars expeditiously despatched, that is all that can be expected; but the man who thinks, the man who knows what might be and has had opportunity to appreciate the influence in the long run, on the passing crowd, of good proportions, agreeable colors, and artistic arrangement, will feel every day he enters the subway, that it is a lost opportunity, that we might have had in this undertaking a piece of engineering work which could have been clothed with architectural beauty and been a pride to the city quite as truly as our parks or gardens. We have to thank the subway commission for their excellent work, their scrupulous business methods, but, unfortunately, we have also to thank them for building an ugly hole in the ground, constructed so well that we can never hope to afford to tear it out and do it as it ought to have been done.

BOOK REVIEW.

THE LAW OF MECHANICS' LIENS UPON REAL ESTATE IN MASSACHUSETTS. By Henry T. Lummus, LL. B., of the Essex Bar. Little, Brown & Co, Boston.

Very few works have been written upon the topic of lien laws, and fewer still have any tangible value to the layman, as it is a subject which in its practical application can most safely be left to one's lawyer. The best that can be hoped from such a volume, in as far as it appeals to a possible party to a suit, is that it shall present a careful classification of decisions and intelligent generalizing of conclusions. In order to be of real value such a work must of necessity be quite local in its nature, as the customs vary greatly in the different States. Mr. Lummus has put into very compact shape the present law of Massachusetts as regards mechanics' liens. The subject matter is presented in a very easily understood form, and is accompanied by a thorough cross index which makes the work unusually valuable. While the best way to avoid liens on a building is to have nothing to do with any but thoroughly responsible contractors, still the most careful architects and owners are occasionally caught unawares, and a study of the 139 pages of this book will go a long ways towards posting one as to individual rights and the way to obtain them.

PERSONAL.

Albert Kelsey, former president of the T Square Club, Philadelphia, has just returned from an eighteen months' stay in Paris and the Continental cities of Europe, where he has made an especial study of the "Science of Cities" for the University of Pennsylvania. In this connection Mr. Kelsey expects to deliver a course of lectures on "Focal Points in Foreign Cities," "Urban Circulation, Transportation and Delivery," and "Commercial Architecture."

Mr. J. George Morgan, architect, Philadelphia, member of the T Square Club, has been appointed second lieutenant in the Volunteer Engineer Corps, U. S. A.

Frank E. Wetherell, architect, formerly of Peoria, Ill., has opened an office at Oskaloosa, Iowa. Catalogues desired.

A. B. Rosenthal, architect, has removed his office from 620 Milwaukee Avenue to 81 Dearborn Street, Chicago, Suite 341–43.

J. L. O'Connor, architect, Openheimer Building, Austin, Texas, will be glad to receive catalogues.

ILLUSTRATED ADVERTISEMENTS.

THE following illustrations appear in our advertising pages: Land, Title, and Trust Company's Building, Philadelphia, Pa., D. H. Burnham & Co., architects; advertisement of Conkling, Armstrong Terra-Cotta Company, page v; mantel in hall of Miss

HERALDIC PANEL FROM THE HOTEL RALEIGH, WASHINGTON, D. C.
Executed by the New York Architectural Terra-Cotta Company.
H. J. Hardenbergh, Architect.

Fitzgerald's house, Roxbury, Mass., William G. Preston, architect; advertisement of Fiske, Homes & Co., page vii; residence of Louis Schoellkopf, Esq., Buffalo, N. Y., C. D. Swan, architect; advertisement of The Harbison & Walker Company, page xv; Manhattan Hotel, New York City, H. J. Hardenbergh, architect; advertisement of Henry Maurer & Son, page xxiii; shapes of roofing tile made by the Celadon Terra-Cotta Company, Limited, in their advertisement, page xxvii; illustration showing ten positions in which the Bolles Revolving Sash may be placed, page xxxvi.

The American Schoolhouse. IX.

BY EDMUND M. WHEELWRIGHT.

THE schools in which courses in mechanical training are given in conjunction with the principal courses of high schools are known either as "Manual Training" or "Mechanic Arts High" schools.

In these schools manual skill is not taught for its own sake. By the course of instruction offered, intellectual activity is encouraged through knowledge of tools, materials, and forces, as well as through books. Manual training is but one, and in many cases the smaller, part of the instruction given; such training is used as a means to an end and not as an end in itself. "Mechanic Arts High," although a clumsy word, more closely designates the purposes of such schools, while the name of "Manual Training" confuses the purpose with that of the technical trade schools, whose object is purely utilitarian. If the mechanic arts high schools have a future success commensurate with that of the past it is not improbable that a better designation need not be sought, and the need will not exist to use any other name than that of high school.

Schools of this type, the most distinctly American development of schoolhouse architecture, are provided with the class rooms, recitation rooms, and laboratories, and drawing rooms of the high schools, and in addition have rooms equipped with machinery for wood and metal working, with carpenters' benches, forge shops, and in some cases molding and modeling rooms.

These schoolhouses are the most complex and latest development of the high school in this country, and as such necessarily have not yet been perfected in all their features. But few schools of the type completely designed for this purpose have as yet been built and there are no foreign models to help us except in regard to minor details. The development of the plan of the mechanic arts high school offers still an important field for the joint labors of our educators and architects.

In many cases, to meet the needs of such instruction, existing buildings have been adapted for shops. At St. Louis, Chicago, Cambridge, and Boston, especially designed high schools of this type have been built. At Toledo, an addition for work shops, etc., has been added to a high school building.

The St. Louis Manual Training School was built partly in 1879 and partly in 1882, at a time when there was little precedent to guide its projectors. On the third floor of this building is the first-year schoolroom fitted with ninety-six desks for first-year pupils, two recitation rooms, each fitted with twenty-four shelf chairs, a drawing room, physical laboratory, one wood-working room with benches for twenty pupils.

On the second floor is the second-year schoolroom with eighty-eight desks, this class being composed of four divisions of twenty-two each. Here, also, is a wood-working room with twenty-four benches and twenty-four turning lathes, a molding and soldering room with twenty-four benches, and a drawing room.

In the first story is the office of the principal, the third-year schoolroom with sixty-three desks, the forging shop with twenty-two forges and anvils, of which but twenty are shown on the plan here given. There is no basement under the forge shop. The machine shop is also on this floor. This room is equipped with lathes, drills, and other machine tools and has fourteen benches, marked B on the plan, and dressing lockers (marked C). A small chemical laboratory adjoins the first-year schoolroom.

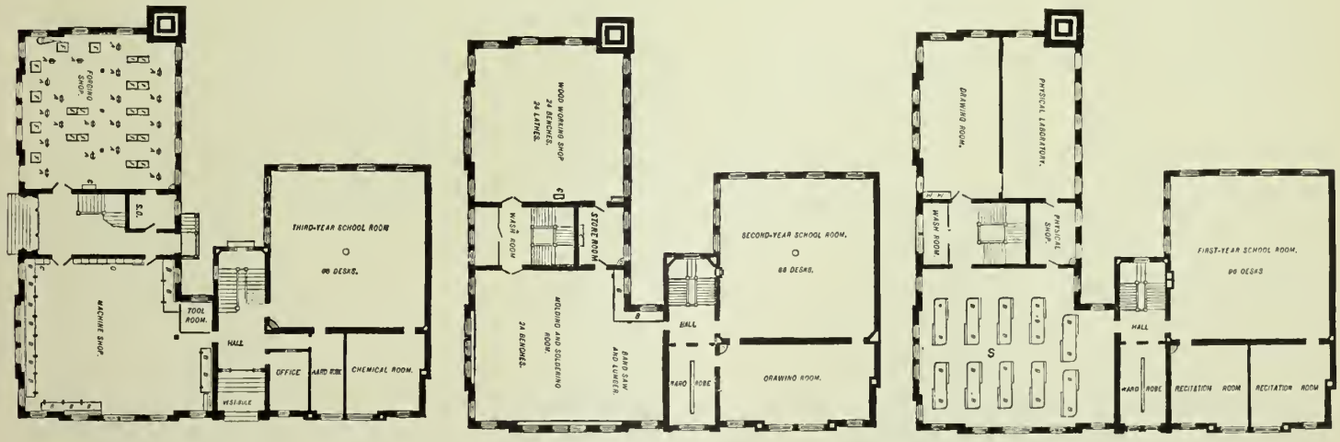
The second and third floors are provided with the requisite wash rooms; hose for the first-floor shops are placed in the basement. Here, also, are dressing rooms and toilet rooms, the engine room, the repair shop, a lunch room and a warm-air chamber, the boiler being in a separate building. Under the steps is the fireproof oil room.

Dr. C. M. Woodward, the director of this school and author of a treatise on "The Manual Training School," says, in criticism of the plan of the Toledo school: —

"1. The forging shop, which is the noisiest shop in all, is rather too near the schoolrooms. In warm weather, when the windows are open, the noise is somewhat troublesome. I should prefer a plan which turned the shop wing ninety degrees to the left, so as to place the forging shop directly beyond the machine shop. In other words, I would put the school and drawing rooms at the head of a T, and the shops in the long central part, with the forging shops at the extreme end.

"2. There is no well or shaft for the transmission of power to the several floors from the basement. The transmission should be from floor to floor by belts with suitable tighteners. Each shop should be furnished with a clutch, by means of which the teacher in charge may turn on his shop or turn it off at pleasure, without interfering with the other shops. At times the teacher needs a quiet room where his voice may be easily heard as he gives the theory of a machine, explains the details of a process, or criticizes work before a class. In the transfer of power, gearing is too noisy for a school. The main shafting and pulleys of the machine shop of the St. Louis school cannot be stopped without stopping the engine. While this defect is hard to remedy, it may easily be avoided in a new plan.

"3. On the third floor I would interchange the wood-working shop with the drawing and physics rooms. This would accomplish two things; first, it would place the drawing room and physical laboratory over a comparatively quiet room, as there is no noise in the molding



FIRST FLOOR. SECOND FLOOR. THIRD FLOOR.

ST. LOUIS MANUAL TRAINING SCHOOL, ST. LOUIS, MO.

room; and, secondly, no divisions would pass through a shop where the boys are at work."

Dr. Woodward further suggests that, "As a rule, the study and recitation rooms should be separated from the shops by two walls enclosing halls, stairways, or yard; at the same time I should prefer to have all the rooms for a class on the same floor, or as nearly so as possible, and but a few steps away. It may not work badly to have a division cross the yard, but I advise strongly against sending a division out of the yard, or across the street. I do not favor the transfer of a division of students from one principal to another and back again. No principal would like that arrangement in the case of such a study as arithmetic or spelling, and shop work and drawing should be treated with precisely the same consideration. The same precautions should in all cases be taken to prevent irregularities and loss of time. In short, manual work should be treated as school work, and watched and guarded and sustained as such."

The High and Manual Training School of Toledo, Ohio, is an addition made in 1885 to a large high school. It has three stories and a high basement, in which is placed the forge room or blacksmith shop, the molding room, lumber room, and engine room. The large shops are 40 by 55 ft. The machine shop is on the first floor. Here, also, is the wood-working room, which is fitted with lathes and twenty-four benches. The wood-working room on the second floor is fitted with benches only.

In the Toledo school provision is made for manual training for girls. The girls are taught in divisions by themselves drawing, light woodwork and carving, cooking as a branch of applied chemistry, needlework, cutting, and fitting. One of the large rooms of the second story, and in the third story the corresponding space, is divided into two rooms, one of which is the cooking room, which is thus described in the catalogue of the school:—

"This is 40 by 27 ft., with one large Garland range, two gas cooking stoves, and five double tables 5 ft. long by 5 ft. wide, each table accommodating four pupils. Each girl has her own table space for work, and there is a small gas stove for every two pupils. Each table space has a drawer and cupboard below it for all essential utensils, and each pupil must personally go through every process taught. At the other end of the room are pantry closets for the teacher's use, and a commodious wash room, with all conveniences for girls, including individual closets for the keeping of aprons, clothes, etc."

In the Toledo school each work room is provided with ample wash rooms, which are very important adjuncts of schools of this type.

The Cambridge Manual Training School for boys was founded by Mr. Frederick H. Rindge. The shops and drawing rooms are in a building by themselves, connected by a covered way with the building assigned to the academic course.

TOLEDO HIGH AND MANUAL TRAINING SCHOOL, TOLEDO, OHIO.

In this latter building are the schoolrooms, physical laboratory, assembly hall, fire drill hall, and gymnasium.

The following description of the building for manual training is quoted from the report of the Cambridge High for 1892, written by Dr. Parmenter, now master of the Boston Mechanic Arts High School.

THE WOOD-WORKING ROOM.

In this room there are two departments, one being for general carpentry, and one for turning and pattern-making. On the east side are eight wood-worker's benches, 34 ins. high, with a top 66 by 43 ins. A vertical board, 5 ins. high, divides the top of each bench into two equal parts, thus making it possible for two pupils to work at the same bench, one on each side, without danger of interference. Below the top of the table, at the right of the worker, are three drawers, 23 by 5½ ins., with a depth of 26 ins., each fitted with a lock. Each pupil has one of these drawers in which to keep the individual tools supplied to him, and his unfinished work. The remaining space below the top of the table is converted into a closet designed to hold most of the implements used in common by the members of different divisions.

The saws are kept in a special case provided for them in the front end of the room. They are numbered to correspond with the benches, and each pupil is charged with those which he receives and is held responsible for their return, in good condition, to their proper place, at the end of each working period. Between two of the windows is a case for storing the "blue prints" from which the pupils work. This case is 4 ft. 6 ins. high, 2 ft. wide, and 12 ins. deep, and is conveniently divided into pigeon holes for fifteen sets of "blue prints." Near the benches are several stationary glue-pots heated by steam and always ready for use. Conveniently located for preparing materials for the work of pupils is a double arbor bench saw, capable

of being quickly adjusted for either cross-cutting or splitting, and furnished with the most approved devices for facilitating work.

Running the entire length of the west side of the room, in front of the windows, is a bench supplied with pattern-maker's tools, and adapted to be used by divisions of twelve pupils. Attached to this bench, separated by convenient distances, are twelve Fitchburg quick-action vises, with 9 in. jaws, and near each vise is a set of three drawers, one of which is assigned to each pupil for his individual tools and unfinished work. By the side of the drawers, in each section, is a locker designed to contain the tools which are used in common by members of different divisions.

CAMBRIDGE MANUAL TRAINING SCHOOL, CAMBRIDGE, MASS.

In front of this bench, at a convenient distance from it, is a row of twelve pattern-maker's lathes, each having a 6 ft. bed, and capable of doing work 12 ins. in diameter. Two lathes are placed side by side, 2 ft. apart, their bed pieces being connected by a case carrying two drawers, each fitted with a lock, and designed to hold the tools used in wood turning.

At one end of this row of lathes is a large pattern-maker's lathe, having an 8 ft. bed and being capable of doing work 20 ins. in diameter. This lathe is fitted with the most approved devices for doing all kinds of work, and is designed to be used only by the instructor and by pupils who develop special skill and demonstrate their ability to do a high order of work. By its side are two iron speed lathes, 9 in. swing, 42 in. bed, constructed in the machine shop by the members of the class of '91. Near at hand are a band saw, 26 in. wheel, fitted with an adjustable iron table and a scroll saw, both of the most approved pattern. A tool closet, located in the center of this room, is supplied with a great variety of tools adapted to every possible need of a wood-working establishment. The lumber loft is easily reached by a flight of stairs leading to the top of this closet.

THE IRON-WORKING ROOM.

This room, like the wood-working room, is fitted for two distinct kinds of work. The appliances upon the west side are adapted to general iron fitting,— chipping, filing, drilling, scraping, etc.; while those on the east side are for use in machine-shop work. Upon the west side are located four benches 3 ft. high, and having a top 9 ft. by 3 ft. 8 ins. A vertical wire screen, 24 ins. high, divides the top of each table in the center and serves to protect pupils on opposite sides from the chips which fly from each other's work. Each side of these benches is furnished with two vises and two sets of four drawers, the upper drawer of each set being used in common by the pupils of different divisions. One of the three other drawers is assigned to each pupil for his individual tools and work. At the beginning of a lesson each pupil obtains from the tool room a tray which fits the upper drawer of each set, and which contains all the tools used by the pupil except the hammer.

In addition to the benches described above, there is a side bench furnished with a large number of tools needed for special work. Four small speed lathes are also used in this department for drilling, hand-turning, and polishing.

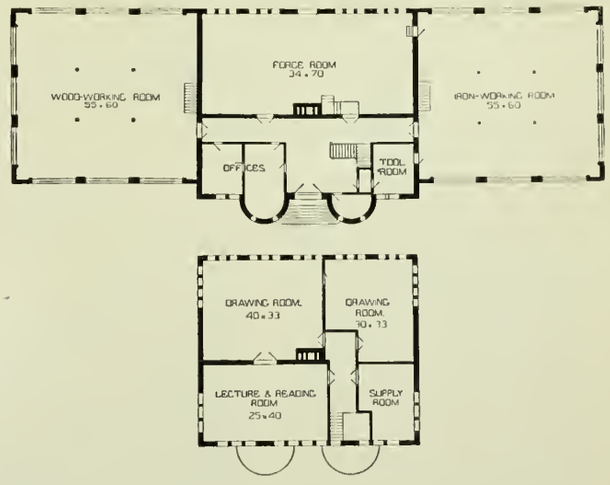
On the opposite side of the room are the equipments of the machine-shop department, consisting of engine lathes, four 16 in., one 15 in., seven 14 in., and one 11 in.; one Brainard, No. 3, milling machine, with attachments; one cutter-grinder; a 24 in. planer; a 15 in. shaper; a 24 in. upright drill; a sensitive drill; a 36 in. grindstone, and an emery grinder. The entire side of the room is occupied by a long bench like that found in the pattern-making department, fitted with twelve machinist's vises and as many sets of drawers in which are kept the tools.

The tool room is furnished with drills, reamers, arbors, taps, lathe dogs, and tools of every variety in sufficient number to supply each boy with whatever he needs to complete a given job. The common cutting tools used by each pupil are those which he forged the year before. Each boy is given ten checks, bearing his school number, which may be exchanged at the tool room for the articles needed; the check takes the place of the tool loaned until it is returned in good condition. A small cupboard, attached under each lathe, contains wrenches, change-gears, and other lathe accessories. Similar arrangements are made for the accessories of other machines

The engine which drives all of the machinery is situated in the iron-working room, and is under the charge of a competent engineer, who gives a course of instruction concerning the construction and care of engines and boilers.

THE FORGE ROOM.

The room is furnished with fifteen Sturtevant portable forges, each connected by proper pipes with a blower, and with an exhaust fan which prevents the poisoning of the air by coal gas, and secures perfect ventilation. Near each forge is an anvil weighing 125 lbs.;



FLOOR PLANS, CAMBRIDGE MANUAL TRAINING SCHOOL.

and a tool bench, 25 ins. high, with a top 21 by 16 ins., surrounded by a rim 2 ins. high, to prevent tools from slipping off. Each bench is furnished with three drawers, which occupy the entire space below the top. A standard 3 ft. high, attached to the back of the bench, supports the "blue prints" from which the pupils work.

Six wooden pillars are fastened securely into the masonry of the floor, in convenient locations, to each of which is attached a wrought-iron blacksmith's vise having 4½ in. jaws. Numerous other tools, needed for special kinds of work, are to be found in different parts of the room. Nothing is wanting which is likely to be needed by a blacksmith. The boilers which generate steam for

the engine and for heating the building are located in this room. These boilers also furnish steam for heating the new building for the academic department, and for driving the ventilating fan which supplies its rooms with fresh air. They are supplied with a feed-water heater, feed pump, injector, damper regulator, and all accessories of practical utility.

THE DRAWING ROOMS.

These large, well-lighted rooms, situated upon the second floor, contain thirty double tables, 36 ins. high, with a top 24 by 76 ins. Each table has two large drawers, designed to hold the drawing materials which are used in common by the pupils of different divisions.

The teacher's platform, measuring 6 by 10 ft., is elevated 3 ft. above the floor, thus making it possible for the most distant pupils to obtain an unobstructed view of the objects placed upon the teacher's table, and of the illustrations upon the blackboards, the lower edges of which are 3 ft. above the platform. These blackboards, three in number, are placed one directly in front of another, each being counterbalanced by weights, like an ordinary window sash, so that it can be dropped down out of sight.

In the rear of the room are cases of small drawers, one of which is assigned to each pupil for his drawings and individual drawing material. Near at hand is the apparatus used in making "blue prints," including a most convenient and efficient device for holding the prints while they are exposed to the sunlight.

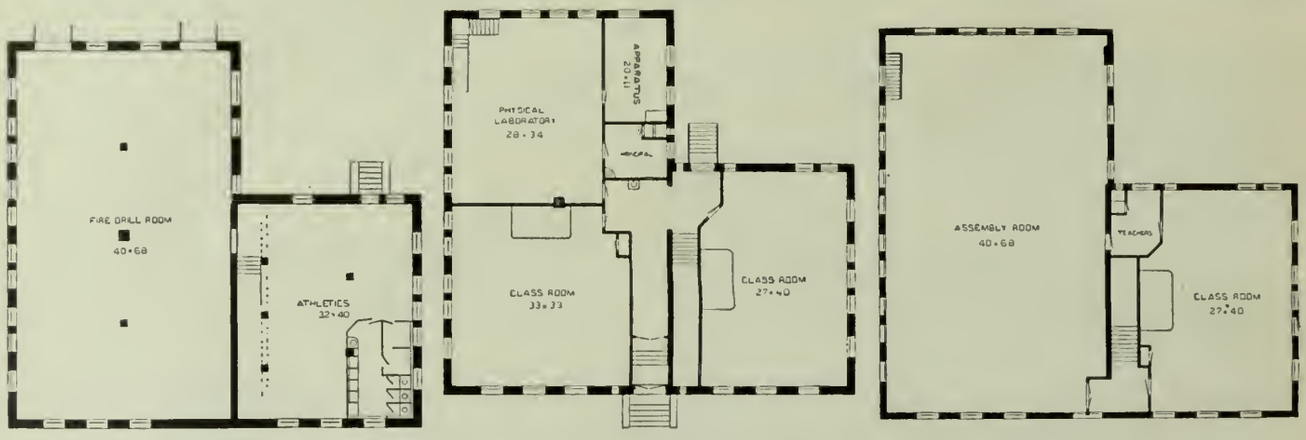
All the appointments of this room, like those of each of the other rooms, are first class in every particular, and the work of the pupils shows that they appreciate their advantages.

Adjoining the drawing rooms are a reading room and a supply room.

THE BASEMENT.

With the exception of the space required for the janitor's room, the central portion of the basement and the entire southern wing are devoted to toilet rooms, wash rooms, and two hundred and seventy-five large lockers for the accommodation of the pupils' clothing. These lockers are grouped about large sinks supplied with hot and cold water. Leading from one of the wash rooms is a well-appointed shower bath. These rooms are kept in perfect order, and are under the constant supervision of an efficient janitor. Every needed convenience has been provided, and no pupil is permitted to form slovenly personal habits. Each pupil must provide himself with a hair brush, comb, shoe brush, whisk broom, two towels, wash basin, and soap dish.

In the northern wing is a large kitchen, furnished with a hotel range and the best modern appliances. Adjoining the kitchen is a small dining room in which dinners are served, at cost, to the instructors and such pupils as desire them. The remaining space in this wing is devoted to a supply room, and to a large dining room in which pupils eat the lunches which they bring to school.



BASEMENT. FIRST FLOOR. SECOND FLOOR.

FLOOR PLANS OF BUILDING FOR ACADEMIC DEPARTMENT, ERECTED IN 1893, CAMBRIDGE MANUAL TRAINING SCHOOL.

RULINGS ON QUESTIONS CONCERNING REAL ESTATE UNDER THE WAR REVENUE LAW.

A SERIES of hypothetical questions were submitted to the internal revenue officials at Washington yesterday by the *Herald's* staff in that city, and, with the answers, are reproduced below, in the hope that they will make plain some matters hitherto undecided: —

Question: Must the actual consideration be stated in a deed, or will it suffice to say "$1.00" and stamp to cover the actual consideration? *Answer:* The actual value need not be stated, but stamps must be affixed for the full value.

Question: If a piece of real estate, worth $10,000 and sold on that basis, is sold for $5,000 cash and a mortgage of $5,000, must the deed be stamped to cover the $10,000 or the equity, $5,000? *Answer:* Stamp must be for the entire value.

Question: If there is already a mortgage of $5,000 on a parcel worth $10,000, must the deed be stamped to cover $10,000 or the price paid in cash? *Answer:* Stamps must be affixed for $10,000.

Question: Under the law, both promissory notes and mortgages must be stamped. Must the note accompanying a mortgage be stamped as well as the mortgage? *Answer:* Both must be stamped.

Question: It is customary to allow mortgage notes to run after they are due without renewal. Would such a note, properly stamped when issued, be good beyond the original time if not re-stamped? *Answer:* Where there is no renewal the original stamp is sufficient.

Question: Mortgage brokers are held to be subject to the $50 broker's tax. If a broker (real estate) sells a piece of real estate for $10,000, of which $5,000 is cash and $5,000 on a mortgage given by the purchaser to the vendor, does he become a "mortgage broker"? *Answer:* No.

Question: If a broker sells a parcel of realty on which there is already a mortgage, which the buyer assumes, does he, by such business, become a "mortgage broker"? *Answer:* No; if he confines himself to purely real-estate transactions.

Question: Can a man, not a broker by trade, receive any part of a commission for a transaction in which a mortgage figures without becoming a "mortgage broker"? *Answer:* No: not in a single instance. —*Boston Herald.*

Architecture of Apartment Buildings.

II.

BY IRVING K. POND.

BEFORE going too deeply into the arrangement and disposal of the single rooms of an individual apartment, the architect should give great consideration to the problem of the public halls and corridors. The man who is ordained by fate, beneficent or otherwise, to dwell in an apartment must be made to feel, and in the true sense, that his apartment is his castle, just as the householder is made to feel that his house is his safe retreat. It is the rule of the best designers of houses in blocks never to place in close proximity the main entrance doors of two adjacent houses, but to make each main entrance a separate and distinct feature. This rule exists in response to a very natural and proper demand on the part of refined and sensitive householders to have their homes in outward expression, as in absolute fact, places of refuge and retirement. The dweller in an apartment has the same rights as has the householder, and it is the duty of the architect to respect these rights; to go further, even, and inspire this feeling for privacy, and foster into an abundant growth what might not flourish otherwise. It is the rule of the best designers to allow, where possible, but one, and never more than two apartments to open from the public hall in any one story. And rather should a designer work to apply this rule simply than by misplaced ingenuity seek to corral a number of families on one stage, and herd them about one stairway or elevator well. There is a loss of self-respect to all concerned when this rule is not applied, and most especially so when the freight elevator is allowed to open off this same public hall; for then the public hall to which only the members of families and their friends, and these in street dress at least, should be permitted, becomes the runway of the butcher, the baker, the grocer, and the servants in the garments of the kitchen and the scullery, and where is self respect! The suggestion of privacy and isolation should begin at the street door, and still be in evidence at the thither wall of the rear chamber. Trial upon trial has been made by designers of recognized ingenuity to get the service across public corridors without bringing it into sight, but never has the success been startling. One expedient was to cross the public corridor in a sort of mezzanine story, but this required rather more of a height to the stories than is desirable in any but the most sumptuous apartment buildings, and there the question never should arise. This point cannot be too strongly insisted upon, that all service connected with individual apartments should be religiously excluded from the public corridors.

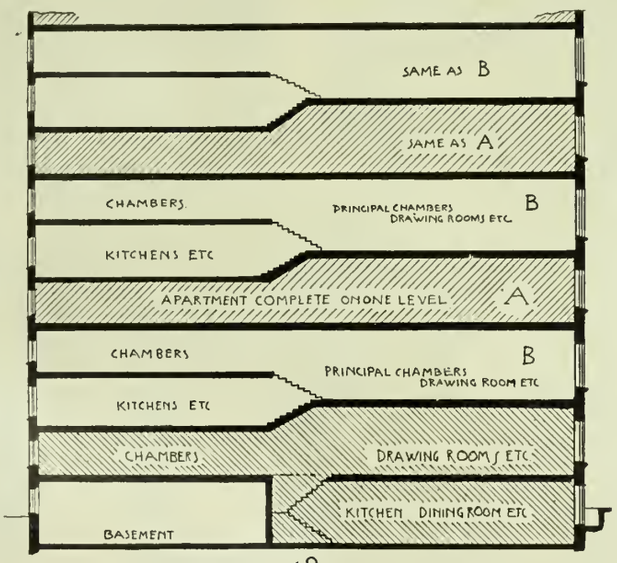


FIGURE 13

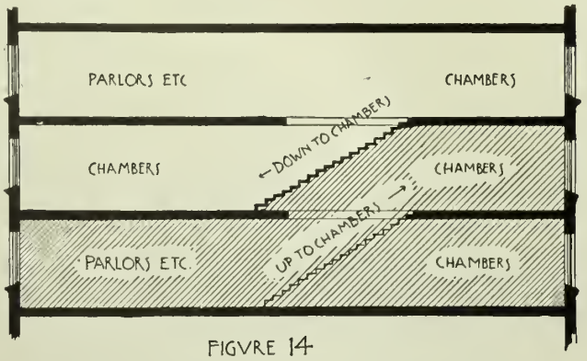


FIGURE 14

The position of living room, dining-room, kitchen, and chambers in relation to each other, and to give the best effect of homelikeness, desired privacy, and the highest economy of service, has been discussed, but something should be added as to the special position or situation of each of these, and of other rooms necessary to a complete apartment.

The living room and library should, of course, be given the sunniest and most pleasing prospect compatible with the location of the building.

As to the dining-room, while it is desirable in common with all rooms that direct sunlight should penetrate it at least during some period of the day, it is not necessary that this room should be as sunny, even, as the chambers. The most pleasant and homelike of the many repasts are those partaken of under the soft glow of the lamps, and social gatherings at the board, almost without exception, are under artificial light, when the sparkle of the eyes, the soft tints of the complexions, the bright colors of the garments, and the deep shadows against which all is set, add charm to the picture and zest to the appetite and to the conversation. The dining-room may give upon a court, but if so the windows must be so arranged as to exclude unpleasant sights and noises; but it seems unnecessary to give to the dining-room a position of prominence equal to that of the parlor or living room, as is generally the case in the French apartment.

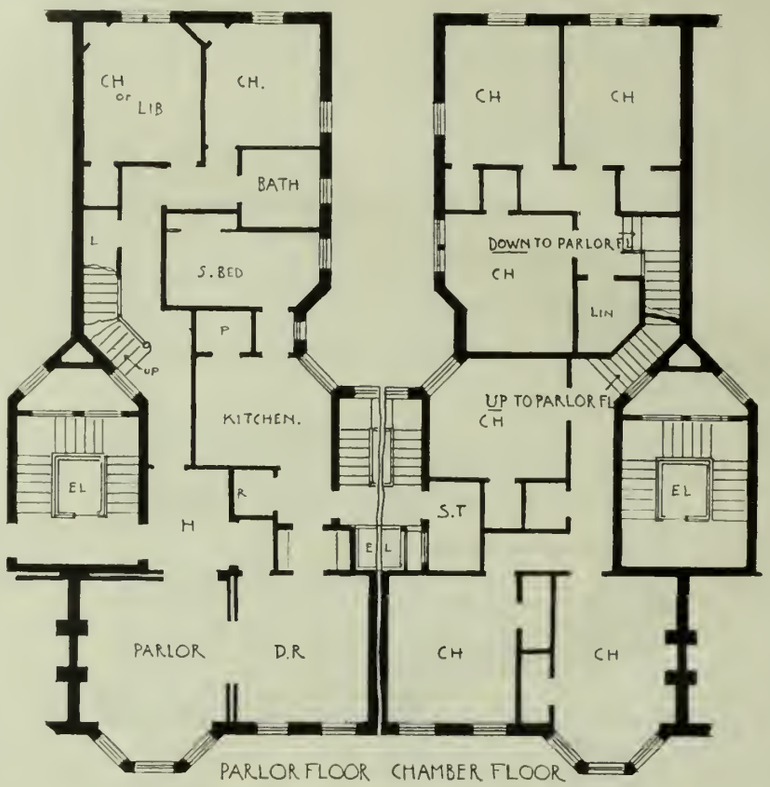
The kitchen should have a sunny aspect, and should be on the open air or on a well-ventilated court; and in either case the windows should be arranged so that the work going on within shall not be in evidence from chambers or other principal rooms on the same court. All well-planned apartments will have the ice chest in close proximity to the kitchen, but not so near as to get the kitchen heat. These refrigerators are attached to the building, and in many instances the chill is supplied from the ice machines in the basement, as the hot water is supplied to kitchen and toilet rooms and to plumbing fixtures in other rooms from the general hot water plant. Today no tenant would consider the kitchen complete without its gas or electric range, while for many years now, especially in medium-sized apartments, a laundry tub has been placed under the drip board of the sink making possible the laundrying of light articles at any desired time and without recourse to the main laundry.

That the chambers should be as sunny as is possible to plan for goes without saying, for no room can be considered perfectly wholesome and desirable as a sleeping apartment into which the sun does not at some time during the day freely penetrate. A general laundry with three tubs and a dryer should be provided for each three apartments at most, thus giving to each apartment the use of the laundry two days in each week.

The fuel gas for the laundry stoves and dryers goes through individual meters, each controlled from the kitchen of its respective apartment, so that the careful mistress of the apartment may see, by going to the kitchen, that the gas for which she is accountable is shut off when the laundry is not in use or when it is in use by other parties. This arrangement saves continual trips to the basement or the attic, in one of which localities the laundry is placed, when it is

not an individual establishment connected directly with the working portions of the apartment.

This last arrangement of course exists only in the most expensive and elaborately planned apartments. As to whether the laundries should be in basement or attic depends somewhat on other details of the plan. If air in free circulation abounds about a well-ventilated basement the laundries may well be placed there. If, however, the laundries open for ventilation on a narrow, deep court, on which chambers and principal rooms depend, then odors must come in course of time to be not a trifle obnoxious, and the laundries themselves become unwholesome. If the roof of the building is made a place of resort in hot weather as is attempted now, more or less frequently, then the attic is no place for laundries or odor-breeding compartments.

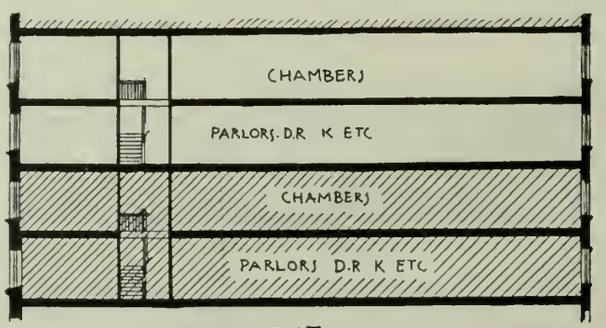


FIGVRE 15 FIGVRE 16

A servants' toilet room containing bath-tub, basin, and closet is the necessary adjunct of every well-planned apartment of more than medium cost. In the more moderate buildings these toilet rooms may be placed in the basement, or, better, off the stair landings of the servants' stairs and should be under the daily inspection of the janitor. From four apartments at most in which a single servant is employed, or from two apartments in which there are two servants, should one of these toilet rooms be accessible. Each and every apartment should have a good-sized storage room in the dry basement, and the walls of these rooms should be of tile or of solid plaster to prevent the spread of fire or vermin. Other and sufficient storage space should be provided in the apartment in the form of closets, cupboards, pantries, etc. The criticism never has been brought against an apartment that closets were too great in number or too ample in amount of storage space provided.

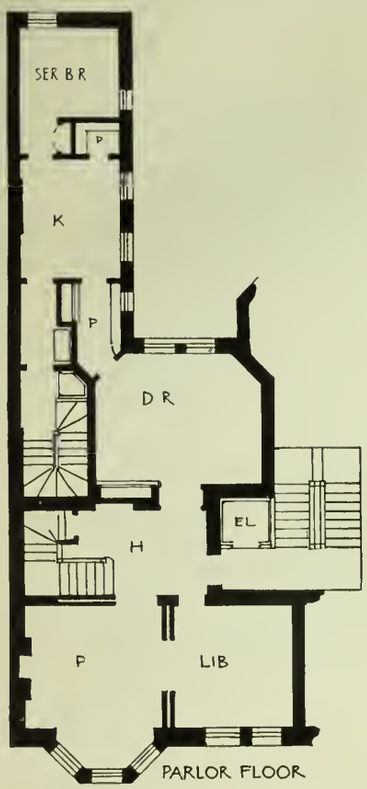
Probably the stable room which was wont to exist at the rear of the court of every French apartment building is transformed nowadays into a bicycle storage room. Sure it is that no apartment building in this country is complete without a conveniently located, easily accessible, and well-equipped room for the bicycles, which are as crying a need in the modern household as were babies in the olden.

The servant's bedroom has always been a matter for serious consideration. The most convenient place in most cases is near the kitchen, and in most plans opens directly into that room. It is better that an air lock should intervene, for kitchen odors, etc., are no more acceptable in a servant's bedroom than in a front chamber. At any rate, the servant's bedroom should be ample and so situated as to be easily and readily ventilated. The advisability of placing the servants from all the apartments in a building in a group by themselves is not yet determined. In France the *concierge* and his generally not numerous family occupy a small apartment at the street level, beside the carriage entrance to the court or near the main entrance door. The servants in many instances are quartered in the *entre sol*, a low story over the shops, which may occur along the street front, or over the stables which generally occupy the lower story at the rear of the court, or they are assigned to rooms in the attic story. As yet this method has not met high favor in this country, but it may have to be adopted as apartments become more luxurious and proportionately greater and higher class service is demanded. Undoubtedly, the necessity for more space than could be gained advantageously on one floor is responsible for the grouping of servants' quarters in a portion of the building remote from the apartments, as it is responsible for the grouping of laundries and storerooms in the basements or in the attics of our American apartment buildings. This same necessity gives rise to a scheme which has been put into practise, not altogether unsuccessfully in some instances, of giving considerably reduced height to the story in the portions containing the unimportant chambers and the kitchen arrangement, and thus getting an increased number of stories in that portion of the building as is indicated in section in Fig. 13. The difficulty with this scheme in general is that it requires a wasteful height of story in the main portion to get a respectable story or mezzanine in the rear, or it is apt to lead to an undesirable complication in plan and an awkward change of levels in corridors through which there is much service. A scheme which possibly is an improvement on this last, and which is especially adaptable to high buildings on shallow lots, is that of using a story and a half to each apartment, as is indicated in section in Fig. 14, and in plan in Figs. 15 and 16. The general advantage and the simplicity of the scheme are apparent with a little study of these figures. The chambers are entirely isolated, and all the rear chambers are quiet, being in a "stack" of chambers. The front chambers, to which one descends from the

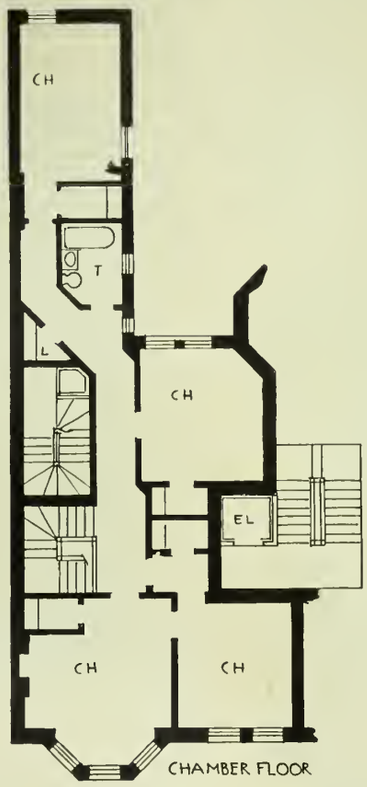


FIGVRE 17

main floor of the apartment to which they belong, are under the living rooms with which they communicate, and hence may be kept quiet, as the noises which disturb in an apartment building are those which emanate from the story above.



FIGVRE 18



FIGVRE 19

The final and full development of the idea of using more than one floor for the accommodation of the rooms of one apartment is seen in section in Fig. 17, and in plan in Figs. 18 and 19, which show the living and chamber floors, respectively. The idea consists in using two entire floors for the same apartment, gaining all the advantages of the two-storied single house, and combining them with the general economy of service and the freedom from responsibility which are the main points afforded by an apartment.

It would seem that arguments in favor of the two-story scheme for apartments should be unnecessary where it can be applied economically to a particular location; but arguments have been made at times and have failed to convince. However, certain owners have recognized the advantages, and the general scheme has been employed. The especial plan presented in Figs. 18 and 19 has been used greatly to the advantage of itself and its neighbor in a scheme on a double narrow lot, as is indicated in Fig. 20. Here every important room in the building, including the janitor's quarters in the basement, gets sunlight, and all rooms, bathroom included, are on the free air of the street or of an ample open court. The combination of types gives prospective tenants a choice, and so gives added value to the property.

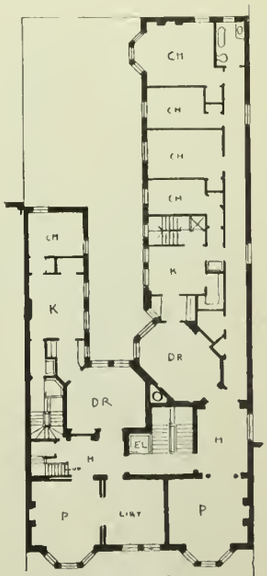
One structural matter now comes to the fore. It is an important matter which has not been overlooked, but which has been removed from its natural context so as the more to bring it in evidence, and it concerns the stairs and elevators. The stair shafts and the elevator wells of any apartment building, of no matter how few stories in height, should be of absolutely incombustible material; this applies to the servants' stairs as well as to the main stairway. This much may be realized in otherwise combustible buildings with little added expense, and the architect should insist on at least this much. But, better yet, each and every municipality should take the matter in hand and insist that every apartment building of over two stories in height erected within its borders should be of fire-proof — not merely "fire-proofed" — construction. The cost should not stand in the way; for even in this day of cheap wooden posts and studs the fire-proof apartment building will not cost more than from 10 to 15 per cent. in excess of the cost of the tinder-box construction. This should not be allowed to weigh against the value of life and neighboring property.

A matter of convenience which should be taken well into account is that of bells and calls from the living rooms and the chamber quarter to the kitchen or servants' quarter, wherever they may be placed, and from some readily accessible point in each apartment to the janitor's quarters. The development of the apartment beyond the bounds of the tenement or the mere "flat" renders necessary all the refinements of convenience which are to be found in every well-appointed house.

So far in this review of the development of the apartment building only more modest types have been presented, and of these only sufficient to illustrate the principles which underlie the planning of apartments generally. Nor does it seem necessary to present more elaborate examples, for the principles are the same, and once understood can be applied to any scheme, however modest or however elaborate. The difference is in degree and not in kind.

The apartment house problem is worthy of the mettle of the most talented architect, on the side both of reasonable and æsthetic planning, and of artistic handling of interiors and exteriors. The problem is more complicated than that presented in the design either of an office building or of a mansion, and comprehends the structural and economic questions involved in the one and the æsthetic possibilities inherent in the other.

The designer of the apartment building holds it in his power to make multitudes see the beauty of simple direct solutions of economic problems of every-day living, based on a sympathetic comprehension of what a refined home life may be, and also he holds the power to bring home to a great number of people by forcing a direct contact, an appreciation of the value of æsthetic surroundings in helping them to realize the ideal of living. This can be done, if by an architect, only by one who has added a mastery of the principles of planning and design to a deep appreciation of what is the real essence of a refined, contained, and sincere home life.



FIGVRE 20

THE Illinois Board of Examiners of Architects, after an examination, at the University of Illinois, at Urbana, have issued certificates to the following competitors, out of a class of eleven: William C. Swern, Chicago; Walter F. Shattuck, Chicago; Bernhard L. Hulsebus, Peoria; Albert C. Phelps, Joliet; Theodore W. Pietsch, Chicago; and William H. Schroeder, Chicago. This list is given in the order of merit marks.

COOPERATION BETWEEN ARCHITECT, ENGINEER, AND TERRA-COTTA MAKER.

BY THOMAS CUSACK.

THE CONSTRUCTION OF BALCONIES.

THE fundamental principles of composite construction as applied to balconies and other projecting members were reviewed at some length in connection with Figs. 52 to 56. Further examples are now given, in one of which (Fig. 57) a balcony of the conventional type is carried on its own brackets, supplemented by a very small amount of iron (or steel), and it of the simplest kind. The 4 by 4 in. cantilevers, for which provision is made in the joints, connect with a 5 in. I beam built into wall longitudinally. From this they have a purchase equal to the thickness of the wall, which, in the present instance, is 2 ft., the blocks themselves acting in conjunction with the wall as a fulcrum. These blocks, as in those of Fig. 55, are molded open on the top bed, and when adjusted to line on a temporary staging the chambers are filled with concrete. The whole platform is then floated off to required grade with about 1½ ins. of granolithic troweled to a smooth surface.

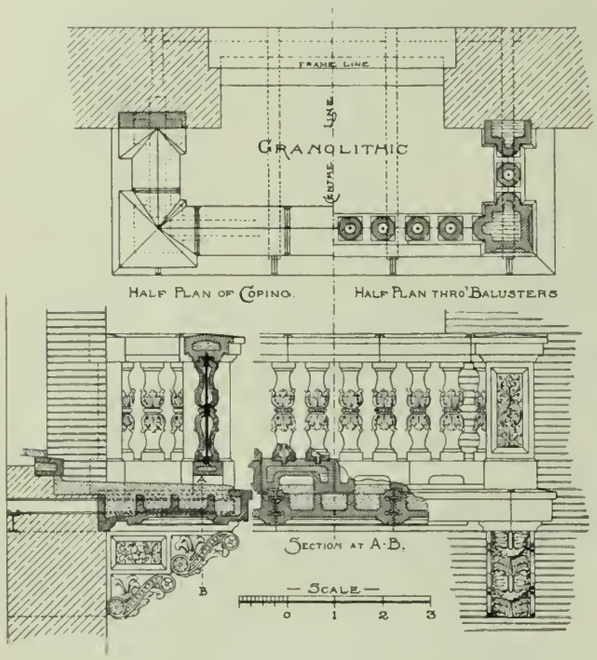


FIG. 57.

A platform constructed on these lines would be self-supporting under any weight likely to be placed upon it; even though the two brackets were taken away altogether it would stand in the case of a wall of that thickness. With them, however, 12,000 lbs. equally distributed would be considered a safe load for a balcony of the same general dimensions. The introduction of a steel triangle, such as is shown in Fig. 53, would be not merely superfluous, its presence would be decidedly injurious, in brackets of this character. Yet, we doubt whether the average engineer could deny himself the gratification of constructing one; two L's and a gusset plate having an almost irresistible charm for the modern man of iron. Facts, figures, and exact inferences are said to be his forte, but he has his weak points, nevertheless. One of these is his apparent inability to differentiate between a technical use of iron *per se*, and the modifications necessary when it is used as an auxiliary support in connection with a material of wholly different characteristics. With him, the exigencies of steel receive more than their due share of attention, while those of the terra-cotta remain a secondary consideration. Rightly understood, the two materials are coordinate in the order of their importance, and must be considered inter-dependent.

A terra-cotta bracket, such as that now before us, would be made with one horizontal partition, dividing the interior into two longitudinal chambers. By merely filling these chambers with good concrete, its strength would be materially increased. But, if a piece of I or T section is inserted (as at Fig. 54) and the concrete then rammed in so as to produce mechanical contact, the resulting bracket could be made stronger than the capacity of the wall from which it projected. We do not, of course, suggest that such additional strength is at all necessary in the one under notice, and for that reason nothing of the kind has been indicated in the drawing, but in many cases this will be found a simple expedient, and one which can be conveniently and effectively applied.

The tensile (or tortional) strength of a well-made terra-cotta bracket is much greater than is generally supposed. This statement will appear more explicit if taken in connection with a few of the many tests on which it is based. A cornice modillion made by the Northwestern Terra-cotta Company was tested in the manner shown at Fig. 58. Measured at the wall line it is 11½ ins. high, 8 ins. wide on face, with a projection of 2 ft. It carried a weight of more than 2 tons; but what the breaking strain would have been remains an unknown quantity, there being no more castings at hand wherewith to increase the load.

A much smaller modillion made under other conditions, by different men, from clay mined one thousand miles distant, was similarly tested at the works of the New York Architectural Terra-Cotta Company. It is but 5½ ins. high, 6 ins. wide at wall line, and has a projection of 14 ins. Allowing the same thickness of shell, this would be about half the sectional area, but with more than half the projection of Fig. 58. It was loaded in the manner shown at A, Fig. 59, until it broke at wall line under a weight of 2650 lbs. Another bracket pressed from the same mold was afterwards inserted where this one had been, and loaded to the extent of 2,400 lbs., which weight it has sustained for more than a month. It is still intact at date of writing.

The former of these modillions was slipped a cream white on a buff body, and is now used in the cornice of a building in Buffalo.

FIG. 58.

The latter was pressed from a clay which, when burned, is an excellent match for Indiana limestone. It was an over, left from a number used on the Delmonico Building, Fifth Avenue and 44th

Street, New York. No concrete filling or extraneous support of any kind was resorted to; the intention being to obtain the breaking strain of the bracket itself exactly as it came from the kiln.

A slightly larger bracket made of different clay was built into wall and loaded with pig iron, as shown at B, Fig. 59. It carried a

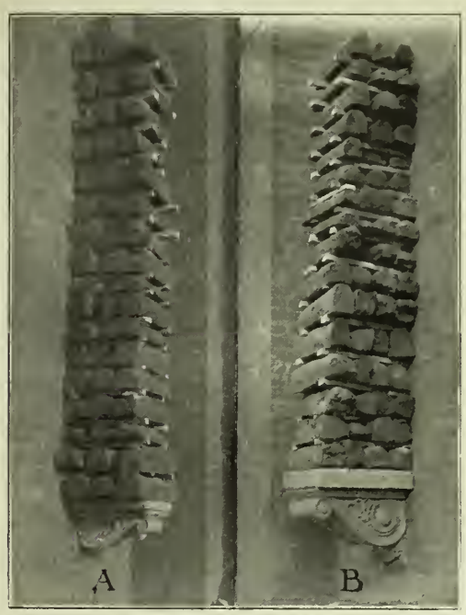


FIG. 59.

weight of 3,200 lbs., but its ultimate capacity could not be reached without endangering the wall from which it projected. This bracket was an over from the main cornice of the Citizens' Bank, Norfolk, Va., made from a clay mixture that burns to a light shade of red. Consols used under balconies being, invariably, much deeper, with at least three times the sectional area of these examples, could not be tested to their full capacity in the absence of special appliances. These comparatively slender cornice modillions were therefore chosen for the greater convenience of loading. The data obtained can, of course, be used as a basis on which extended calculations may be made. Other tests are contemplated and, if made, the findings will be communicated without reserve; but these, we think, are sufficiently conclusive, so far as the safe support of balconies is concerned. Meanwhile, the foregoing results, together with legitimate inferences to be drawn from them, are placed at the disposal of architects and engineers, for whose information these tests have been made.

It will be noticed that the balconies with which we have just been dealing are in connection with comparatively thick walls, a favorable condition of which full advantage has been taken. Archimedes was quite safe in his offer to lift the world on a lever, if anybody would but find him a place whereon to rest it. In like manner, we stand prepared to construct a terra-cotta platform, the carrying capacity of which shall be limited only by the thickness and weight of the wall from which it is projected. This proposal is less extravagant, but more capable of practical fulfilment, for, as will be observed, there is no *if* in it. Thick walls, however, are the exception in these days, and so we are forced to devise some way of dealing with walls in which steel columns and girders come within 4 or 8 ins. of the face.

An example of this kind is shown at Fig. 60, which, taken in connection with the engineer's skeleton (Fig. 61), will serve as a typical illustration of the class to which it belongs. Here the main columns of a fifteen-story building would not allow the consols to bond into wall more than 4 ins., an unfortunate, but it would seem unavoidable circumstance. Had this not been so, they would have entered the wall at least 16 ins. When properly anchored in that position there would then have been no excuse for the otherwise inevitable steel triangle. Even as it is, we think that this triangle might have been dispensed with, arrangements being made whereby the consol would have been bolted directly to the face of column. The gusset plate, at all events, could have been omitted. The diagonal strut would then have passed through a slot in the consol, connection being made with the longitudinal I beam before setting the egg and dart course between it and the top bed of consol. Considering the enormous tensile strength of the slender modillions under an eccentric load, as demonstrated in Figs. 58 and 59, some idea may be formed as to the capacity of consols in which the conditions are reversed, and that on the side of increased strength. With little projection in proportion to its height the strain is changed from tortion to one of compression, 5 tons being a safe load for each consol.

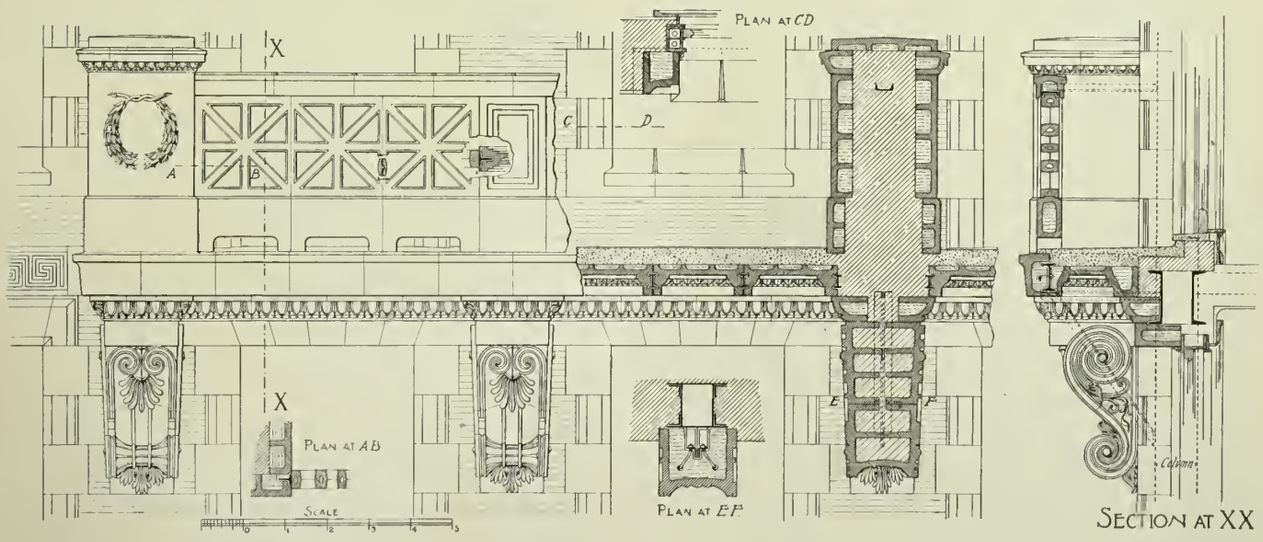


FIG. 60.

This, we contend, would have justified the omission of the steel triangle altogether, allowing the platform to rest on the seven terra-cotta consols, which were spaced on rather less than 9 ft. centers.

As it is, these consols had to be slotted out from the back and when finally placed in position, the cavities on each side of gusset plate filled with cement. In this way they are, of course, rendered quite secure, but they would have been equally so, and in themselves much stronger, had the steel triangle been omitted, and the terra-cotta consol allowed to remain intact. Indeed, the undoubted strength of the steel triangle was very largely neutralized by the weakness imposed on the terra-cotta consol. In work of this kind the use of steel is permissible only in so far as it is absolutely necessary, and then in such way as will not make a sacrifice of the material it had been intended to supplement. Otherwise, we are merely adding strength with one hand and taking it away with the other.

The steel framing for a balustrade of this kind should be fitted together temporarily and have some of the connections made with bolts instead of rivets. This would admit of its being taken apart at will, and reassembled simultaneously with the terra-cotta, in such order of precedence as may be found most convenient at the time of setting. If the iron contractor allows his energies to get concentrated too closely on the completion of his own work, he is liable to forget that clay loses its plasticity once it has been burned. He should remember that though the most ductile of materials in its natural state, it becomes one of the most refractory when made into terra-cotta. Iron or steel, on the other hand, can be framed, forged, or welded to the required shape; and secured by either bolts or rivets, with almost equal facility. Other things *being equal*, the readiest and most economical method must always commend itself. But when a contracting engineer takes a short-sighted view of his own immediate interests he is very likely to lose sight of that qualifying condition. In such cases the terra-cotta manufacturer may have good cause to remind him of the frog's admonition to the boys, "What is play to you is death to us." It would, of course, be highly advantageous to all parties, if, in addition to its many good qualities, the clay could be molded around an unnecessary or, perhaps, prematurely fastened network of iron and then fired *in situ*. Until that can be done we would advise the next best thing: consultation and cooperation between the representatives of the iron and the terra-cotta contractors, the architect's decision being accepted on all sides as final.

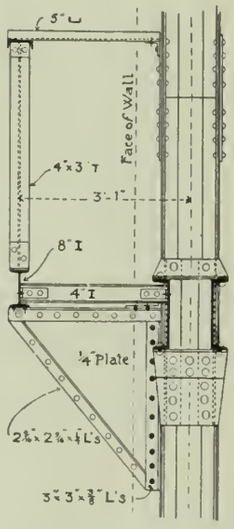


FIG. 61.

We have recommended the use of another material to which some of the preceding remarks do not apply; *viz*, cement concrete. Full advantage has been taken of its setting and adhesive properties in the construction of this and similar platforms. Let the open chambers be tamped full, the rough edges of the partitions taking hold of the matrix, and we have a monolith of great strength and durability. This work, with its surface of granolithic, should be done, preferably, by men well accustomed to the handling of cement. The problems of the age in which we live are in the hands of specialists; even the more scientific use of cement has grown into a separate industry. Those engaged in it are more likely to have men of experience, the right kind of material, and — which is equally important — improved mixing machines at their disposal. A combination of these is, in itself, a sufficient guarantee against surface cracking; the result of either poor material or poor workmanship — two things that seem to have a curious affinity for each other.

Fire-proofing.

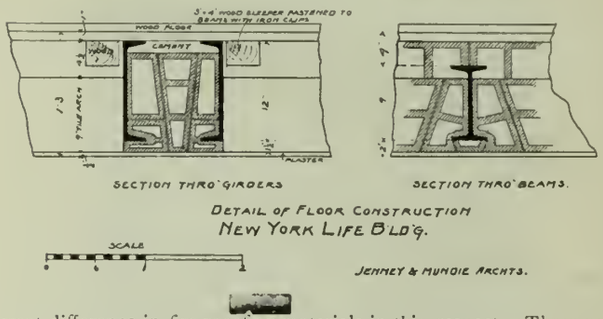
FIRE-PROOFING WITH BURNED CLAY.

BY W. L. B. JENNEY.

THE fundamental question is — What constitutes a good fire-proofing? First, it must protect the steel from becoming injuriously heated.

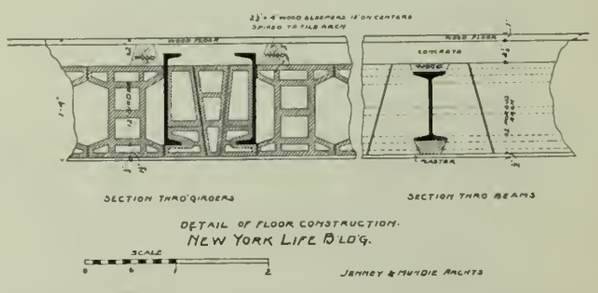
Second. It must be capable of resisting serious injury, both by the fire and by the fire department at the same time. There is a great difference in fire-proofing materials in this respect. There are some burnt clays that will readily stand the high temperature of the fire, and if allowed to cool slowly would sustain little or no injury, but will, if subjected to the dash and force of cold water while at a high temperature, suddenly contract and crack and be washed off. For example, in the Pittsburgh fire of May, 1897, the lower web of the floor arches scaled off, and many columns, and the lower flanges of beams, were partially stripped of their fire-proofing. The Board of Experts employed to examine the injuries to the building attributed the injury to the fire-proofing to other causes, such as movement of the building, with which I do not agree.

Fig 1.



The writer had occasion to examine the injury to the side of the Schiller Theater after the burning of the adjoining building on the east. A part of the side wall exposed to the heat of the fire and to the water thrown by the fire department was of pressed brick — other parts of hollow fire-proof building tile. They were both affected alike. The outer 1 in. in thickness of the pressed brick and the outer web of the hollow tile scaled off and disappeared. Similar conditions obtained at the fire in the Athletic Club, Chicago.

Fig 2.



The lessons taught by these fires are: —

First. The material must be such that it will successfully withstand at same time heat and water. There is plenty of such material. For example, the linings of coke ovens. When all aglow water is poured into the furnace from a 5 in. pipe without material injury to the lining. What is known as porous terra-cotta usually stands well if the clay is good. It is manufactured by adding six parts of

sawdust to four parts of suitable fire clay. The material can be easily tested by heating and plunging into water, which test should always be a part of the specifications, so there is no excuse for using an improper or defective material.

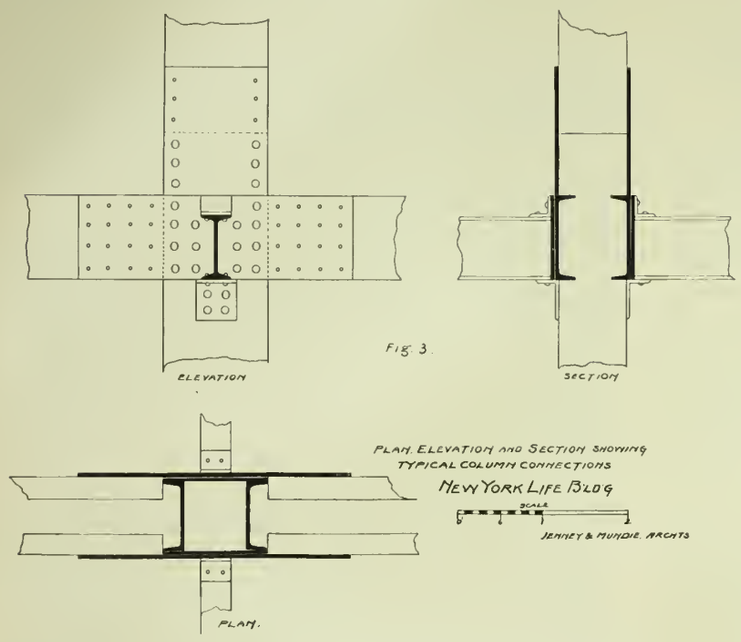


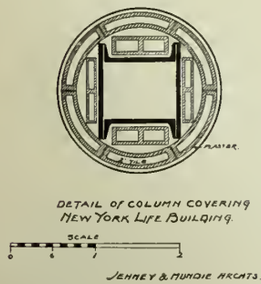
Fig. 3.

Second. Much care should be given to the shapes that they shall thoroughly protect the steel and be themselves thoroughly and substantially secured in place and protected from injury. The fire-proofing should not be liable to be washed off by the shock of the stream of water from the fire engines. To this end it is best to have smooth ceilings, that is, without panels, as the projection of the girders below the beams, paneling the ceiling, introduces an element of weakness in the lower flange protection of the girders that are not as firmly secured when they project as when they do not.

Figs. 1 and 2 are sections of the floor of the addition to the New York Life Building, Chicago. Two channels were used as the girder in order to secure a very rigid connection with the columns (Fig. 3) as all the wind bracing is thus provided for, doing away with the necessity of any other interior bracing, so difficult to manage without serious inconveniences. The interior fire-proofing of the double channel girders is by special shapes.

In Fig. 1, 9 in. tile arches were proposed. The sleepers to which the floor was nailed rested directly on the beams and were secured by steel clamps. Tile furring was proposed between the sleepers. Further study and discussion of the subject suggested Fig. 2, where a 12 in. arch was used, and in order to firmly secure the floor sleepers a strip of wood 1½ ins. thick was shaped and secured to the top flanges of the beams by steel clamps. To this strip the floor sleepers are spiked so as to be well secured and not liable to move by the usage of the floor, as has often been the case when the sleepers were simply bedded in the concrete over the arches.

Fig. 4



On presenting the two diagrams for proposals it was found that Fig. 2 would cost something less than Fig. 1, and as it was in all respects satisfactory, it was adopted.

For the protection of the columns Fig. 4 was used, every tile being thoroughly clamped to those above and below and around the columns. For a warehouse something more is required. Fig. 5 was used at the Fair, a great department store.

All the fire-proofing was set in a mortar composed of one part Portland cement and three parts best lime mortar, using only clean Lake Shore sand; all tile in dry weather to be wet before laying.

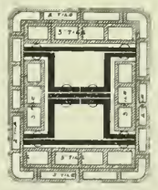
The concrete on the arches and between the floor sleepers is composed of one of Portland cement, three of clean Lake Shore torpedo sand, and four of aggregate; the aggregate to be composed of broken stone (other than lime stone), broken blast furnace slag, or waste brick or fire-proofing broken to go through 2 in. ring in all directions. This concrete to be pounded hard with a tamper weighing 40 lbs., with a cast-iron head 8 ins. by 8 ins. face. No cinders to be used.

The Pittsburgh fire showed the worthlessness of cinders in fire-proofing; they are consumed in a fire and offer no protection. Limestone would be burned to quick lime, would slack and destroy the concrete.

At a meeting of the Clay-Workers, Mr. Gates, president of one of our terra-cotta companies, offered a suggestion that can be made valuable for columns and for wall finish when terra-cotta can be used for the finish. "Make the terra-cotta the fire-proofing."

Here is an opportunity for a valuable innovation for exterior work and for the interior of a railroad station, a grand hall, etc., etc. The entire surface, however ornamental it may be, can be of terra-cotta that at the same time serves as fire-proofing. The material must be capable of satisfying the conditions of good fire-proofing material. It should be uninjured by heating to redness and then plunged into cold water. Great care should be taken with the anchorage that none of the pieces under any conditions that are likely to obtain can possibly be knocked off or put out of place.

Fig. 5



Good fire-proofing must not only save the steel from injury, but should itself pass through the fire uninjured.

One of the lessons learned from the recent fires is that while the steel was substantially protected from injury the fire-proofing was itself destroyed, entailing a severe loss to the underwriters. This is not as it should be, nor is it a necessity, and should be avoided.

Most plastering is worthless after it has gone through a fire. Plaster of Paris is of itself worthless under the conditions of heat and water. It becomes permanently soft and washes away. Therefore no partitions of plaster of Paris blocks should be used; although they do not burn, they are destroyed in a fire and increase the loss. An excellent fire-proof plastering is coming into use; it is known as asbestic, and is composed of lime mortar to which a large proportion of asbestos is added at time of using. It can be hardened and improved by the addition of Portland cement. Further experiments should be made with this material.

The British Fire Prevention Committee, embracing in its membership many of the leading architects of Great Britain, and which has for its main objects the use of its influence in every direction towards minimizing the possibilities and dangers of fire, and to bring together those scientifically interested in the subject of Fire Prevention, has issued, in pamphlet form, the paper, by Mr. Francis C. Moore, on "How to Build Fireproof," recently printed in these columns.

Masons' Department.

Mortar and Concrete.

QUALITY OF MORTAR.

NEARLY all of our modern masonry constructions, and certainly all brickwork, is built on the assumption that the individual blocks, whether brick or stone, are to be imbedded in a matrix of mortar, uniting the whole into a homogeneous mass. As a matter of fact this assumption is rarely perfectly correct, for the reason that the mortar, though forming the key to the strength of the whole wall or pier, and, consequently, of extreme importance as a factor in building operations, very often fails to receive the proper care, and a scientific knowledge of the properties of the material is often sadly lacking on the part of our builders. It is encouraging to notice, however, how much advance has been made in a comparatively few years in the uniformity of the product which is used in our more important buildings. The old-fashioned way of preparing mortar was to burn the lime in a more or less crudely constructed kiln, and to mix the materials as they were required on the job in small batches, the lime being partially slacked and then being immediately covered with a blanket of sand, theoretically to keep the heat in, but practically checking the thorough slacking of the particles. Then the mortar, whether with lime or cement as a base, was worked over by hand on a board close to the wall, and the brickwork was laid up with very little attention to anything except to get the material in place.

The necessities of modern building operations, no less than the scientific study which a few of our best builders have devoted to the subject, have resulted in a modern compound specifically known as machine-mixed mortar, which is so far ahead of the average product which we were formerly obliged to depend upon that, though it has not achieved perfection, and the results are not as good as were brought about by the Roman methods of centuries ago, it is a vast improvement over the average hand-mixed mortar. Unfortunately, this machine-mixed mortar cannot be obtained in all cities. It has been used a great deal in New York, and to a certain extent, we believe, in the other large cities, but as far as we know, it has not been found practicable to ship it to any great distance without increasing the cost over hand-mixed mortar; though if considerations of the quality of the work were to be put above a matter of a few cents per cubic yard in cost, it would be far better for the builders in our small towns to have the machine-mixed mortar shipped to them. The cost is claimed to be some twenty-five cents per thousand bricks less than the average cost of hand-mixed mortar, while it is claimed that an additional saving of twenty-two cents a thousand can be effected in the labor of laying the brick.

It is extremely satisfactory to feel that a good material, which is a decided improvement upon old methods, results not only in a better construction, but in a distinct saving of money. We should be inclined to look upon it another way and urge that even if the cost were thirty or forty cents more per thousand bricks, it would be well worth the difference to use machine-mixed mortar. This, of course, is on the assumption that the quality of the mortar is uniform and is kept up to high standard. It is much easier to do this mechanically than by trusting to manual labor. Any one who has watched the ordinary laborer mix mortar will undoubtedly appreciate how very variable the quality is. A bricklayer will try to judge of the mortar by the way it feels under the trowel. We know of one instance where an attempt was made to ascertain how much value could be placed upon such means of judgment. Three mixtures were made, one with two parts of sand to one part of Rosendale cement, the second with three parts of sand to one of cement, and half a portion of ordinary loam; the third mixture was one part cement, one part of loam, and four parts of sand. The color of the mortar in each case was so nearly the same as to be difficult to distinguish. Three bricklayers, to whom these batches of mortar were submitted, united in declaring that the one with equal parts of cement and loam was the best, their judgment being based simply upon the smoothness with which the mortar could be laid in the wall. There is no question but that if the utmost care were taken to thoroughly slack the binding material and to properly proportion the sand, giving plenty of time to the whole operation, hand-mixed mortar would be perfectly satisfactory in every respect; but such conditions rarely obtain in a large building, and by mixing machine-mixed mortar by the ton it is perfectly easy to maintain exact proportions, to have the binder equally strong in each case, and to have the intimate mixture of the components perfectly uniform.

There is another factor entering into the use of mortar, or perhaps, more properly, into the construction of masonry, which is liable to be overlooked. There is a saying among what we sometimes call the old-fashioned builders, to the effect that a wet building makes a dry house, or, in other words, that in a masonry construction, if plenty of water is used throughout, the bricks kept well wet, the joints thoroughly grouted, the result in the set of the mortar will be vastly superior to what one would expect from opposite conditions. This is, of course, especially true of work laid up with cement mortar, but it applies with very considerable force, also, to lime-mortar work. It is a common belief that in cold weather bricks should be heated before being set. We are not sure that this is the correct assumption. We have noticed a number of times that where bricks have been used hot the mortar, after a few months, is dry and crumbly under the hand, and has the appearance of having been frozen. It seems to stand to reason that hydraulic cement which requires a very considerable excess of water to set properly would have the life all drawn out of it by being set in bricks, which not only are free from water, but are heated so that they would absorb all the free water from the cement. It, of course, is not always practicable, on account of the cold, to wet bricks in winter time, but from personal experience we should be inclined to say that a wall would stand better if the bricks were laid up cold in winter than if the bricks were first heated. And certainly for any work in ordinary weather the liability is that it will be kept too dry rather than too wet.

We had occasion to notice a while ago an instance of the efficacy of the liberal use of water in this connection. In a certain prominent building in this city the door trim and the dado work were all constructed of Portland cement applied directly to fire-proof partition blocks. After the work had been run there came a spell of quite dry, hot weather, and the building was left open, with the result that when the cement work had the appearance of being dried out it was so soft and porous that it could be brushed away with a broom, and there was hardly any surface to it. The builder was shrewd enough to try some experiments before going to the expense of removing the whole. He stationed a number of laborers around the building with pails of water and big sponges, and instructions to wet the cement work down thoroughly and keep it wet. This treatment was continued for, if we remember rightly, some ten or twelve days, when the cement began to harden, and in a few days more it had set up in a perfectly satisfactory manner, and ultimately proved to be an exceptionally strong piece of work. We have no doubt that much of the poor mortar that is encountered in taking down old buildings owes its friability and seemingly poor texture to the fact that not enough water was used in the construction.

MATERIAL MAN.

THE Supreme Court of California holds that one who agrees to furnish certain mantels, tiles, and grates, and the appurtenances of same, for a building, and to deliver and set them in position, is a material man, and not an original contractor, within the meaning of the mechanics' lien law of that State.

The same court also holds, a person contracting to furnish doors, sashes, blinds, etc., which, instead of manufacturing to order, he purchased ready made, is a material man only.

Hydraulic Cements.

BY CLIFFORD RICHARDSON.

(*Continued.*)

Necessity of Keeping Cement Work Moist or Not. The necessity of keeping all work done with both kinds of hydraulic cement moist and supplied with water for a long time after setting, in order to aid in the hardening process and to prevent drying out and air cracking, is apparent.

It is found that the final strength which different cements attain in the process of hardening does not correspond at all to the celerity with which they first set. A quick-setting cement, which may show a great strength in a few hours, will not ordinarily compare, after the lapse of a month or more, favorably with one that is slow setting, while Portland cements harden much more rapidly than natural cements, although setting much slower. In this respect there is, however, a considerable variation in different brands, and those are usually considered most desirable which continue to harden after long intervals of time. For example, the American Portlands seem to gain most of their strength in a few weeks, while the German brands will, many of them, be inferior in strength to them at seven and twenty-eight days, but will continue to increase for nearly a year afterwards, and finally attain an equal strength. It is also worthy of note that there is a variation in the way in which cements, especially the natural ones, set throughout the mass, some hardening first on the exterior and others on the interior.

Effect of Variations in Composition in Portland Cement. Even within the narrow limits of composition for good Portland cements, already given, there is sufficient opportunity for variations to produce decided differences in character, some of which have been noticed. The set is much influenced by the amount of lime, especially when the cement is underburned, or by a large amount of alumina. As has been said, the more lime a cement contains the more difficult it is to bring about proper and complete combination in burning, and the higher the temperature and the longer the heat that is required. When perfectly made the high-limed cements are much slower in set, stronger and better for ordinary use, although they will not stand such immediate immersion in water as a low-limed cement will, and are, therefore, less suited for use where water is present. They are, however, most in demand for ordinary construction, and are especially satisfactory for sidewalks and work where a sufficient time must elapse before setting to allow of the placing of the material properly. Cements high in lime, which are not thoroughly burned or seasoned, are generally very quick setting, hot, and unstable, as are those which contain too much alumina or are over-clayed, as it is called. They have a tendency to expand and to blow or check, which is one of the faults of inferior Portland cement to be most carefully guarded against. The presence of magnesia is also supposed to bring about expansion after the lapse of a considerable period of time, while sulphates, as well as magnesia, are considered to be the causes of the disintegration of Portland cement in the presence of sea water.

Cements low in lime are sometimes found which, without an excess of alumina, but with more silica, are merely deficient in strength like underburned cement. A cement with 64 per cent. of lime is a highly limed one, with 65 excessively so, with less than 60 very low limed, and with 62 to 64 a normal cement. Alumina above 8 per cent. is high, below 5 very low. Magnesia above 3 per cent. is excessive, and above 2 high, while sulphuric acid above 1½ may demand consideration.

The amount of the two latter constituents ordinarily found in Portland cement can be seen in the following determinations in cements actually in the American markets during the past few years: —

Magnesia and sulphuric acid in Portland cements: —

Mgo.	SO_3
.86	1.25
2.79	.71
1.81	1.24
1.45	1.11
1.69	1.50
2.48	1.36
2.84	1.53
1.16	2.71
2.73	1.51
1.85	.39
1.32	1.82

Magnesia is usually below 2 per cent., and sulphuric acid not higher than 1½.

(*Continued.*)

STABLE SUBSOIL FOR FOUNDATIONS.

INVESTIGATIONS preliminary to the foundations of a large building are seldom made with sufficient thoroughness. Our readers doubtless will recall the famous epitaph on the tombstone of an architect who was buried in Westminster, which reads: —

"Lie heavy on him, Earth,
He laid great loads on thee."

The amount of the loads arising from a great building, and their effect upon not only the immediate soil, but upon the subsoil, is often more considerable than we are aware of. Furthermore, even with the best of soil the conditions are sometimes such as require especial provisions to guard against trouble. Some years ago an apartment house of considerable size was in process of erection in Brooklyn, upon a street in a newly developed portion of the city which had been laid out over a line of low mounds or hillocks, the streets having been cut down very nearly to a level, so that the finished grade was only a short distance above the bed rock, and the foundations of the building were even closer to the substratum. The earth in this case was of a clayey nature, and after an unusually heavy rain which was allowed to soak in around the foundations and get down through to the rock, the whole structure, building, foundations, clay bottom and all, proceeded to slide down hill and finally ended by landing in a heap in the middle of the street.

There is a great deal more movement of this sort than people are aware of. It has been stated on excellent authority that the whole southerly slope of Beacon Hill, Boston, with the buildings upon it, has been gradually sliding down into the water at a rate which is only a few inches a century, but yet quite sufficient to be appreciable; and as the section which it is alleged is in process of transit is occupied at points by some of the heaviest structures in the city, it may sometime become a question as to how far this species of loading can be safely carried when imposed, as in this instance, upon a sloping substratum of rock. In the more recent New York tall buildings it has been the custom to assume that the soil was worthless to resist the loads, and the foundations have accordingly been carried clear down to the bed rock. In Chicago, on the other hand, most of the large buildings are floated upon a relatively thin and by no means very firm layer of alluvial deposit. The Chicago buildings settle a good deal, the average Boston building settles slightly, and usually unequally, while the more recent New York buildings do not settle at all. The latter is obviously the best result, though also the most expensive.

SURETY LIABLE ON BUILDING CONTRACT.

A PROMISE by the surety of a building contractor, to whom the contractor had assigned the money to become due under the contract, to pay the claim of a subcontractor, if the latter would continue the work, is without consideration, unless the work specified was something which the subcontractor was not required to do by his contract, and is not binding on the surety unless it is in writing.— *Sup. Court, N. Y.*

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK. — The past month has been undeniably dull in this city, not only in regard to new building projects, but in every branch of the real-estate business. There is very little new work in sight, but no uneasiness seems to be felt by architects and builders, as both confidently hope for a brisk revival of business when peace is restored, and when other lines of business are as active as usual. We had hoped to see the demolition of the old reservoir at Fifth Avenue and 42d Street commenced this summer and work on Carrère & Hastings beautiful library building started, but there are no signs of it as yet, and probably nothing will be done during the Tammany administration. The Academy of Design, however, will be started at once, as it is not dependent upon the city for funds.

Among the new building projects might be mentioned: Dehli & Howard have prepared plans for a new building for St. Jerome Roman Catholic Church, to be built on 137th Street and Alexander Avenue; cost, $100,000.

McKim, Mead & White have planned a five-story brick and stone dwelling for W. E. D. Stokes, Esq., to be built on 54th Street; cost, $100,000.

W. Wheeler Smith has planned a two-story brick and stone structure to be erected on the Roosevelt Hospital grounds; cost, $30,000.

Rossiter & Wright are preparing plans for a four-story brick studio building to be erected on 34th Street; cost, $15,000.

N. Le Brun & Sons have prepared plans for a six-story brick structure to be erected on East 76th Street, for the Academy of the Marist Brothers; cost, $50,000.

E. H. Kendall has completed plans for the eight-story addition to the Methodist Book Concern, Fifth Avenue and 20th Street.

Hill & Turner are preparing plans for a ten-story brick and stone apartment house to be erected at Madison Avenue and 53d Street.

Cleverdon & Putzel have planned a five-story brick mercantile building to be erected at Third Avenue and 20th Street; cost, $60,000.

Carrère & Hastings are completing plans for a three-story brick and stone residence to be built at Morristown, N. J., for Abraham Wolff.

Ernest Flagg is preparing plans for an addition to the Singer Building, to be of brick and stone; cost, $400,000.

H. T. Howell has planned a seven-story brick flat and store building to be built on the Boulevard near 91st Street; cost, $80,000.

W. C. Dickerson has prepared plans for three four-story brick flats to be built on Wales Avenue; cost, $60,000.

James E. Ware & Son have planned a brick and stone flat building; cost, $25,000.

McKim, Mead & White have planned a six-story brick store and loft building to be erected at 300 Broadway; cost, $110,000.

CHICAGO. — Between war and the strikers Chicago architects are feeling blue. The cut stone difficulty, described a month ago, was apparently settled by an acceptance of the old wage, — $4 per day of eight hours, and a minimum of four men instead of eight for every planer. But other troubles have arisen, and contractors predict that one will be unable to get even a plain sawed sill for a small residence. Another serious strike has been that of the wood-workers in sash and door factories. These have been among the last of craftsmen to succeed in organizing unions. Their present trouble seems to be settled.

The most remarkable strike that Chicago has seen is that of the stereotypers. It is notable because its result has been to prevent the appearance, for several days, of all the daily papers except the German publications. The publishers even closed their bulletin

PARK ROW SYNDICATE BUILDING, NEW YORK.
Photographed by Hall expressly for Central Fire-Proofing Company. Showing fire-proofing of domes and floors. This is the tallest office building in the world.
R. H. Robertson, Architect.

TOWN HALL, EAST ORANGE, N. J.
Details shown on Plates 49, 50, 51, 52.
Boring and Tilton, Architects.

boards, and Chicago people were wild for newspapers about the time Cervera's fleet was destroyed.

Another fire-proof mercantile or manufacturing building is announced. The building, designed by D. Adler, will cost $60,000, and be occupied by a wholesale tailor.

Shepley, Rutan & Coolidge have let contracts for a hotel at South Bend, Ind., the cost of which is given at $223,000. The building is steel frame and tile-arch construction. The exterior is Renaissance in design. The first story is stone, but the other five are brick with terra-cotta window trimmings, cornice, etc. The Chicago Hydraulic-Press Brick Company and the American Terra-Cotta and Ceramic Company are to provide the brick and terra-cotta.

An interesting alteration job is that of the Studebaker Carriage Depository on Michigan Avenue. By September this ten-story building will have been transformed (under the hands, very properly, of its original architect, S. S. Beman) into "The Fine Arts Building." There will be two music halls — one to seat 1,600, the other 700, and an assembly hall to accommodate 500. The building is intended to be a center for art, educational, and literary interests, and is renting space to prominent sculptors and painters, to publishers like Harper & Bros., and D. Appleton & Co., and various periodicals, and to musical and art clubs.

Five hundred Chicago architects have paid each his $25 for a license, and now as each answers the call for his first annual $5 fee he sympathizes with the builder contractors who have to pay a like annual license fee. The plumbers, however, have to pay $30 per year, and at a recent date 800 out of 1,000 master plumbers were delinquent.

"THE FAIR" BUILDING, CHICAGO.
Exterior of terra-cotta bricks furnished by the Columbus Brick and Terra-Cotta Company.
Jenney & Mundie, Architects.

PITTSBURGH.—The general idea that almost nothing is being done at present in the building line does not seem to be confirmed by the report of the building inspector. While there are very few office or store buildings either in process of erection or being contemplated, the inspector reports that the number of permits for new buildings in June have increased 27 per cent. over those of 1897, while the valuation has increased over 43 per cent. As compared with last month, they have fallen off one in number but increased in valuation 10 per cent. This would indicate that a better class of dwellings are being built, and it is gratifying to note a large decrease in the number of frame buildings even in unrestricted wards, the majority being brick houses of from about ten to fifteen thousand dollars value.

Among the most important building news items at present are: The new six-story store and office building at the corner of 6th Street and Liberty Avenue. It is to be built of light sandstone and Roman brick, and cost $130,000; James T. Steen, architect. The new Kaufmann store on Smithfield Street, of stone and gray Roman brick; cost, $175,000; Charles Bickel, architect.

The new building for C. L. Magee, on Fifth Avenue, near Wood Street, is being built from plans by F. J. Osterling. The front is almost entirely of light-gray terra-cotta.

Alden & Harlow have recently let the contract for the Wylie Avenue branch of the Carnegie Library. It is to be built of brick and red sandstone, and cost, complete, about $40,000.

Among residences recently completed is that of Mr. A. M. Byers, in Allegheny. Although a double house, it is built to resemble a single house; cost, about $175,000.

The J. G. Jennings house on Fifth Avenue, East End, has also recently been finished; built of buff Roman brick and light terra-cotta; cost, $40,000. Alden & Harlow are the architects of both.

Boggs & Buhl are making a large addition to their department store in Allegheny. S. F. Heckert is the architect. Though constructed with a steel frame, wooden joist twelve inches apart are being used to support the floors,

TERRA-COTTA COLUMN, CHAMBER OF COMMERCE, CLEVELAND, OHIO.
Executed by the Northwestern Terra-Cotta Company.
Peabody & Stearns, Architects.

TERRA-COTTA CAPITAL, OFFICE BUILDING, HOLYOKE, MASS.
Executed by the Standard Terra-Cotta Company.
Clough & Reid, Architects.

and have caused the writer to wonder whether the difference in insurance between this construction and that of a fire-proof floor would not in a few years have paid the difference in cost between the two constructions.

Geo. S. Orth & Bros. are at work on a brick residence for Col. A. J. Logan, on Fifth Avenue, East End. They have also prepared plans for a brick residence for W. L. Jones, on Forbes Street; cost, $25,000; a stone residence for W. A. Shaw, to cost $30,000; four houses for E. B. Alsop, to be built on Ellsworth Avenue, East End,

WATER TOWER, CHAPINVILLE, CONN.
Stone, Carpenter & Willson, Architects.

THE CONVERSE BUILDING, BOSTON.
Terra-Cotta furnished by the Excelsior Terra-Cotta Company. Face brick by the Sayre & Fisher Company.
Winslow & Wetherell, Architects.

and cost about $75,000; also for five houses for the Aiken estate, each to cost about $6,500. They have also recently let the contract for a stone residence for Miss Alice Hogg, to be built in Homewood; cost, $25,000.

J. C. Westervelt, of New York, has made plans for a brick colonial house for W. S. Kuhn, to be built on Forbes Street; cost, about $40,000.

F. J. Osterling is at work on the new insane asylum for Allegheny County, to be built at Woodville; cost, $200,000. He is also preparing plans for the new building for the Chautauqua Lake Ice Company. It is to be a brick, fire-proof building, 100 by 225 ft.

A competition has recently been held for a new twelve-room school building in the 22d Ward, but is, as yet, not decided.

CURRENT ITEMS OF INTEREST.

WALDO BROTHERS have been awarded the contract to furnish Atlas Portland cement to the town of Concord, Mass.

TERRA-COTTA DETAIL.
Executed by Gladding, McBean & Co., San Francisco, Cal.

TERRA-COTTA DETAIL, MT. VERNON HIGH SCHOOL, MT. VERNON, N. Y.
Executed by the Conkling, Armstrong Terra-Cotta Company.
Poring & Tilton, Architects.

THE NEW CATLIN BLOCK, HARTFORD, CONN.
Hollow brick used in this building supplied by the C. P. Merwin Brick Company, Berlin, Conn. Terra-cotta by the Excelsior Terra-Cotta Company, through their Connecticut representative, W. P. Felt, New Britain, Conn.
W. C. Brocklesby, Architect. Hopkins & Roberts, Builders.

NORCROSS BROTHERS are using Meiers Puzzolan cement in backing of light stonework at the Radcliffe Gymnasium, Cambridge, Mass.

THE CUMMINGS CEMENT COMPANY, of Akron, N. Y., is furnishing their Storm King Portland for the fire-proof building now being erected by John Druecker, of Chicago.

WALDO BROTHERS are furnishing Alsen Portland cement to the Roebling Company for use on floors for Somerset Hotel, Boston, Mass.

THE AMERICAN CEMENT COMPANY, who have four works at Egypt, Pa., and one at Jordan, N. Y., have recently made shipments of cement to Siberia, and also to Mexico.

SAYRE & FISHER COMPANY are supplying through their Boston agent, Charles Bacon, ivory cream enameled bricks for the new swimming tank in Craigie Hall, Harvard College; Miss Josephine Wright Chapman, architect.

THE EXCELSIOR TERRA-COTTA COMPANY, through their Boston agent, Charles Bacon, is supplying the architectural terra-cotta for the new Home for Aged People, Cambridge, Mass.; Stickney & Austin and W. E. Chamberlain, associate architects.

CLOISTER (SHOWING GUASTAVINO CONSTRUCTION), ST. CHRISTOPHER MISSION HOUSE, NEW YORK CITY.
Barney & Chapman, Architects.

H. F. MAYLAND & CO., New York agents of the Burlington Architectural Terra-Cotta Company, have closed the following new contracts: Graphic Building, Fourth Avenue, New York City, Wm. J. Dilthey, architect; apartment house, 34th Street, New York City, George H. Van Auken, architect.

THE work of rebuilding the plant of the Illinois Supply & Construction Company, at St. Louis, recently destroyed by fire, is progressing in a very rapid and satisfactory manner. No inconvenience has been caused in the matter of filling contracts that they had on hand at the time of the fire, as plenty of bricks were left them uninjured.

THE BRICK, TERRA-COTTA AND SUPPLY COMPANY, M. E. Gregory, proprietor, Corning, N. Y., has been awarded the contract for furnishing the paving brick required for paving Main Street, Geneva, N. Y. They also have the contract for furnishing the architectural terra-cotta required for Telephone Building, Wheeling, W. Va., Rutan & Russell, architects.

THE BURLINGTON ARCHITECTURAL TERRA-COTTA COMPANY, Burlington, N. J., have received the following new contracts: residence, 33d and Diamond Streets, Philadel-

phia, H. E. Flower, architect; Holy Cross Church, Ninth and Lehigh Avenues, Philadelphia. Isaac Pursell, architect; new building, Zoological Garden, Philadelphia, Hewett Brothers, architects.

THE CELADON TERRA-COTTA COMPANY, LTD., will furnish their roofing tiles on the following new buildings: residence for H. T. Chandler, Cleveland, Ohio, A. N. Oviatt, architect; Science Hall, Syracuse University, Prof. Edward H. Gaggin, architect; residence for E. W. Swisher, Columbus, Ohio, C. A. Stribling & Co, architects; office building for International Bridge Company, Niagara, N. Y., R. H. Wallace, architect; residence B. W. Kauffman, Yost & Packard, architects; station for C. R. I. & P. R. Railway, Iowa City, Iowa, W. K. McFarlin, architect; station for same company at Atlantic, Iowa, W. K. McFarlin, architect; residence for W. H. Ensinger, St. Paul, Clarence H. Johnson, architect; Somerset Apartments, Boston, Arthur H. Bowditch, architect.

AMONG the recent contracts executed by the Berlin Iron Bridge Company is a new boiler house for the People's Light and Power Company, Jersey City, N. J. It is of fire-proof construction throughout with steel framework, brick side walls and iron roof covering; a new scrubber house at the 25th ward gas works; a new boiler and engine house at the Point Breeze Works; also a condenser and purifier building at the same location, all for the United Gas and Improvement Company, of Philadelphia, Pa. These buildings are of steel-frame construction, brick side walls and slate roof supported on metal purlins carried by clear span trusses; new buildings for the electric railroad plant of the Syracuse Construction Company, at Syracuse, N. Y. These buildings are all of steel framework covered with corrugated iron.

THE following new buildings have been furnished with the Shawnee brick manufactured by the Ohio Mining and Manufacturing Company, through their Pittsburgh agents, Burgy & McNeill: residence for W. A. Roberts, Pittsburgh, D. B. Morris, architect; Borrows Apartments, Pittsburgh, T. H. Scott, architect; residence for T. W. Bithell, Pittsburgh, A. K. Miller, architect; McGee Building, Pittsburgh, F. J. Osterling, architect; store building for Geo. W. Driver, Washington, Pa., John Vester, architect; residence for T. S. Morgan, Bellevue, Pa., E. M. Butz & Co., architects; residence for H. Robbins, Pittsburgh, Sidney Heckert, architect; two residences for J. H. Elder, Pittsburgh, Victor E. Kelley, architect; public school, Wilkinsburg, Pa., E. M. Butz & Co., architects; public school, Charleroi, Pa., E. M. Butz & Co., architects; Katterburg Building, Pittsburgh, E. B. Milligan, architect; Murtland Building, Pittsburgh, Alden & Harlow, architects.

INDEX TO ADVERTISEMENTS.

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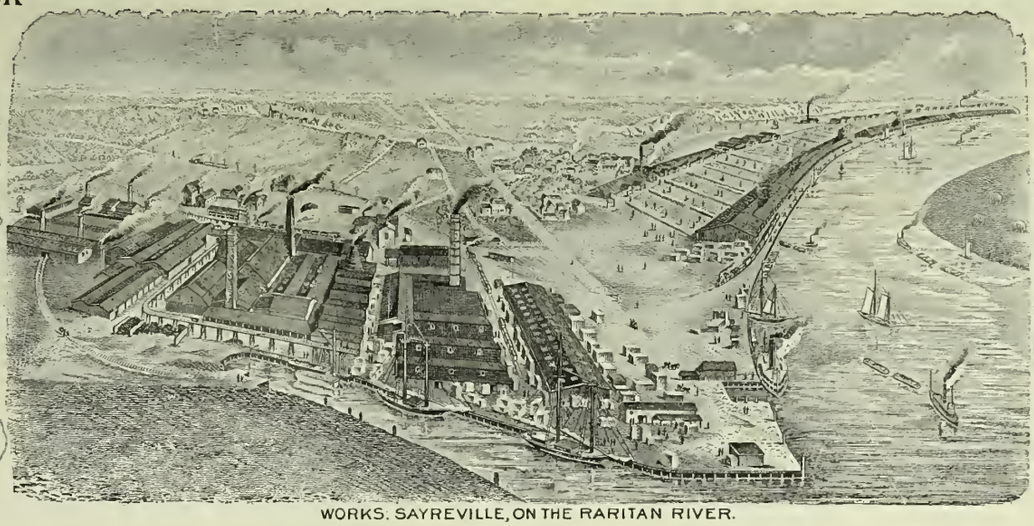

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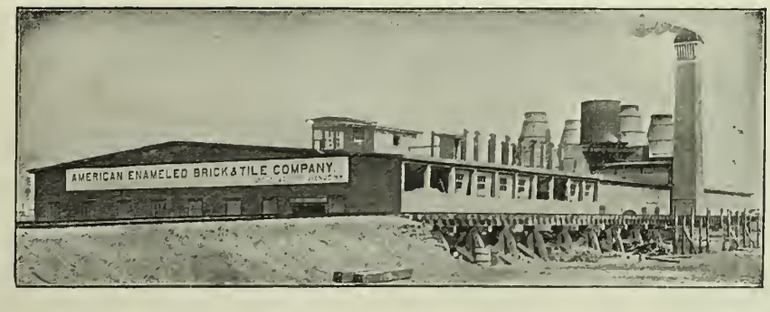

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LIST OF BUILDINGS SUPPLIED.

Binghamton State Hospital, Binghamton, N. Y. Miles Leonard, builder.
St. Catherine's Hospital, Brooklyn, N. Y. Arch., Wm. Schickel & Co., New York. W. & T. Lamb, builders.
Bellevue Hospital, New York. Arch., Withers & Dickson. John F. Johnson, builder.
Brooklyn Distilling Co., Brooklyn, N. Y.
Mechanics National Bank, Brooklyn, N. Y. Arch., Johnson & Co. W. & T. Lamb, builders.
Trenton Water Works, Trenton, N. J. Arch., Wm. A. Poland. John Barlow, builder.
Mutual Life Building, Philadelphia, Pa. Arch., Philipp Roos. E. L. Pennock, builder.
Wadsworth Building, New York City. Arch., Youngs, Bergersen & Cornell. Robinson & Wallace, builders.
The Bowling Green Building, New York City. Arch., W. & G. Audsley. Standard Structural Co., builders.
Schenectady Water Works, Schenectady, N. Y. John McEnerge, builder.
Stamford, Conn., Railroad Depot (N. Y., N. H. & H. R. R.), Wm. A. Thomas, builder.
Hotel Manhattan, 42d St., New York City. Arch., Henry Hardenburg. Marc Eidlitz & Son, builders.
Brooklyn Trolley Power House, Chas. Hart, builder.
Altman's Dry Goods Establishment, 18th St., New York City. Arch., Kimball & Thompson. Chas. Sooysmith & Co., Marc Eidlitz & Son, builders.
Waldorf Hotel Extension, New York City. Arch., Henry J. Hardenburg. Chas. Downey, builder.
Private Stable, 120 East 75th St., New York City. John J. Tucker, builder. (These were made to match Farnley imported Brick, in white and in colors. Made in our new one-fire process and were pronounced by the owner a great success.)
Private Stable, Utica, N. Y. R. T. Proctor, owner. Arch., J. Constable. John F. Hughes, builder.
Addition to same Stable. Arch., R. M. Hunt, Jr., and Maurice Fournachon. John F. Hughes, builder.
Old Men's Home, Brooklyn (patent tile). Arch., Johnson & Co. Thomas Dobbin, builder.
Large Delicatessen Establishment and Restaurant, Harlem, N. Y. Arch., J. P. Walthers. Scheidecker & Gonder, builders.
Trolley Power House, Woodside, L. I. John D. Woodruff, builder.
Private Stable, Portchester, N. Y. Arch., Nathan C. Mellen. Wm. Ryan, builder.
Fire Engine House, Newark, N. J. James Moran, builder.
In addition to these there are other large contracts and an innumerable amount of smaller ones.
New York Athletic Club House, New York City.
Columbia College Gymnasium and University Hall, New York City. McKim, Mead & White, Architects. Norcross Bros., Builders.

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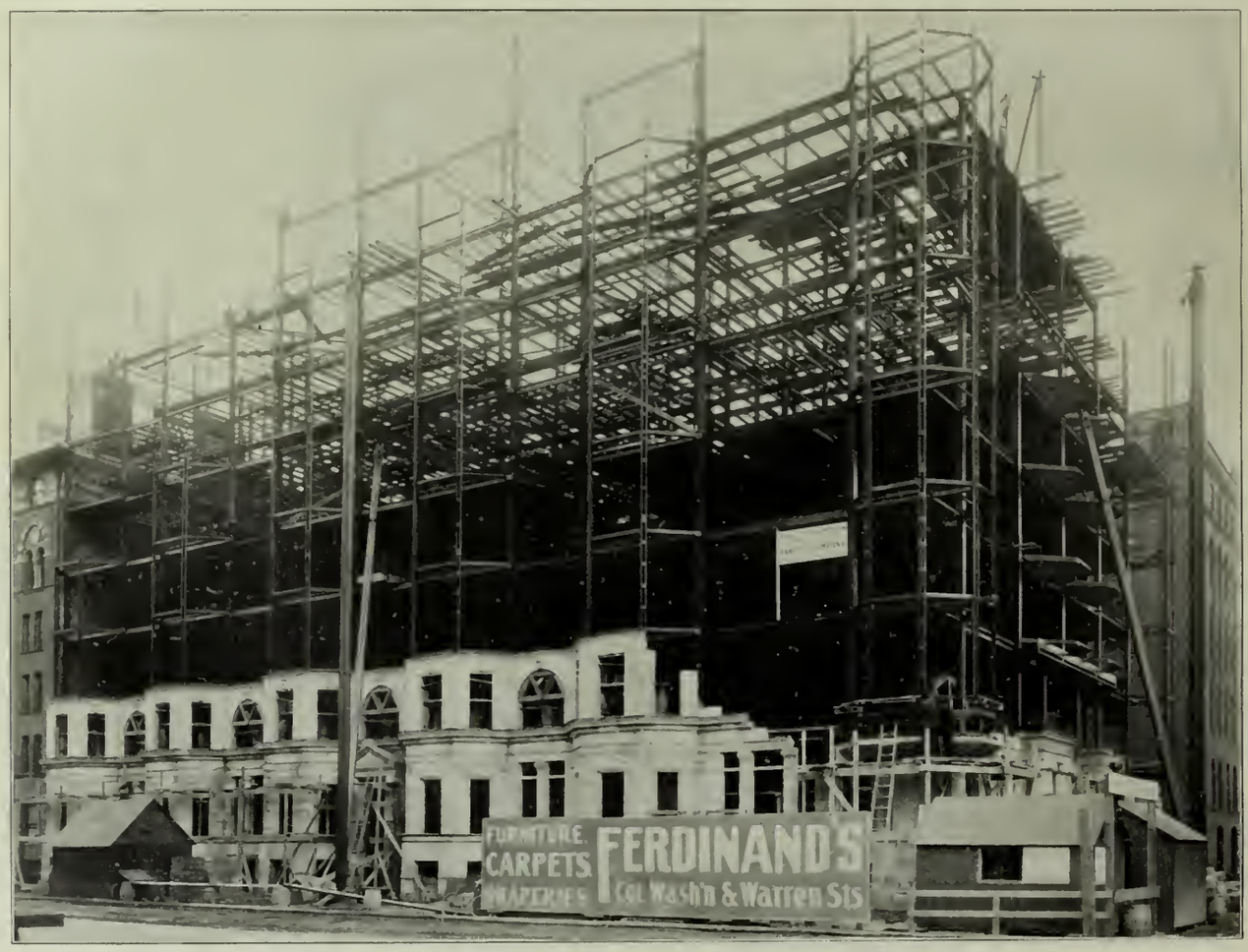

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VOLVME VII AUGUST 1898 No. 8

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

ROGERS & MANSON,

CUSHING BUILDING, 85 WATER STREET, BOSTON.

P. O. BOX 3282.

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PUBLISHERS' STATEMENT.

No person, firm, or corporation, interested directly or indirectly in the production or sale of building materials of any sort, has any connection, editorial or proprietary, with this publication.

THE BRICKBUILDER is published the 20th of each month.

CONCEDING the proper object of this journal to be the encouragement of the best work in brick and terra-cotta, and with a view of presenting in concrete form embodiments of the principles which we have urged in these columns, we begin with this number of THE BRICKBUILDER the publication of a series of articles dealing with the designing and construction of a ten-thousand-dollar private residence. The first of the series is contributed by Mr. Charles A. Rich, the well-known architect of New York. It will be followed by similar articles by some of the leading architectural minds of the country, and the series will present the views of the profession as to the possibilities of brick and terra-cotta as applied to residences of moderate cost and dimensions. Our brick and terra cotta manufacturers have of late years given a great deal of attention to devising means for bringing their products prominently before the people in order to create a large demand of their wares, and to accomplish this they have sought the advice of architects and constructors and have adopted all of the well-known methods of properly advertising their products, some of the manufacturers having issued some very excellent monographs illustrating brick and terra-cotta architecture and its possibilities. All of these have had their use and have been fruitful in results, but we feel a special pride in the possibilities within the reach of this journal to call out and present the ideas which this series of articles will embody. It is the kind of encouragement of brick architecture, *per se*, which we believe will be most efficacious not only in developing the fact that brick can be used most advantageously under certain circumstances, but in going beyond this and showing specifically how it can be a factor in a thoroughly artistic as well as practical dwelling. The best way to encourage an art is to practise it. Ideal solutions are often in a general sense of more value than actual illustrations of existing work, and this series will correspondingly show how the thoughts of some of our best architects can find a fitting expression in the materials which are peculiarly ours to foster.

We cannot forbear offering just a bit of advice to our brick manufacturers in this connection. The advice has nothing to do with the size of the brick, its particular composition, nor the exact shade or coloring, all of which are matters which are capable of almost endless discussion and often with little real satisfactory result; but the most artistic dreamer as well as the most sternly practical constructor will agree with us that the best recommendation for a particular style of brick is to have it used in a thoroughly successful building, successful not as a matter of mere size nor as regards prominence of location, but successful in the artistic, beautiful lines which appeal so strongly to the architect, and which, as the years increase our measure of popular appreciation, will appeal with increasing force to the great mass of people who live in architect-built houses. So that our advice would be to the salesman who is seeking to have his bricks most approved by the public, to take pride and advertise the successful buildings from an artistic standpoint, to claim excellence of result rather than mere fineness of product, and to measure success by the artistic worth of the buildings in which the brick may become so integral a portion. The question of price is one which will adjust itself, the question of artistic result is one which has to be adjusted, and in proportion as good brick houses are built, in that proportion will good bricks be appreciated.

THE lack of color in our modern architecture is often commented on, and we frequently hear expressed the hope that a more consistent and general use of color might prevail in our street architecture. Color is, however, almost a closed book to many architects, and the reason for this, we believe, is very largely timidity and a fear of spoiling the particular building which engages the attention. Timidity, however, never built great monuments nor led the way to any advance, and if we are to do color we must stop talking about it and get to work and do it. It is not every one who has a distinct eye for color, and it is not always possible to reason out in advance a scheme of applied color which will be successful. In this connection we are reminded of a most excellent designer whose chief title to fame was his ability to work out an uncomfortable corner or to straighten out an entangled bit of design. Indeed, it used to be said that he never could do a thing right until he had done it wrong first and got it all snarled up. Now that kind of reasoning applied to color is illogical, we admit, and of doubtful success as compared with the spontaneous conceptions of the true colorist, but for the average practitioner it is far better to plunge in boldly, make a mistake in his colors and then by using a little reason try and straighten them out, rather than to yield to the timidity which would lead him to abandon striking combinations entirely and adhere to the commonplace. For instance, let one of these timid designers some day try an experiment. Suppose he has a terra-cotta front, let him somehow put a great blotch of green right in the center. As he has got it there he has got to make it good looking, so the next step might be to put right alongside of it a brownish yellow; and if the green is a bright emerald-green hue such as we sometimes get in the

terra-cottas, let him put just a faint dash of purple between the yellow and the green and he will have a combination which he will have to use his wits to get out of. The chances are that it will be thoroughly bad: but by remembering the simple fundamental laws of harmony and contrast in color, remembering that in a general way red complements the green, and purple the yellow, and blue the orange, and by making a few studies in pastels, it would be very strange if he couldn't pull himself out of that combination with a result which ought to yield some very interesting and, after a few trials, valuable color effects. At any rate, after a man has done this once or twice his worst enemies would never accuse him of timidity, and if he didn't succeed in making a success of the combination he can, at least, console himself with the feeling that some other wayfarer, seeing his failure, might take heart, try again and do it better, all of which may not be particularly consoling to the owner who has employed the essayist, but it would be a step towards what we are all looking for, color in our buildings. If any one should undertake to analyze most any of the really successful architectural color effects, such, for instance, as the Della Robbia frieze on the Pistoja Hospital, it would be seen that the very colors which we have enumerated here are used in juxtaposition and that the unity is brought about by what is added after these had been thrown in; and though, as was said before, the best way is to feel the color in the beginning, to do it naturally and let it be *sui generis*, he who has not that endowment need not, therefore, content himself with the commonplace monotones. A friend of ours taught his son to swim by tying a rope around his waist and throwing him into the Mississippi from the deck of a steamboat. The boy learned to swim very promptly. A similar treatment of self-immolation on the part of our timid designers would very speedily give us, at least, the prospects of some strong colorists.

The aggregate fire loss in the United States for 1897 was $2,454,592,481, which is $2,382,845 less than in 1896. The insurance loss for the year was $1,438,902,448, or $7,181,655 lower than the loss for the previous year. This showing is smaller than for any year since 1890. A noticeable feature is that for the first time the yearly loss of New York was exceeded by that of another State, Pennsylvania leading with a fire loss of $13,706,315, and an insurance of $8,674,980.

The number of fires reported during the year was 55,779, of which but two caused a loss of over $1,000,000. One was at Knoxville, Tenn., in April, where the figures footed up to $1,019,725, and the other was at Pittsburgh, Pa., in May, when the loss was $1,905,515. The loss to the State of Pennsylvania on the buildings at Harrisburg aggregated $700,000. The greatest monthly loss occurred in January, when the property loss was $11,594,495, and the insurance loss $7,187,515.

There were burned in 1897, 33,033 dwellings and tenements, 11,811 barns, stables, and granaries; 1,753 general merchandise stores; 913 retail liquor stores and saloons; and 735 churches.

Part of the $50,000 asked for by the National Academy of Design, in recent appeal to its friends for aid in the erection of the school portion of its new home on Morningside Heights, New York City, has been subscribed, and it is confidently expected that the balance will be raised soon. The architects, Carrère & Hastings, have estimated that the new academy, if built of the finest material in the best manner, would cost not less than $800,000, and the academy has only about $200,000 to meet this demand. It has been decided to erect the school portion of the building first.

The Chicago Architects' Business Association has prepared and copyrighted a full set of forms of contracts, certificates, waivers of lien, and other blanks, in accordance with the provisions of the mechanics' lien law of Illinois. These blanks were carefully prepared by a special committee appointed by the association, and are believed to meet every exigency of the lien law and the conditions of building in that section.

Competitive plans for the $350,000 addition to the Ohio State House were submitted by Yost & Packard, of Columbus; H. A. Linthwaite, of Columbus; George F. Hammond, of Cleveland; Samuel Hannaford & Sons, of Cincinnati; and H. C. Lindsey, of Zanesville. The plans of Samuel Hannaford & Sons, of Cincinnati, were accepted. The structure will be completed in eighteen months.

At a meeting of the Executive Committee of the American Institute of Architects held in New York, July 21, the following persons were elected as Fellows of the Institute: Charles I. Berg, Albert L. Brockway, New York City; William H. Conway, Springfield, Ill.; Herbert W. Foltz, Indianapolis, Ind.

By operation of section 11 of the license law, nearly one hundred architects in Chicago, and thirty more in the State at large, having failed to renew their licenses during the month of July, have had the same revoked by orders of the State Board of Examiners of Architects on the first day of July, 1898.

There will be 60,000 sq. ft. of white enameled brick arches on the under side of the midway floor of the new Southern Union Station, Boston, requiring in their completion 400,000 of the finer quality of brick, and 600,000 of the commoner kinds, in all a round million. Where the roof has been covered in the work of setting the arches has been started.

ILLUSTRATED ADVERTISEMENTS.

In the advertisement of Fiske, Homes & Co., page vi, is illustrated one of a number of mantels which they have just finished for the new Ranleigh Chambers, Boston.

The Conestoga Building, Pittsburgh, Pa., Alden & Harlow

CARTOUCHE FROM THE PAVILION BUILDING, BOSTON.
Executed by the New York Architectural Terra-Cotta Company.
Burr & Sise, Architects.

architects, is shown in the advertisement of Harbison & Walker Company, page xv. Two residences, one of Justice H. B. Brown, Washington, the other of D. J. Hubbard, Esq., Chicago, are shown in the advertisement of the Celadon Terra-Cotta Company, page xxvii.

The American Schoolhouse. X.

BY EDMUND M. WHEELWRIGHT.

THE Mechanic Arts High School in Boston was begun in 1893. It was not at first fully completed, and the addition originally contemplated for this building is about to be built. This addition, with certain changes in the original structure, will complete it with all the features shown in the plans here published.

The following description of the plan and appointments of the building is based upon that given in the last report of the master, Dr. Charles W. Parmenter.

The boiler room, coal room, engine room, and engineer's store room are in the basement. Here, also, are the principal toilet rooms and dressing rooms containing the clothes lockers, each of which is 23 by 18 ins. in plan and 5 ft. high; the floors and tops of these lockers are of stout wire netting. The doors have panels of the same netting and are fitted with combination locks. In one of the dressing rooms is the lunch counter. The forge shop is also in the basement.

On the first floor are the office of the master with lobby for visitors and library adjoining, chemical laboratory and room for chemical stores; two school rooms, each accommodating seventy pupils; three recitation rooms, the machine shop, the metal-working tool room, storage room for metal stock, office for the instructors in metal work, and a private room for men teachers.

On the second floor are the physical laboratory, with teachers' laboratory, and store room and dark room adjoining, private room for women teachers; two school rooms, identical with those on the first floor, two wood-working rooms for first-year pupils, the carpentry tool room and room for preparation of wood-working stock, and the finishing room.

THE MECHANIC ARTS HIGH SCHOOL, BOSTON.

On the third floor are three drawing rooms, two school rooms, a large recitation room, storage room for drawing materials, wood-turning and pattern-making room, a modeling room, and a toilet room. The drawing room at each end and the adjacent school room are separated by flexible doors so that the two rooms may be thrown together to furnish an assembly hall for occasional use.

Each of the drawing rooms has accommodations for six classes of thirty-six pupils. Each drawing table is fitted with a locker which holds six half-imperial drawing boards. The six drawers on the right contain the personal property of each pupil. In drawers above the locker are placed the drawing instruments furnished by the school board.

Over the teacher's platform in each drawing room, in addition to the slate blackboard on the wall, is a set of three movable blackboards placed one directly in front of another, and each hung by counterbalanced weights. In the rear of the larger room are the sink and racks for washing and drying blue prints.

Two adjoining rooms on the second floor are assigned to the department for wood-working with hand tools. These rooms are equipped for six classes of thirty-six pupils. Each room is furnished with eighteen double benches, 57 ins. long, 45 ins. wide, and varying in height from 29 to 33 ins. On either side of these benches is a tier of three drawers, one of which is assigned to each pupil, for the set of cutting tools with which he is supplied. Here, also, is kept his apron and unfinished work. Dividing the top of the bench in the center is a vertical tool board 9½ ins. high. At the ends of the bench, upon hooks and shelves, are kept the measuring and miscellaneous tools used in common by members of different classes.

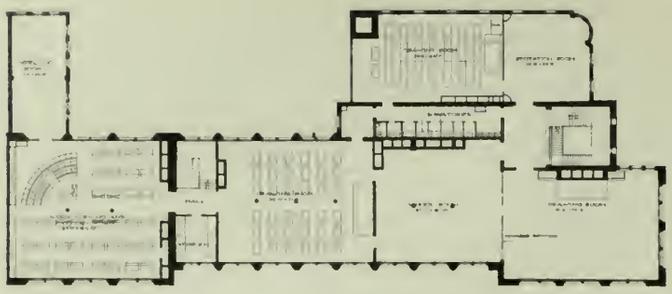
Each pupil is supplied with a tray for carving tools 26½ ins. long, 13¾ ins. wide, and 1¾ ins. deep, divided into compartments. These trays are stored in cases at one end of each room. In each room is a grindstone with trough.

The tool room, which contains a variety of minor supplies, together with a large collection of miscellaneous tools for occasional use, is located between the two wood-working rooms, and is entered from either of them. Many of the shelves in this room are divided by narrow strips of wood in such a way that each tool has its appropriate compartment. Each pupil is supplied with three brass checks bearing his shop number, one of which will be received by the person in charge of the tool room in exchange for any desired tool. The check is placed in the compartment from which the tool is taken, where it remains until it is redeemed by the return of the tool.

Opening out of one of the wood-working rooms is a small room for the preparation of stock for models and for special saw work, in which is installed a double-arbor bench saw, a band saw for the use of the instructors and especially skilful pupils only, and a jig saw which all the pupils are permitted to use. The location of these saws in a separate room permits their use without disturbance to class exercises.

There are thirty-six benches in the wood-turning and pattern-making room. On one side of the bench is an 11 in. speed lathe, the other end is used for hand tool work. As in the other wood-working rooms, these benches are fitted with 9 in. quick-action vises. Beneath the lathe is a tier of three drawers, in each of which is kept a set of turning tools. On the opposite side, under the work bench, is a tier of four drawers. The top drawer in this tier is devoted to the measuring and miscellaneous tools used in common, while each of the three others contains an undivided set of cutting tools.

The forge shop, when constructed in accordance with the plans here shown, will be 40 ft. long, 100 ft. wide. It is to be lighted both by windows in the wall and by a large monitor with skylight. The restriction of the site necessitates a closer relation of the forge shop with other parts of the building than is theoretically desirable, but the experience with the room as originally constructed proves that the noise incident to the work of this shop will be of but little practical disadvantage in spite of the closer connection given by the enlarged shop; at least, this disadvantage is not enough to outweigh the advantage of the equipment of this shop for the



THIRD FLOOR.

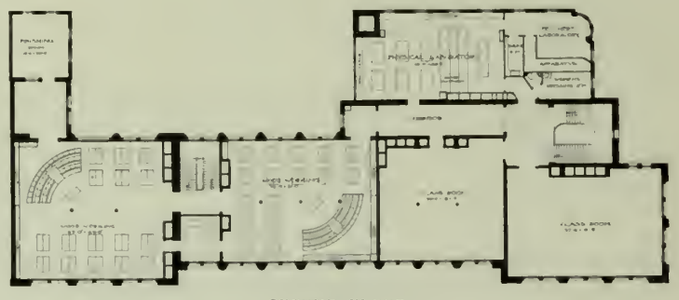
instruction of thirty-six, instead of, as formerly, twenty-four pupils in a class.

The forges, of the Sturtevant single-fire, down-draft pattern of the latest make, are to be ranged on each side of the room, and in a double row. An 130 lb. anvil is to adjoin each forge, and near by is to be a tool bench. Each boy has a drawer in this tool bench for the storage of models and for his hammer.

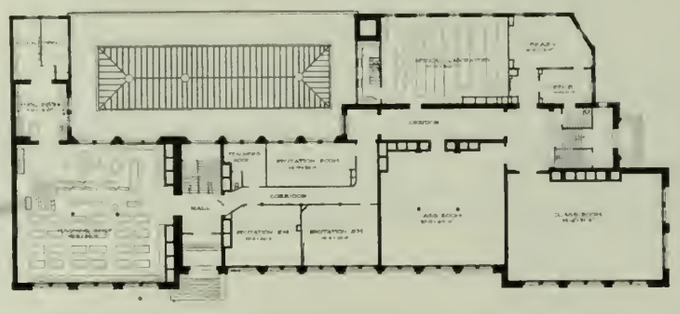
Eleven blacksmith's vises are attached to benches 21 by 30 ins., 34 ins. high. The blast for the forges is to be given by fans, by which also the foul air and the products of combustion are to be carried off through underground ducts to the aspirating shafts through which runs the boiler flue. The instructor's forge and two other forges are to be supplied with hand blowers for use when the engine is not running. Near the instructor's anvil is to be a 75 lb. power hammer. At the center of the room is to be placed a combination power punch and cutter. Attached to the wall near the power hammer is to be a drill press. At the opposite side of the room, resting on an iron bracket bolted to the wall, is to be a grinding machine, which carries at each end of the spindle a 12 by 1½ in. emery wheel. At the end of the shop, opposite the instructor's forge, will be two cases for the storage of supplies and special tools. The equipment of the room is to be completed by a bolt-heading machine, an oil tank, a brine tank, and a swage block.

The machine shop is equipped for classes of twenty-four pupils. The benches, 20 ins. wide and from 32 to 36 ins. high, which extend along three sides of this room, are divided into twenty-four sections, each provided with a vise and with a tier of four drawers. One of the three lower drawers is assigned to each pupil, but the top drawer is reserved for the tools used in common by members of different classes. In his individual drawer the boy stores the work upon which he is engaged, together with about a dozen files and a set of chisels and lathe tools. At the beginning of a lesson each pupil obtains from the tool room a tray adapted to fit a compartment either in the upper drawer at his bench or on the tool board of his lathe. This shop is equipped with the following tools: Twenty-four lathes, nine hand lathes, two planers, one pillar shaper, one milling machine, one tool and cutter grinder, two upright drills, two grindstones with troughs, one wet and dry grinder, one arbor press, one power hack saw.

Each engine lathe is furnished with a tool board of special design, adapted to receive the tool tray, and to provide a convenient place for cutting and miscellaneous tools. Upon pegs in a vertical board fastened under the bed of each lathe are kept the face plates, change gears, back rest, chuck drill rest, and a set of dogs. There is no available space for an amphitheater similar to those in the wood-working department. During the demonstration lessons pupils occupy tablet armchairs grouped about the instructor's bench, which is placed in front of a large blackboard in the rear of the room. Near at hand is the tool room, furnished with shelves and cases for the numerous tools required for the various kinds of work. One of these cases which stands near the door contains the small tools likely to be needed frequently, and the tool trays previously mentioned. An attendant delivers these trays to the pupils at the beginning of the lesson, and is always ready to furnish any desired tool in exchange for a pupil's check. The universal tool and cutter grinder and the power hack saw are located in this room.



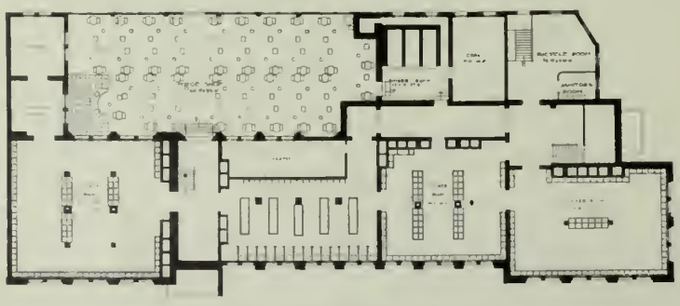
SECOND FLOOR.



FIRST FLOOR.

It is the opinion of Dr. Parmenter that it is inadvisable to have more than twenty-four pupils in a machine-room class, even when the arrangement of the building is all that is desirable when it is equipped, and with the best appliances, as a larger number cannot receive the requisite individual supervision by the chief instructor; and further, that in none of the other mechanical departments of such a school should there be a greater number than twenty-four in a class unless the arrangement of the building is thoroughly convenient and the equipment is of the best pattern and quality.

The experience in this school also shows that the large class rooms for seventy pupils are undesirable unless supplemented by an ample number of large recitation rooms, each to accommodate thirty-six pupils. The Boston school, if space had permitted, would have been provided with two such recitation rooms in addition to those which are shown on the plans.



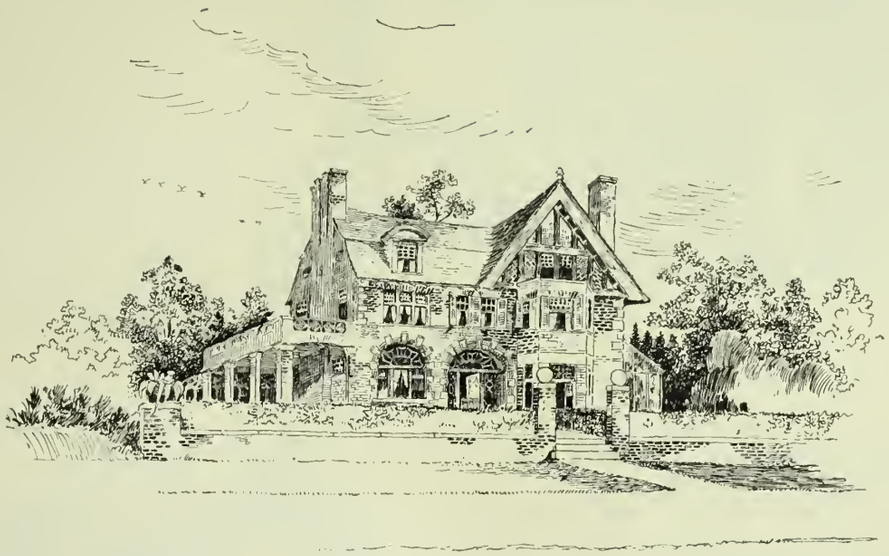
BASEMENT.

Suburban Residence Built of Brick.

COST, TEN THOUSAND DOLLARS.

BY CHARLES A. RICH.

THE author of the "Story of My House" remarks that "if we leave the house to the architect, he builds merely for himself — he builds *his* house, not yours." This is just what we propose to do. The client has left the office, and, thank Heaven, has put the ocean between us, and has left nothing behind to remind us of his existence except a brief page of "necessities" and a bright, crisp check for ten thousand dollars. We place it on ice for preservation until the house is completed.



EXTERIOR.

Our client does not have to earn his daily bread; his father was an engraver and etcher of note, and upon taking up his residence among the justified, left to his son not only his own good taste in matters of art, but also sufficient to keep the wolf from the door. The young man meanwhile gave promise of being sufficiently gifted in black and white to keep himself and the toby closet well stocked with the necessaries of life. Thus our work on his house is cut out for us and made the more easy. Now, since every man has what may be called his own distinct character, so it seems to us that his home should reflect somewhat of this character, at least as to his needs, so that the man will fit into the house, and his desires and modes of life find expression in the general arrangement of parts.

To begin with, we find in the list of "necessaries" that our own hobbies have been met to the letter, and we can practically build to suit ourselves. This is his first house, but it is our one hundredth or more, so we ought to know what he ought to want.

To illustrate our hobbies: I have known a man who would willingly go without the almost necessary apparel of civilized man, and perchance be down at the heel or lacking in buttons, yet he would buy beautiful pictures, or books, or bric-à-brac. Now this man is sensible; he gets all there is enjoyable in life, although some people think his discrimination curious. Just so in our house we shall insist upon an enormous room which we shall call "the living room," even at the expense of all other reception quarters, wainscots, carvings, etc.

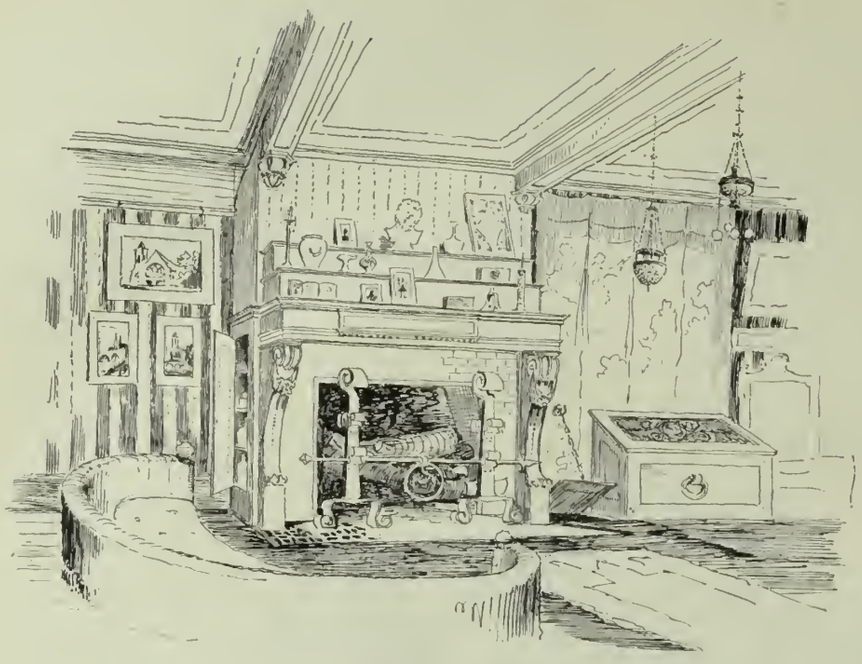
ENTRANCE.

We shall also insist upon a fireplace in this room of rooms that shall grow sick at any wee billets of wood, and demand the good old-fashioned logwood bonfire. The expense of a few cords of good cheer often wards off dollars' worth of gloom and blues. I remember in old-time fireplaces there were nooks and crannies, cupboards and closets. Not to be beaten by our forefathers, therefore, in matters so important, we simply call attention to the sketch of the fireplace, the facing simply laid up in soft red brick tile, with the inviting little toby closets on each side, and the shelves of which seem to indicate the insidious cocktail and the fragrant Havana. We never see them, they are for our friends, of course.

Secondly, every man must have a place of retreat, his den, his workshop, his library, whatever you may choose to call it. He must have a place of retreat where he may lock himself in, or be locked in upon occasion. In this particular case, about the only instruction of our client was to have his den towards the north, so that when the inspiration struck him, he might the better carry on his work. A glimpse of this room may be seen in the plan through a picturesque little balcony in the living room, the floor being raised five steps above the hall level, and the opening being filled with an old iron gate grille, picked up, we will say, in Spain, or some other foreign clime.

Since our check is not large, we cannot reasonably expect a large house, so you will note that the den and kitchen quarters are but one story high. But this gives the possibility of running the den roof on a pitched slant, whose real timbers we have exposed and neatly stained green, and whose roof will not be hot in summer, being towards the north. The sketch will show you the general treatment. Here is an all brick mantel made of soft green-glaze brick, simple in design, but running high up and all exposed.

We insist that with most people beautiful surroundings induce beautiful things. Our client, therefore, as he sits at his work table, shall have before him an old rose arbor, bright with shadows in the morning, and soft and cool in the shade of the afternoon, and if perchance his mind wanders, as he works, to those cooling retreats of a Capri or an Amalfi, he will find a little doorway in the corner of his room through which he may glide into his arbor and revel in the same day dreams of those lovely spots. He, too, if he will, may

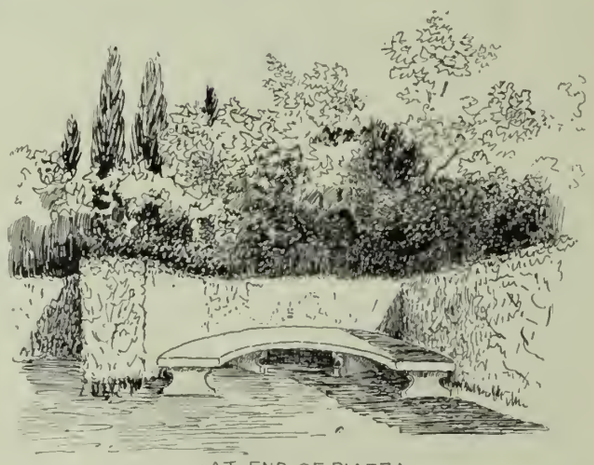


LIVING ROOM.

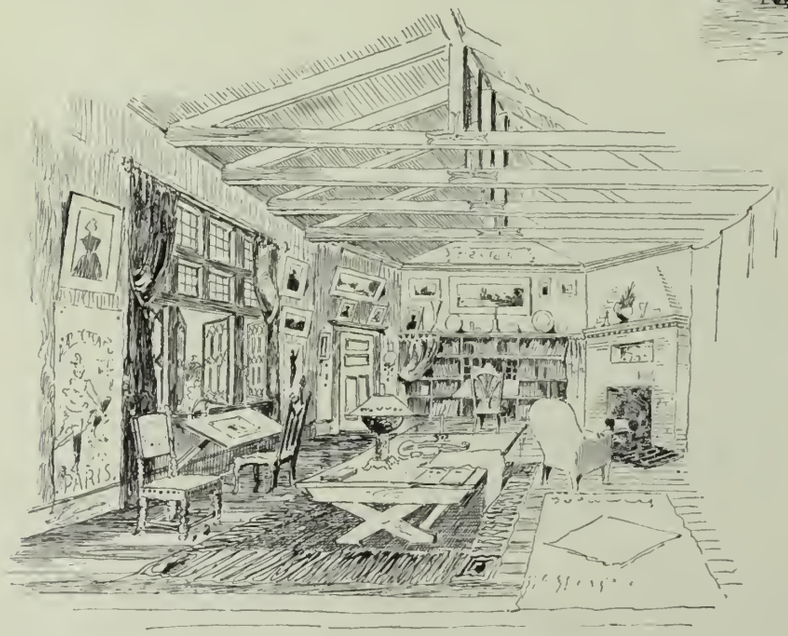
have his *siesta* in a grape or rose shadowed arbor, and if he has been sensible enough in his purchase of a hillside to overlook a water view, his dreams may be sweet indeed.

Our last point of insistence concerns the mother as well as the head of the house. Have you ever lived in a house with a growing family and a single bathroom, bluntly speaking? If you have you have probably too often stood in abbreviated costume, awaiting your opportunity to slide in and enjoy your morning plunge. We trust you did not have to take the 8.20, for if you did, you have often waited in vain, and after words not fit to be printed have given it up. Yes, "godliness with contentment is great gain," but contentment can never be attained with one bathroom, and as for godliness, well, that is out of the question under such trying circumstances. We insist, therefore, on two of these luxuries, and do not forget a third for the servants, an absolute necessity in our mind.

Lastly, we are selfish men! We admit it; and since we are to spend one third of our life in nocturnal repose, we propose to have our sleeping apartments the largest and most comfortable the house affords. We must be awakened in the morning by gladsome sunshine, if we will, and not by the shades of the past night. And this same gladsome sunshine must flood this apartment each hour of the day; for it must be remembered that since the house is of modest proportions, this room is largely the day home of the wife, and her comfort is to be equally looked after. What applies to the man must the more apply to the wife: another reason for its largest size. Adjoining, and full of all-day sunshine, come the quarters of the children. They, also, are equal factors in the home life, and as such must have a slice of the best accommodations possible. And what about the guests? Well, they are transients and must be content with what is left.



·AT·END·OF·PIAZZA·

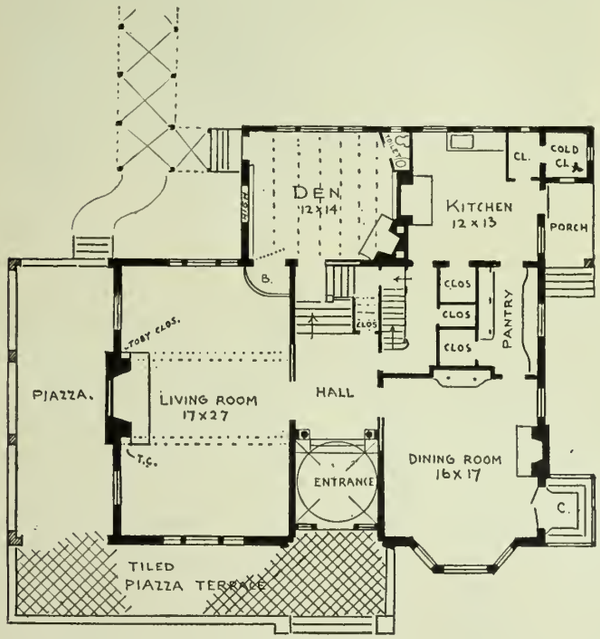


DEN.

While you have been upstairs we have been preparing the entrance. Here we intend to make a departure from the general mode. We came across a beautiful, ivory-colored speckled brick while we were considering the plan, and at once determined to enter the house on a lower level, make a sort of lower vestibule with tiled floor and side walls, and simply groined ceiling of these soft-colored bricks. Why not? Introduce, then, a frieze of the old Parthenian casts, recalling thus to the mind the beauties of the Acropolis, and we surely have an inviting entrance. We also have a place to seat the persistent book agent, the aromatic piano polisher, the messenger boy, or that constantly appearing personage known to every household as the "unknown." Even so, let it be all brick and tile, to intimate that he who stops there is yet among the outside elements, and may not ascend to the hall.

But one cannot think of his home without placing it among its surroundings, which to make up a whole are necessary and essential parts. The

very trees which overhang their branches, the hedges, gardens, and shrubs which lend color and tone to the picture, each one plays its part. Think for a moment of the sunny slopes of an Italian landscape, the broad terraces, and the grape-covered arbors. They are the cheapest accessories of the home, and yet they are the features that give esthetic and artistic character to the whole. They are full of sentiment; the very rustle of the leaves, or their ever-varying shadows are joys which increase as nature showers on them an ever-increasing wealth of foliage. Our ground slopes up gradually from the front, and we will build a low brick wall with old gate posts, and wide and generous steps. Back of this, across the front, shall be a low box hedge garden, such as is dear to every old New



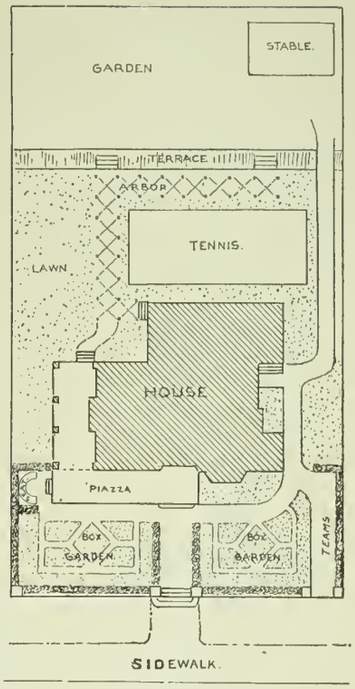
FIRST FLOOR.

England recollection. At the end of the piazza we shall mass the trees, form the hedge with a sort of recess, and therein place a little circular bench, a cool retreat in the morning or after the shadows have fallen in the late afternoon. And then at the rear, as I have already pointed out, we shall form the arbor, and tennis court, and back of this the garden. Do you tell me this seems very beautiful in the word picture, but seldom exists in reality in ten-thousand-dollar houses? Then we shall retort upon you that it is the client's fault and not the architect's. This client is going to have it at any rate, and if you doubt it, you have only to look at the little plan of the grounds.

But what of the outside of our house and its general construction? Louis Stevenson portrays his house in poetry: —

> "Here all is sunny, and when the truant gull
> Skims the green level of the lawn, his wing
> Dispetals roses; here the house is framed
> Of kneaded brick and plumed mountain pine,
> Such clay as artists fashion, and such wood
> As the tree-climbing urchin breaks.
> My house, I say."

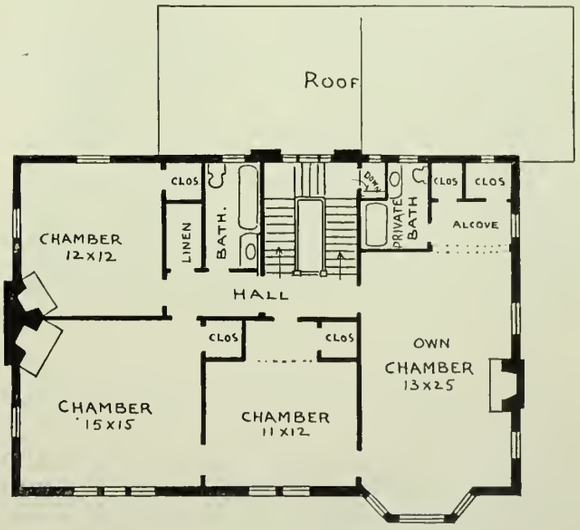
So let it be; good red brick, and its enrichments shall be of terra-cotta of the same character. We shall select a hard-burnt common brick and shall thank our brickman if he will send us all the old black vitreous cast-off odds and ends of his kiln. A curious order to a layman, who will not look at them in the pile, but will wonder at their beautiful effect when laid up with random headers, with white pointing. No feature is so well adapted to our material as the arch, and we shall therefore use it for our entrance and the two large windows in the living room. The quoins shall be simple with deeply molded jambs of brick. In the gables we shall still use brick, but dispose of it between the heavy open beams in diaper patterns. Thus is every component part of our house formed from the clay of which the scripture informs us on good authority we, also, are most wondrously made. Thus, also, is our client and his house bound together by a common tie, and singularly enough, the house will outlast the client.



PLAN OF GROUNDS.

But after all, why describe the exterior further? Candidly, we live in the interior, and the exterior is but the shell, which we have pictured to be of simple form to cover the plan. "I like it — I like it not," and herein is contained the whole matter.

THE discussion on the extension of the Boston fire limits has reached a rather acute stage. It is argued that to build of brick is so much more costly than to build of wood that the owners of land in the less thickly settled wards could not afford to improve their property, but must sell at a loss, and the value of land so restricted would be greatly reduced. This notion seems to have produced a certain effect upon the public, but, like a good many other apprehensions which stand in the way of public improvements, it would be hard to tell on what real foundation it rests. Certainly, the prohibition of wooden buildings in Philadelphia has neither ruined the suburban districts nor deprived the poorer citizens of homes. On the contrary, in no great city on this continent are people of small incomes housed so safely and comfortably as in the little brick houses of the outlying parts of Philadelphia. — *American Architect.*



SECOND FLOOR.

Brick and Marble in the Middle Ages.

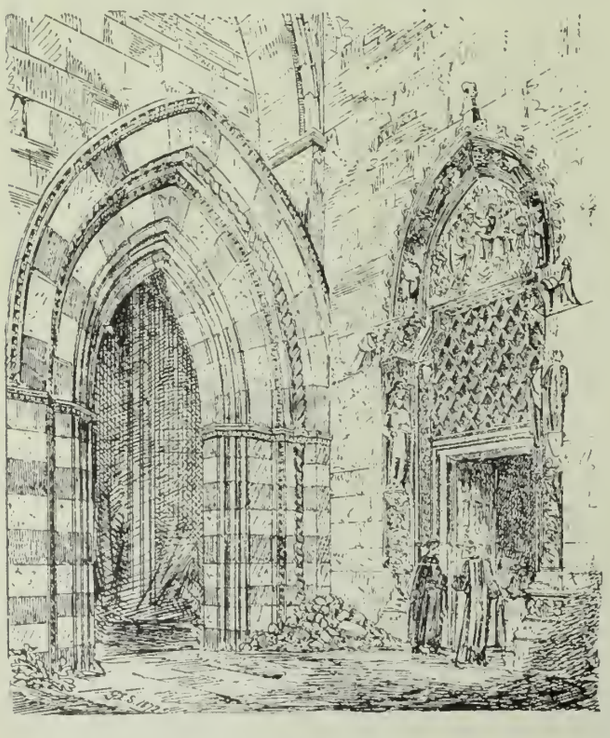
BY G. EDMUND STREET.

CHAPTER IX. (*Concluded.*)

AT Aquileja the appropriation of pagan fragments was carried so far that we found Classic capitals doing service as holy-water stoups.

The interior of the eastern part of the church is more interesting than that of the nave. It is all probably of the original foundation, and retains most of the old arrangements. The floor of the choir is raised some ten or twelve steps, with two flights of steps on each side of the centre. At the top of these steps, projecting sideways into the transepts, are tribunes with open balustrades which seem to have served as ambons. The apse has two rows of seats, with the patriarch's seat raised in the centre, and the altar stands in front of this on the chord of the apse. It is curious that this, which is an apse internally, is a square projection from the transept externally.

A descent on each side under the tribunes leads to the crypt under the raised choir. This is very small, but is divided into three aisles in width, and four bays in length. The central space is screened round jealously with close grilles reaching from floor to vault, so as to protect the shrine of S. Hermacora, which occupies the centre. But little light steals into this crypt, and that little has to find its way between rank weeds which grow up round the windows; but there is quite enough to reveal vaults covered with paintings of subjects, and to show as picturesque and beautiful an *ensemble* as one need wish to see. Kneeling desks were placed round the shrine, but the cultus of S. Hermacora seems to be no longer popular, and the only pilgrims are curious visitors like ourselves.

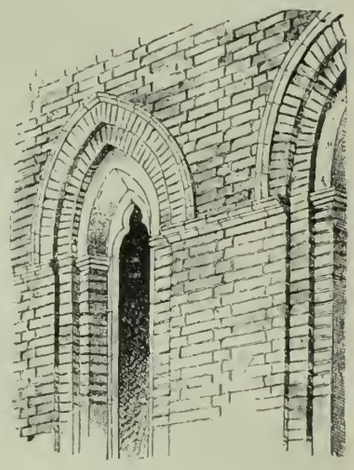


DUOMO, UDINE.

The paintings on the groining appeared to me to be of not earlier date than the fourteenth century, and are very cleverly contrived to suit the early vaults.

The transepts remain to be mentioned. Each has a small eastern apse near the extreme end, and a tomb or shrine between this apse and the choir tribune. These are of the thirteenth century, and are enormous blocks of stone, panelled and carved in front, and supported on four detached shafts. In the south transept there are fragments of a Byzantine screen round the altar in the small apse, which are of rare beauty and intricacy. The screen consisted of a solid base, breast-high, covered with carving, and upon which columns stood originally at intervals of six feet, just as in the screen at Torcello, of which I have given a view.

There is an early painting of Our Lord, seated on a throne in the semi dome of this apse, and there are remains of an early wall-painting in the choir-apse, partly covered by a fifteenth-century picture in a good frame. The choir stalls are of elaborate intarsiatura work, and date from the end of the sixteenth century.



AISLE WINDOWS, DUOMO, UDINE.

A little way to the north of the church stands its campanile, a tall plain mass of masonry, with the date MDXLVIIII. on the upper stage, and the inscription "*Tadeus Luranus hoc o. fecit.*" It is worth the climb to the top to get the view over the flat surrounding country, which reveals what one fails to see from the dead level of the road, that the Adriatic is not far off — far enough, it is true, to have ruined the port of Aquileja — but so near as to be a very important element in the fine prospect. From here we saw through the haze the island of Grado, on which I cast longing eyes in vain. My information as to the distance had been all at fault, and I thought that in a long day from Gorizia, I might see both Aquileja and Grado. This is, however, quite impossible, as the boatmen required, they said, three hours for the *trajet* each way. It was a misfortune to miss the church at Grado, which contains much that is worth seeing, and has considerable historical interest, as the seat of a patriarch, whose jurisdiction included Malamocco, Venice, Torcello, and Chioggia — and whose importance is vouched for by its old titles, "Venetæ oræ Istriæque Ecclesiarum caput et mater," and "Aquileja nova."

The patriarch's throne and the ambon or pulpit, which still remain in the church at Grado, are evidently extremely fine examples of Byzantine furniture. The former corresponds with that of Aquileja, but has the rare addition of a flat canopy or tester supported in front by two columns, which rest on the side walls of the steps leading up to the seat. Probably there was a similar canopy at Aquileja. The dignity of the patriarchal throne is not a little increased by the addition, simple as it is in its decorative features. The pulpit is even more striking: it is six-sided, all the sides being arranged in a series of bold circular projections, with sculptures of the Evangelistic emblems on their face. The pulpit is supported by a central shaft, and six smaller columns alternately plain and spiral, and above the pulpit a series of octagonal shafts are provided to support a canopy or dome over the head of the preacher. These columns carry arches which are of the common Venetian ogee trefoil outline, and, there can be little doubt, are later than the pulpit. The combination is, however, very picturesque, and not the less interesting in that it has a most strangely Eastern look.[1]

The rest of my party went, whilst I was sketching in the cathedral at Aquileja, to look at the baptistery. They reported it to be as completely modernized inside as it certainly is outside, and so I failed to enter it. I believe I lost nothing, though at one time it was well worthy of a visit.

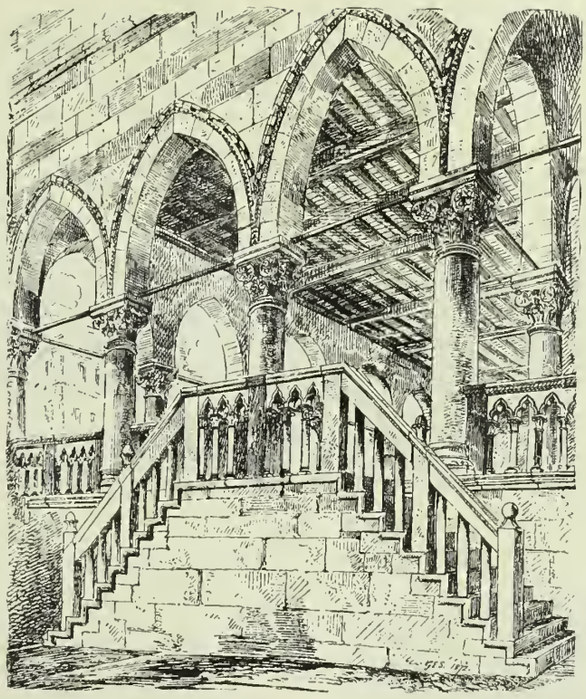
A rapid drive back to Gorizia was made with the advantage of

[1] I take these notes of Grado from "Mittelalterliche Kunstdenkmale des Oesterreichischen Kaiserstaates." Stuttgart, 1858.

a view of the mountains before us all the way; and we arrived in time to avail ourselves of the last train to Udine, which we did not reach until after dark.

I arrived here in entire ignorance of what might be in store for me in the way of my art. I had seen no drawings of any of its buildings, and I suspect that most of my readers are in the same state of ignorance. It was with no little pleasure, therefore, that my earliest stroll in the morning brought me to a Palazzo Publico, which if not exactly magnificent in scale is at least very important, and has the special merit in my eyes of being all Gothic, and almost unaltered on the outside since its erection. It stands in a piazza which some sixteenth or seventeenth century scenic architect has treated with considerable skill. One or two public buildings and a steep hill behind them have been dealt with in such a way as to call to mind such a disposition of buildings as one sees, e. g., on the Capitol at Rome, and no doubt so as to increase very much the apparent importance of this little city. The Palazzo Publico is a building of two stages in height, the lower entirely open with pointed arches resting on columns, and the upper presenting on its principal front a large balconied window, or Ringhiera, in the centre, and smaller windows on each side of it, and at the ends. The cornice and roof are modern, otherwise the whole design is intact, and exactly in the state in which its architect left it. The character of the design is clearly Venetian, and the date about the beginning of the fifteenth century, but still it is not slavishly Venetian as the houses of Vicenza are, but on the face of it the work of a local architect who knew enough of what was being done in Venice to profit by it without absolutely copying.

The lower or ground story is open on three sides, and has ten arches in front, and five at each end. The space inclosed is irregularly divided by a longitudinal line of columns, carrying semicircular arches, which support the walls of the rooms above, the access to which is by a modernized staircase in the rear. The materials of the walls are generally red and white marble. The balustrades between the columns and the staircases leading to them are so good and complete as well to deserve illustration. The upper part of these, including the cusped heads to the openings, is of white marble, whilst the shafts are alternately of the same material and of serpentine. The upper story is modernized within; but one learns to be grateful for small mercies, and it was certainly with every feeling of gratitude to later architects that I sketched this really beautiful building, which they have been good enough to leave so nearly unaltered on the outside.



PALAZZO PUBLICO, UDINE.

The state of the cathedral is less a subject for thankfulness! The whole building has been completely modernized within and without, with the exception of the west front and the tower. The former was the façade to a nave with two aisles on either side, or perhaps with one aisle and chapels beyond. All the roofs are of the same flat pitch, and stepped regularly so as to give a broken and bad outline to the mass. The work is mainly of brick, with some good detail in the windows of the outer aisles, of which I give an illustration. The west doorway is of the fourteenth century, with a very steep crocketed gable between pinnacles, and a badly sculptured tympanum with a curious assortment of subjects; in the centre the Crucifixion, right and left of this the Resurrection and an Agnus Dei, and above it the Nativity. Three circular windows light the three centre divisions of the front, and the two lower are connected by a broad band of brick arches which crosses the entire front just below the central circular window. There is not a word to be said in favour of such a design. It *is* old, and that is its only virtue!

The tower is more interesting, though it is only an incomplete fragment. The lower stage is of stone built in dark and light courses, with a large sunk recess on each side. On the west side is a fine doorway built of alternate courses of white marble and serpentine, and there are small circular windows in the cardinal sides just above the lowest stage. Above these the whole is a plain mass of brickwork, of which a very small portion only seems to be original. This tower is no less than fifty-two feet in outside diameter, and its lowest stage is finely groined, with no provision for the passage of bells. It might almost as well have been intended for a baptistery as for a tower! It stands close to the north side of the choir, and by its side is a rather fine doorway leading into the transept, with a good deal of late Gothic sculpture and architectural detail. There are niches and figures in the jambs and round the arch, the Coronation of the Virgin under the latter, and figures of the Annunciation stuck against the wall on either side in a very haphazard fashion. The strange contrast in style between these two doorways will be seen in the illustration which I give. Here we have, side by side, examples of the most pronounced kind of two national styles of Gothic; the door into the tower being as clearly Italian in its beautiful colour and refined simplicity, as that into the church is German in its cleverness, want of repose, and hard angularity of detail.

The only other old churches I could find in Udine were San Giacomo and that of the Ospidale. The former is modernized, but retains an early square brick belfry, arcaded below, and with simple pointed windows of two lights above. The church of the Ospidale is also modernized. The façade has a gable with an old brick eaves-arcade, and the only too common feature of a large circular window inclosed within a square border.

A picturesque Renaissance well-canopy (dated 1487) over the Fonte di San Giovanni was the only other feature I could find worth sketching or making a note of; and having seen everything, I took the railway on again to Venice.

The views of the Friulan Alps, under which one travels for some distance, are very exquisite. We passed Conegliano, where I once left the railway for a journey through the heart of the Dolomite country to Cortina d'Ampezzo, and, to my regret, hurried past Pordenone, having forgotten that at any rate a tall brick campanile was there, which seemed to promise some reward to the visitor. It is of plain arcaded brickwork below, and the upper stage is slightly battered out with very tall machicoulis, from within the parapet of which a smaller octagonal stage rises, covered with a low spire. The whole composition as one sees it from the railway is unusual and very good, and recalls just a little the campanile of the Palazzo Publico at Siena.

The Grueby Faience.

BY C. H. BLACKALL.

THE opening of Japan to the commerce of the West less than two generations ago brought to what we are pleased to call civilized nations an art development, which, though at that time regarded as barbaric, has since been accepted as a manifestation of the highest appreciative and creative perception. Japanese pottery and faience have set the style for the whole civilized world, and for nearly half a century the aim of our foremost potters has been to produce something which will compare with the Japanese porcelains. It is not for this generation to say how much success has attended our attempts at imitation. We cannot fairly judge of our own achievements as compared with what was produced by a far-off and alien race, but it is certainly given to us to appreciate a pretty full measure of progress which has been ours, and by comparison we can form an estimate of the direction in which the forces of development are tending. As a nation we have been too busy to produce great art works. At any rate we have certainly given more attention to the utilitarian arts than to the purely esthetic developments of human intellect, and until a very recent period it is doubtful if there could have been found in the whole of this country a single manufactory capable of turning out pottery or faience which was worthy for a moment of being compared with the average work of the Japanese, either in design or in the mechanical details of artistic workmanship. It has taken us a long while to approximate the fundamental instincts of the Japanese craftsman, namely, that the art of a piece of pottery is not necessarily dependent upon the amount of work expended upon it, or upon the fineness of the material, but is a direct factor of the thought and appreciative skill possessed by the one whose hand is responsible for the result. That we have learned this lesson to at least a limited extent has been manifested by a recent exhibition in Boston of the work of the Grueby Faience Company. It has been a privilege and a pleasure to watch the attempts which Mr. Grueby and his earnest colleagues have been making for a number of long, weary years to develop the manufacture of artistic faience, a manifestation of industrial art which has until recently obtained but scant recognition, but which is bound to take an important rank; and it is a pleasure to record the persistent struggles which the Grueby Company have maintained to produce something which was perhaps a little beyond the average market, but which was certainly in a direction which the country is rapidly growing to, and which appeals most strongly to the artist. It is this kind of imaginative work which is deserving of the utmost encouragement. It is by efforts such as have been made by this concern that our artistic manufactures are going to rise, and surely no one who is familiar with the best of the Japanese work could have visited this exhibition without being impressed with the extent to which these craftsmen have been able to give to their work the elements of sincerity, of perfect fitness, and of thoroughly artistic good taste, quite irrespective of mere fashion, which go so far towards forming the fundamental worth of the Japanese product. The Grueby faience and pottery

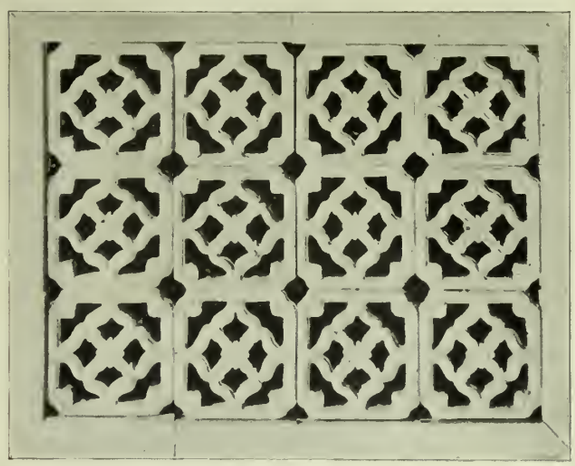
is not Japanese, except in that the spirit is common to Japanese work. The motives in this work are in many cases frankly borrowed. Life is too short and the nineteenth century is too well educated to feel any necessity for arbitrarily inventing all details, but borrowing, as these artists have, from the past, from Italy, Spain, or Japan, is merely bringing to us a little measure of the art which has graced our more fortunate neighbors, and showing us how problems can be solved here quite as successfully as there.

Some of the purely architectural faience work of this company is not unfamiliar to the readers of this publication, having been well known for a number of years. The exhibit included some excellent high relief work in the style of the Della Robbias, with the same treatment of enamels and strong glazes which characterizes the work at Pistoja. The value of such work is in its careful modeling and judicious coloring. Technically it is quite as satisfactory as the older work. There has been as yet but little opportunity to see such work in place to any great extent, but there is surely no mechanical or artistic reason why, if the need arose, it could not be quite as satisfactorily met in this medium. Another application of faience which was illustrated in the exhibition was in the form of balustrades for terraces, conservatories, etc. The work shown by the illustration is a dull blue, and was a portion of a railing used in a house at Cambridge. There are possibilities in openwork filling of this description which are very entertaining, carried out either in full glazes or in the dull mat finish, which Mr. Grueby has been able to apply very successfully to a number of the architectural forms. There was exhibited also a large lion's head,

very boldly modeled and enameled a dull copper bronze, with a mat surface, having all the effect of wrought bronze.

In tiling there were a number of interesting pieces. The illus-

tration shows one of the Moorish patterns. The main lines of the design are in low relief, the pattern being brought out by the enamel-



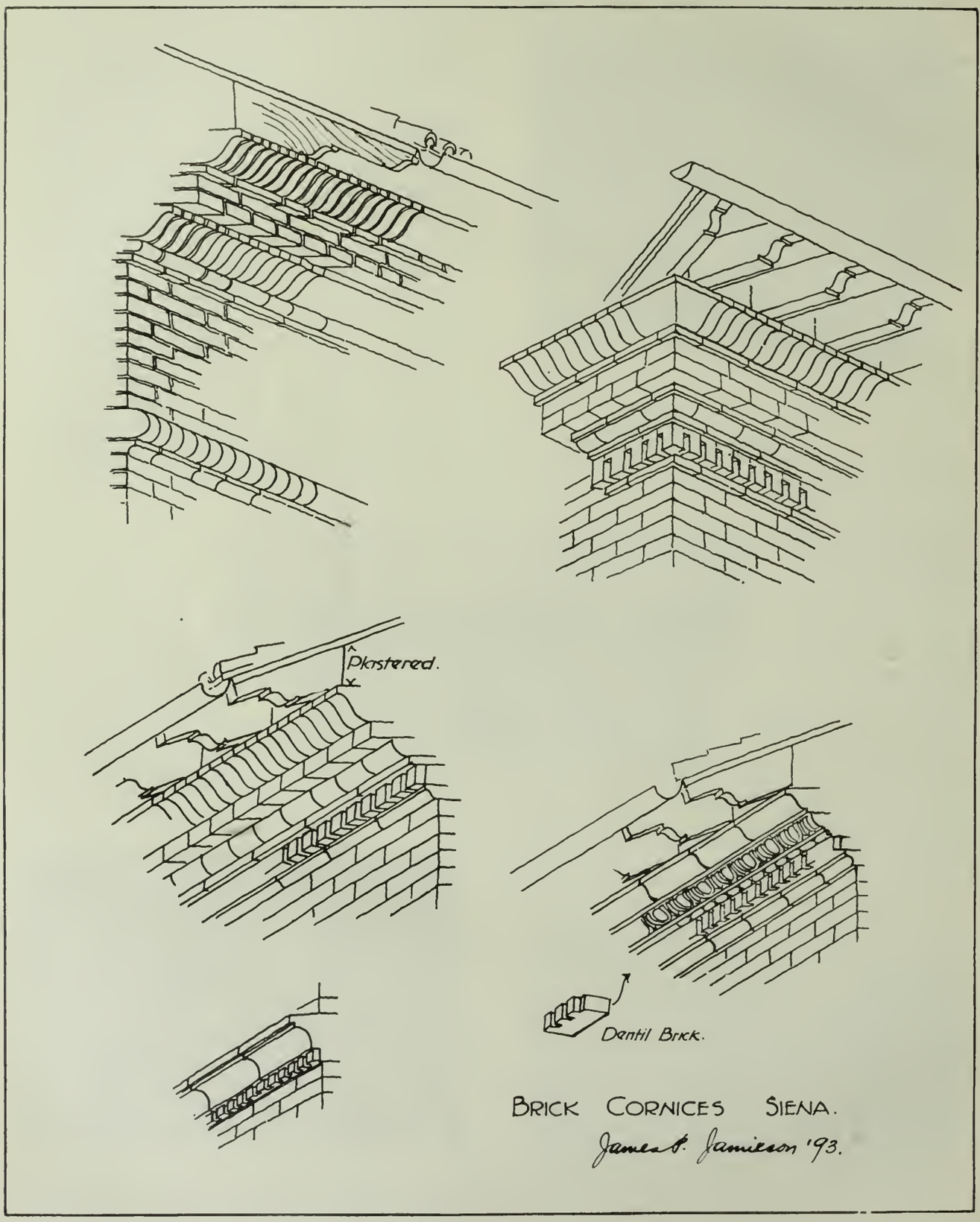
ing settling into the hollows. The upper border shows a buff key pattern on a pale green ground, with an edging of strong blue. The palm pattern below it is a deep blue glaze ground, with a mat, dull green pattern. The coloring of the tiles themselves can only be approximately appreciated from the photograph. The strong squares of colors at the corners are in a deep indigo blue. The center of each pattern is a pale blue, the radiating figures are green, and the groundwork is a cream with the intersecting patterns forming the outer row of each tile in yellow. The yellow is a bright glaze, and all the rest is dulled to a mat finish. The glaze over the lines of the pattern is very thin, so that the tile body, a pale gray, shows through, with the dull effect of mortar joints. This tiling is a very close imitation of the coloring and of the effect of the old Moorish tiles.

There were also shown a number of exceedingly interesting hand-painted hexagonal tiles with a mottled blue ground, with figures and patterns in slight relief, showing exactly the quality of old majolica ware. There were also some nursery tiles, so to speak, blue patterns and white ground, the ground, however, not a clear white, but a sort of gray crackled effect. These were very interesting and extremely effective. And there was exhibited a part of a set of peacock tiles designed for a fireplace in Cambridge, and a number of heraldic and pattern-work tiles in which the outline of the figure was formed with slip and the colors put on under the glaze. In all of this tiling work there is an entire absence of the machine effect which makes a great deal of our modern tile work so monotonous, and there is a fresh sketchy treatment of the designs which entirely removes them from the commonplace.

The exhibition included several large panels, which had been painted over glaze, by Mrs. Eliza M. Fairchild, for a frieze in the Dutch Room in the Hotel Reynolds, Boston. These were in Delft blue on a white ground, and in a decorative way were quite interesting, though, to our mind, not possessing the intrinsic charm of some of the nursery tiles.

The pottery that was exhibited was in many respects unique. All of this was hand made, thrown up on the wheel with a keen sense of proportion and subtlety of line which can best be described as throughly Japanese, while the variety of shapes, the different contours, indicated a most fertile, directing mind. They included jardinieres, flower-stands, incinerary urns, and other shapes, useful and ornamental. The illustrations show only a few of the forms, and utterly fail to give the exquisite color effects. There was a lot of ware made with a grayish body with dull crackled effect running all through it under the glaze, something in the style of the old Satsuma ware, the glaze being kept down to a very dull mat surface. These were especially artistic both in outline and in effect of color. One jar, which is remembered with especial delight, was a tall shape, standing eighteen or twenty inches high, with a ground of pale dappled green shot through with threads of white, filmy crystals under the glaze, giving the effect of a bit of old Genoa damask; a kind of jar which would make the collector's heart warm to the very cockles, and would be a thing to put upon the corner of a mantelpiece and worship devotedly every morning — one of those bits of individuality which are only possible when an artist is willing to linger lovingly over the decorating of a piece of earth, and to experiment, and try and hunt out new artistic possible combinations of chance and thought. Then there were a number of shapes in a mottled silvery yellow, which were peculiarly effective; and there were several large jars in pale greens and warm browns, with mottled wave lines running around the surface, and quaint handles on each side; jars that had no purpose but their beauty, and fully and completely answered that purpose. In fact, the exhibition offered a strong contrast between the purely esthetic jugs and pots which had no excuse but their beauty, no aim but to give pleasure, no thought but to delight the esthetic appreciation, and the very practical tiling, the wall linings of majolica ware, which were primarily for use, fundamentally for service, but were at the same time not without their full share of the artistic sympathetic treatment. There is no need to dwell upon the technical difficulties which Mr. Grueby met and overcame. In an artistic sense these do not concern us, for art is not measured by technicalities, but when we look back ten years and appreciate how utterly impossible it would have been to collect together any such work as was shown in this exhibition, and when we realize how closely this work is in touch with the best spirit of the old Japanese ware which lines the walls of our Art Museum, we can appreciate that though we may not yet have reached the height of the Japanese potter, we at any

rate have been able, in this busy country, to give the time and thought and artistic ability necessary to produce in enameled terra-cottas and in simple potter's clay, works of very high artistic value.



BRICK CORNICES SIENA.

James B. Jamieson '93.

Tensile Tests of Cement.

BY IRA O. BAKER, PROFESSOR OF CIVIL ENGINEERING, UNIVERSITY OF ILLINOIS.

OF all the structural materials probably hydraulic cement is the most variable in its qualities; some varieties are strong and some weak; some are slow setting and some quick; some are durable and grow stronger with age, while some are liable to deteriorate in strength, and perhaps become an agent of destruction. Partly owing to the variability in the product and partly because of the greatly increased use of cement in architectural and engineering construction, rapidly increasing attention is being given to the testing of cement.

There is no lack of literature on this subject, which contains much valuable information, and yet the writer believes that much of the astonishing variation in the results obtained by different operators is due to a difference in methods. Unfortunately, there is no detailed and uniform method of procedure in use in this country; and it is usually impossible to determine from the report of the results what method was employed in making the tests. The writer will, therefore, attempt to make an unusually full and complete statement of the method of making the tests, and call attention to such variations in practise as are in common use.

In this article attention will be given to tests of tensile strength, partly because of the importance of such tests and partly since a description of the method of making these tests is a preliminary to the consideration of the other tests necessary to fully determine the quality and durability of a cement.

The tensile strength of cement mortar is usually determined by submitting a specimen of 1 sq. in. cross section to a tensile stress. The reason for adopting tensile instead of compressive tests is the greater ease of making the former, and the less variation in the results. Mortar is eight to ten times as strong in compression as in tension.

The accurate determination of the tensile strength of cement is a much less simple process than at first appears. Many things, apparently of minor importance, exert such a marked influence upon the results that it is only by the greatest care that trustworthy tests can be made. The variations in the results of different experienced operators working by the same method and upon the same material are frequently very large. The variation is chiefly due to the fact that there is no detailed and specific description of the method to be pursued in preparing and testing the specimens.

NEAT *vs.* SAND TESTS.

It is very common to test neat cement mortar. There are two serious objections to this practise. First, most neat cements decrease in tensile strength after a time. This decrease seems to be due to a change in the molecular structure of the cement, the crystals growing larger with increase of age, thus producing a crowding which results in a decrease of the tensile strength. This decrease is most marked with high-grade Portlands which attain their strength rapidly, and usually occurs between three months and a year. A second objection to neat tests is that coarsely ground cements show greater strength than finely ground cements, although the latter when mixed with the usual proportion of sand will give the greater strength.

On the other hand, more skill is required to secure uniform results with sand than with neat cement.

THE SAND.

The quality of the sand employed is of great importance, for sands looking alike and sifted through the same sieve give results varying 30 to 40 per cent.

The standard sand employed in the official German tests is a natural quartz sand obtained at Freienwalde, on the Oder, passing a sieve of 60 meshes per square centimeter (20 per linear inch) and caught upon a sieve of 120 meshes per square centimeter (28 per linear inch). The diameters of the wires of the sieves are 0.38 and 0.32 millimeters respectively. The standard sand recommended by the Committee of the American Society of Civil Engineers is crushed quartz used in the manufacture of sandpaper, which passes a No. 20 sieve (wire No. 28 Stubs's gage), and is caught on a No. 30 sieve (wire No. 30 Stubs's gage).

The crushed quartz consists of sharp, glossy splinters, while the standard German sand is composed of nearly spherical grains having a rough surface like ground glass. The quartz contains about 50 per cent. of voids, while the German standard sand contains but about 40. Crushed quartz gives less strength than standard sand and ordinarily common building sand will give a higher strength than standard sand, since usually it consists of grains of a greater variety of sizes, and consequently there are fewer voids to be filled by the cement.

THE AMOUNT OF WATER.

The amount of water necessary to make the strongest cement varies with each cement. It is commonly expressed in per cents. by weight, although in part, at least, it depends upon volume. The variation in the amount of water required depends upon the degree of fineness, the specific gravity, the weight per unit of volume, and the chemical composition of the cement. If the cement is coarsely ground, the voids are less, and consequently the volume of water required is less. If the specific gravity of one cement is greater than that of another, equal volumes of cement will require different volumes of water. The chemical composition has the greatest influence upon the amount of water necessary. Part of the water is required to combine chemically with the cement, and part acts physically in reducing the cement to a plastic mass; and the proportion required for each of these effects differs with different cements. The nature and condition of the sand may also appreciably affect the quantity of water required. The finer the sand, the greater the amount of water required. Again, the more thorough the mixing, the less the quantity of water required.

Attempts have been made to establish a standard consistency, but there is no constant relation between the consistency and the maximum strength. With one cement a particular consistency may give maximum strength, while with another cement a different consistency may be required to develop the greatest strength. The relationship between consistency and strength will vary also with the details of the experiment. In reporting the results of tests the quantity of water employed should be stated.

There are two distinct standards of consistency for the mortar employed in testing cements, — the plastic and the dry.

Plastic Mortar. This grade of mortar is that commonly employed in the United States and England, and is frequently used in France. There are two methods of identifying this degree of consistency, viz.: the Tetmajer method and the Boulogne method.

The Tetmajer method is much used on the continent of Europe. It is as follows: "The plasticity shall be such that a rod 0.4 of an inch in diameter, and weighing 0.66 lbs. will penetrate 1.25 ins. into a box 3 ins. in diameter and 1.57 deep, filled with the mortar."

The Boulogne method is much used in France, and gives substantially the same results as the Tetmajer method. It is as follows: "The quantity of water is ascertained by a preliminary experiment. It is recommended to commence with a rather smaller quantity of water than may be ultimately required, and then to make fresh mixings with a slight additional quantity of water. The mortar is to be vigorously worked for five minutes with a trowel on a marble slab to bring it to the required consistency, after which the four following tests are to be applied to determine whether the proportion of water is correct: —

"1. The consistency of the mortar should not change if it be gaged for an additional period of three minutes after the initial five minutes.

"2. A small quantity of the mortar dropped from the trowel upon the marble slab from a height of about 0.50 meters (20 ins.) should leave the trowel clean, and retain its form approximately without cracking.

"3. A small quantity of the mortar worked gently in the hands should be easily molded into a ball, on the surface of which water should appear. When this ball is dropped from a height of 0.50 meters (20 ins.), it should retain a rounded shape without cracking.

"4. If a slightly smaller quantity of water be used, the mortar should be crumbly, and crack when dropped upon the slab. On the other hand, the addition of a further quantity of water — 1 to 2 per cent. of the weight of the cement — would soften the mortar, rendering it more sticky, and preventing it from retaining its form when allowed to fall upon the slab."

With any particular cement the exact amount of water to produce the above degree of plasticity can be determined only by trial, but, as a rule, the quantity required will be about as follows: —

For neat cement: Portland, 23 to 25 per cent; natural, from 28 to 36, usually from 30 to 32 per cent.

For 1 part cement to 1 part sand: Portland cement, 13 to 15 per cent. of the total weight of cement and sand; natural, 17 to 20, usually 18 to 19 per cent.

For 1 part cement to 2 parts sand: Portland, 12 to 13 per cent. of the total weight of the sand and cement; natural, 12 to 16, usually 13 to 15 per cent.

For 1 part cement to 3 parts sand: Portland, 11 to 12 per cent. of the total weight of the sand and cement; natural, 12 to 13 per cent.

Dry Mortar. This grade of mortar is employed in the German and French governmental tests of tensile strength. The rules for the identification of this degree of consistency are not very specific. "Dry mortars" are usually described as being "as damp as moist earth."

The German government does not recognize tensile tests of neat cement mortar, but for 1 to 3 sand mortars specifies that the weight of water used for Portland cement shall be equal to 10 per cent. of the total weight of the sand and cement.

The French Commission gives a rule for 1 to 2, 1 to 3, and 1 to 5 mortars, with either Portland or natural cement, which is equivalent to the formula: —

$$w = \tfrac{2}{3} W R + 45,$$

in which w = the weight, in grams, of water required for 1,000 grams of the sand and cement;

W = the weight, in grams, of water required to reduce 1,000 grams of neat cement to plastic mortar;

R = the ratio of the weight of the cement to the weight of the sand and cement.

For a 1 to 3 mortar the preceding formula gives 8.5 per cent., which seems to show that the French standard requires less water than the German.

The cement laboratory of the city of Philadelphia employs the above formula, but uses 60 for the constant instead of 45. For a 1 to 3 mortar, the Philadelphia formula gives 10 per cent., which agrees with the German standard.

MIXING THE MORTAR.

The sand and cement should be thoroughly mixed dry, and the water required to reduce the mass to a proper consistency should be added all at once. The mixing should be prompt and thorough. The mass should not be simply turned, but the mortar should be rubbed against the top of the slate or glass mixing table with a trowel, or in a mortar with a pestle. Insufficient working greatly decreases the strength of the mortar — frequently one half. The inexperienced operator is very liable to use too much water and too little labor. With a slow-setting cement, a kilogram of the dry materials should be strongly and rapidly rubbed for not less than five minutes, when the consistency should be such that it will not be changed by an additional mixing for three minutes.

Usually the mortar is mixed with a trowel on a stone slab; but when many batches are required there is a decided advantage in mixing the mortar with a hoe in a short V-shaped trough on the floor. Various machines have been devised with which to mix the mortar. The jig mixer is an apparatus in which the materials are placed in a covered cup, and shaken rapidly up and down. The Faija mixer consists of a cylindrical pan in which a mixer formed of four blades revolves. The latter seems to give the better result, but neither are used to any considerable extent.

THE FORM OF BRIQUETTE.

The briquette recommended by the Committee of the American Society of Civil Engineers, Fig. 1, is the form ordinarily used in this country and in England. The form generally employed in continental Europe is somewhat similar to the above except that the section is 5 square centimeters (0.8 sq. in.), and the reduction to produce the minimum section is by very much more abrupt curves.

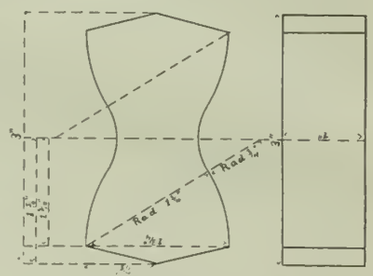


FIG. 1. AMERICAN FORM OF BRIQUETTE.

The molds are made of brass and are single or multiple, the latter being preferred where a great number of briquettes is required. The molds are in two parts to facilitate removal from the briquette without breaking it.

MOLDING THE BRIQUETTE.

In molding the briquette there are two general methods employed, corresponding to the two standard consistencies of the mortar.

Plastic Mortar. As a rule, plastic mortar is molded by hand.

The Committee of the American Society of Civil Engineers' recommendations are as follows: "The molds while being charged should be laid directly on glass, slate, or some non-absorbing material. The mortar should be firmly pressed into the molds with a trowel, without ramming, and struck off level. The molding must be completed before incipient setting begins. As soon as the briquettes are hard enough to bear it, they should be taken from the molds and kept covered with a damp cloth until they are immersed."

The French Commission recommends the following method: "The molds are placed upon a plate of marble or polished metal which has been well cleaned and rubbed with an oily cloth. Six molds are filled from each gaging if the cement be slow setting, and four if it be quick setting. Sufficient material is at once placed in each mold to more than fill it. The mortar is pressed into the mold with the fingers so as to leave no voids, and the side of the mold tapped several times with the trowel to assist in disengaging the bubbles of air. The excess of mortar is then removed by sliding a knife blade over the top of the mold so as to produce no compression upon the mortar. The briquettes are removed from the mold when sufficiently firm, and are allowed to remain for twenty-four hours upon the plate in a moist atmosphere, protected from currents of air or the direct rays of the sun, and at a nearly constant temperature of 15 to 18 degs. C. (59 to 64 degs. Fahr.)."

Various machines have been devised for molding briquettes of plastic mortar, but none are used to any considerable extent. In Canada, and to some extent in England, the briquettes are molded by applying a pressure of 20 lbs. per square inch on the surface of the briquette. Some advocate a pressure of 1,000 to 1,500 lbs. upon the upper face of the briquette.

(*Continued.*)

Fire-proofing.

A CONSENSUS OF OPINION AMONG LEADING ARCHITECTS OF CHICAGO ON THE USE OF BURNED CLAY FOR FIRE-PROOF BUILDINGS.

AS a natural sequence to articles on the use of burned clay as a fire-resisting material by two of the architects of Chicago, THE BRICKBUILDER has sought by a series of interviews, to bring out a consensus of opinion among some of the other leading architects of that city who have had large experience in the erection of fire-proof buildings in which the latest and most improved methods have been used. These interviews demonstrate mainly the esteem in which clay is held as a building material with reference to diminishing losses by fire. There is unanimity among the interviewed in that they prefer burnt clay in some form for all fire-resisting work, and they have demonstrated this in their practise. There is not unanimity, however, in the special kind of clay manufactures preferred, while some have omitted to give their opinions on this interesting question. Hard hollow tile and porous hollow tile still have their advocates, while the virtues of semi-porous tile, that have been advocated in THE BRICKBUILDER, seem to have hardly attracted attention. But there is unanimity in the answers to the question, "Have the recent attacks on the burned-clay systems of fire-proofing, by promoters of other systems, influenced your judgment?" And the answers give no comfort to these promoters. There is more in these than most readers will apprehend, for while these attacks have appeared in publications, often over the names of civil engineers engaged for the purpose, those of which architects are most cognizant are such as they hear in their own offices from the advocates of these very devices and materials. While it is admitted by several that the only reasons why they had in certain cases consented to the use of other materials and methods was the saving of money, which their clients had insisted upon, one of the firms interviewed, which had never used anything but burned clay, made an outside statement that they had in one case tested these claims that the concrete systems were cheaper, by letting all who had asked the privilege submit proposals, all of which, whenever the ceiling and floor construction were both included, proved to be more expensive than flat hollow-tile arches forming both ceiling and floor construction.

These interviews have developed the fact, in Chicago at least, that there is a variance of opinion as to whether or not the makers of and contractors for the construction of burned-clay fire-proofing (all the makers in Chicago contract to set up their work complete) are endeavoring to improve and perfect their material and its method of application. It is fair to assume from this that some, at least, are trying to do so, and these must have been in mind with those who answered affirmatively.

As to the lessons to be found in recent fires in buildings of the modern sort designed to be fire-resisting, we regret to say that the answers do not show such an interest in the subject as some might be led to expect. The answers are mostly in general terms. Some are satisfied with the results, and others say that the work ought to be and can be better, but in what respect they say not.

Architects always want the best of everything if their clients can be induced to pay for it. But they do not often get it if the material is to be covered up when the building is finished. The *Pons Asinorum* that they too often have to cross — and frequently fail in the attempt — is the demonstration to a client who has the figures before him that two bids under the same specification represent two different things, and that the lowest is the most expensive. This is oftener the case with burned-clay fire-proofing material than any other, for there are no two clays alike, and no two makers produce the same article. It is no wonder, therefore, that it was difficult to get direct answers to the seventh question.

It was assumed in the eighth question that the price and quality of burned-clay fire-proofing had been reduced during the last ten years. That the price has been lowered is self-evident, and the reason for it generally given is in the one word "competition." It is also a matter of fact that the quality has *not* been reduced, but has remained stationary. It is a mistaken assumption, however, that improvement in manufacturing processes has reduced the price. To competition alone can this be ascribed, a competition which has offered every possible temptation to reduce the quality. But it has thus far only resulted in reducing weight, and discouraged all attempts to improve methods of construction.

Opinions differ as to the employment of special experts. Those who do not consider it desirable have large establishments of their own and scientific *attachés* regularly in their employ, while the views expressed by Mr. Beman seem to reflect the opinion of the average practitioner.

The following questions were submitted to those whose names appear hereafter, which have elicited very prompt and satisfactory responses.

1. Do you employ burned clay in fire-proof buildings, and if so to what extent?
2. Do you prefer it to other so-called fire-proofing systems, and if so for what reasons?
3. What kind of burned-clay material do you prefer? or would you employ different kinds for different purposes?
4. Have the recent attacks on the burned-clay systems of fire-proofing by promoters of other systems influenced your judgment?
5. Do you think that the makers of burned-clay fire-proofing are trying to improve and perfect their material and its method of application?
6. What do you think is the lesson to be learned from recent fires in buildings fire-proofed with burned clay?
7. Do you think it right for architects to consent to their clients always taking the lowest bid for this kind of work without regard to the differences in what the parties intend to furnish?
8. What do you think is the reason why the price and quality of burned-clay fire-proofing have been reduced during the last ten years?
9. Do you agree with the opinions given by Mr. Jenney in the July BRICKBUILDER?
10. Do you think it desirable for architects to employ fire-proofing experts to design the details of fire-proof work and supervise its erection, as is now done in the case of steel constructions?

Holabird & Roche, whose experience in the erection of the largest fire-proof buildings, in Chicago at least, has been fully equal to that of any other architectural office, submitted their answers in writing as follows: —

"We beg to submit categorical answers to your inquiries regarding fire-proofing" (as follows): —

Question 1. "Yes, for floors, partitions, and protection of all metal work.

Question 2. "Yes, we think it more fire-proof if properly plastered.

Question 3. "Porous terra-cotta.

Question 4. "No.

Question 5. "Yes.

Question 6. "We should have perfect covering of each piece of metal and more substantial fastening or anchoring and the best quality of plaster. No work to be unplastered.

Question 7. "No.

Question 8. "Improved methods of manufacture and general reduction of prices throughout the country caused by panic and competition.

Question 9. "Do not wish to give an opinion.

Question 10. "We have been in the habit of making our own drawings and details."

Daniel H. Burnham, speaking for D. H. Burnham & Co., who are too well known to need introduction, said in answer to the first question: "We use burned clay in all fire-proof buildings; for walls, both outside and inside, and for partitions. We also use large quantities of terra cotta, enameled and unenameled, for exterior and interior construction and ornamentation. We use hollow-tile arches for all floors and hollow-tile protection for columns, beams, and girders."

In answer to the second question he said: "Yes; because by its use we have a fire proofing of the best quality and get the best results both in bracing and tying the structure together."

To the third question he said: "For exteriors we prefer brick walls, or heavy brick covering when metal columns actually carry the structure, because they are less likely to be injured by heavy cold water streams in case of fire. We prefer hollow-tile arches between beams because they brace the structure, protect the metal best, and can, with their air chambers, be put in with the greatest rapidity and with a minimum use of moisture, and also because they leave a strong, firm, flat ceiling, against which partitions can be braced effectually.

To question four he said "No," and to five, "Yes." He thought that the lesson to be learned from recent fires in buildings fire-proofed with burned clay is, that the modern methods protect the steel structure against fire thoroughly when they are properly applied. He declined to give an opinion on question seven.

To question eight he said: "I know nothing about the reduction in quality, because we use the best. I think mechanical processes have reduced the price during the last few years." He had not read Mr. Jenney's article, and therefore could give no opinion about it, but with regard to question ten he said: "Speaking for ourselves, we have our own corps of constructive engineers in this office, and these questions are examined and settled by them."

S. S. Beman said: "I have used burned clay of different kinds in all but one of my fire-proof buildings. I used concrete with metallic reinforcement on the tension system only in the last Studebacker Building on Wabash Avenue, Chicago. I had great trouble through delay on account of using the concrete system in winter in this building. A great deal of the work was frozen and had to be done over again. It is an undesirable system to use at such a time. Clay tile can be well set in any kind of weather. When using tile I think the most important thing is to set it right, with good joints, making every joint air tight. I prefer porous terra-cotta, if made of the proper kind of clay, wherever it is possible to use it. I have never used semi-porous hollow tiles. There is very little porous material that is properly made. It requires a plastic fire-clay, which is found in very few localities, and manufacturers should improve their output by using such clays; but most of it that we get is soft and rotten because the makers use local clays to save cost. That now made in large quantities at Chicago has been improved considerably during recent years. Many factories have failed through trying to make it of unfit material. There was once a factory at St. Paul which I understand made such inferior material that its capital was sunk because so much of its output was wasted and rejected. It was only when its failure was assured that it commenced to use the Chaska clay, which made the finest porous terra-cotta I have ever seen. Others took up the manufacture in that city, but I understand they continued to use the inferior clays. The first and best porous terra-cotta ever made in this country was manufactured in Chicago from the clay that comes out of the coal mines at Brazil, Ind., but no one is making porous material from it now. It is only used to mix with inferior clays."

In answer to question four, Mr. Beman said "No." In answer to question five he said: "I hardly think they are." As to question six, he had not studied in detail the published accounts of the results of recent severe fires in fire-proof buildings at Pittsburgh, or formed an opinion as to what should be done to improve fire-proof building materials of clay otherwise than as above stated. He had not tried to get anything better than the market for such things provided; in fact, he had only used such manufactures as he found them always trying to secure, the best.

In answer to question seven, he said: "No, I always dissuade them from it." He thought that competition among manufacturers has been the main factor in reducing the price and quality of the product where the same has been reduced.

As to why a great many architects have not taken an interest in having the fire-proofing systems improved, he said that men who were largely interested in the artistic side of their profession were inclined to be indifferent to such things, while his observation led him to believe that only a few architects who were not so much interested in fine art matters had made a study of the art of fire-proofing applied to construction. In such a state of affairs it was not to be expected that much improvement would result. These were the plain facts. In fact, architects generally who are very busy had little time to do missionary work however much they might desire to do so. If they did, it would often be at the expense of other matters of equal importance. He thought, however, that there should be a consensus of opinion among architects who were designing fire-proof structures; that they should decide between them what is best, stand together and decide to demand it. But he believed this ideal state would never be realized.

Mr. Beman is a believer in having all fire-proof material thoroughly secured in place, though he has no special system to suggest. In his own practise, he has insisted upon the use of copper wires for tying the work together wherever possible to use it, and holding it from the inside, so that all holdfasts will be protected. He has had fires in several buildings he has designed, and there have been no failures in the fire-proof material used. He dislikes the weight of hard tile, which, in case some of it is dislodged, might disturb others in its fall. In other respects he agrees with the opinions expressed by Mr. Jenney. In reply to the tenth question he said in conclusion: —

"I think there ought to be an opening for a specialist in fire-proofing. It is quite as important as any other special branch of the craft, such as steel work, sanitary conditions, etc., where fire-proof buildings are concerned."

(*Continued.*)

THE report of fire losses for 1897 will be of interest to the progressive architect who has made a study of fire-proof structures. The very material reduction in fire losses can scarcely be considered the result of accident. By observing the report (see page 154, THE BRICKBUILDER) it will be seen that the drop in losses is not simply a sudden drop in 1897, but a gradual diminution, 1897 being less than 1896, and 1896 than 1895, and smaller than any year since 1890. This result must be highly satisfactory to both architects and manufacturers of fire-proof materials. And the progressive character of this diminution in losses augurs some influential cause, and this certainly must be found in the increase of fire-proof and slow-burning structures during the last few years. Up to within a short time underwriters have not been willing to give much credit to fire-proofing as a fire preventative or saving feature, but some of the late fires in this class of buildings, especially the Pittsburgh fire, have compelled them to acknowledge the sturdy character of these structures, and recent insurance rates in New York have shown how fully they believed in their safety.— *Architecture and Building.*

NUMBER nine of the series of publications issued in pamphlet form by the British Fire Prevention Committee, London, and which has just come to hand, contains a paper on "Lessons from Fire and Panic," by Thomas Blashill, F. R. I. B.A., Superintending Architect to the London County Council.

Masons' Department.

ESTIMATING BRICKWORK.

BY F. E. KIDDER.

THE most general method of estimating common brickwork, and one that is very largely followed by brick contractors in all localities, is by the thousand bricks, measured by certain fixed rules, and figured at a certain price per thousand, wall measure, the price per thousand being generally uniform, while the adjustment for different kinds of work is made in the manner of measuring.

The principle underlying this system is explained as follows: —

"The plain dead wall of brickwork is taken as the standard, and the more difficult, complicated, ornamental, or hazardous kinds of work are measured up to it so as to make the compensation equal.

"To illustrate: if, in one day, a man can lay two thousand brick in a plain dead wall, and can lay only five hundred in a pier, arch, or chimney top in the same time, the cost of labor per thousand in such work is four times as much as in the dead wall, and he is entitled to extra compensation; *but instead of varying the price*, the custom is *to vary the measurement* to compensate for the difference in the time, and thus endeavor to secure a uniform price per thousand for all descriptions of ordinary brickwork, instead of a different price for the execution of the various kinds of work." *

The application of this system, as actually carried out by the brick contractors of Denver, is as follows: —

All walls are first reduced to thousands of brick by multiplying the external superficial area of the walls by 15, for walls 9 ins. thick; by 22½, for walls 13 ins. thick; by 30, for walls 17 ins. thick; and in the same proportion for thicker walls. No deduction is made for openings containing less than 80 superficial ft., and where deductions are made for larger openings, the width is measured 2 ft. less than the actual width. Hollow walls are also measured as if solid. To the number of bricks thus obtained is added the measurement for piers, chimneys, arches, etc.

Footings are generally measured in with the wall by adding the width of the projection to the height of the wall. Thus if the footings project 6 ins. on each side of the wall, 1 ft. is added to the actual height of the wall.

Chimney breasts and pilasters are measured by multiplying the girt of the breast or pilaster from the intersections with the wall by the height, and then by the number of bricks corresponding with the thickness of the projection. Flues in chimneys are always measured solid.

Detached chimneys and chimney tops are measured as a wall having a length equal to the sum of the side and two ends of the chimney, and a thickness equal to the width of the chimney. Thus a chimney measuring 3 ft. by 1 ft. 4 ins. would be measured as a 16 or 17 in. wall, 5 ft. 8 ins. long.

The rule for independent piers is to multiply the height of the pier by the distance around it in feet, and consider the product as the superficial area of a wall whose thickness is equal to the width of the pier. In practise, many masons measure only one side and one end of a pier or chimney.

Arches of common bricks over openings of less than 80 superficial ft. are usually disregarded in estimating. If the arch is over an opening larger than 80 sq. ft., the height of the wall is measured from the springing line of the arch. No deduction is made in the wall measurement for stone sills, caps, or belt courses, nor for stone ashlar, if the same is set by the brick-mason. If the ashlar is set by the stone-mason, the thickness of the ashlar is deducted from the thickness of the wall.

The sum of all of these measurements represents a certain number of thousands of bricks, and the whole is then multiplied by a common price per thousand, as $6, $8, $12, or $16, according to whatever the cost of plain brickwork may be. If the building is to be faced with pressed brick, *the actual cost* of the pressed brick, as nearly as it can be computed, is added to the estimated price of the common pressed-brick work, nothing being added for laying the pressed brick, nor anything deducted from the common brick measurement, the measurement of the common work displaced by the pressed brick being assumed to offset the difference in the cost of laying the pressed and common brick work.

In arriving at the cost of the pressed brick, the external superficial area of the walls faced with such brick is computed, and all openings, belt courses, stone caps, etc., deducted. 5 in. stone sills are not usually deducted. If a portion of the wall is covered by a porch, so that common brick may be used back of it, this space is also deducted. The net pressed-brick surface is then multiplied by 6, 6½, or 7 to obtain the number of bricks required, 6½ giving about the number of pressed bricks required to the square foot of the size used in Denver.

The topping out of the chimneys, if of face brick, is measured by girting the chimney and multiplying by the height, and adding the sum to the wall area. As a simple example of this system of estimating we will take a small brick house 28 by 32 ft. without cross walls, the basement walls to be 13 ins. thick, with footings 2 ft. 6 ins. wide; first-story walls, 13 ins. thick; second-story walls, 9 ins. thick; height of basement walls from trench to top of first floor joists, 8 ft. 6 ins.; from first-floor joists to top of second-floor joists, 10 ft. 6 ins.; from second-floor joists to plate, 9 ft.

Wall Measurement: —

Basement walls, equal 120 ft. (girt of building) × 9 ft. 10 ins. (height and projection of footing) × 22½; equals 26,550 bricks.

First-story walls, 120 ft. × 10 ft. 6 ins. × 22½; equals 28,360 bricks.

Second-story walls, 120 ft. × 9 ft. × 15; equals 16,200 bricks.

Topping out two chimneys, each 1 ft. 9 ins. × 1 ft. 5 ins., 14 ft. high above roof, equals 2 × 14 ft. × (1 ft. 5 ins. + 1 ft. 9 ins. + 1 ft. 5 ins.) × 30; equals 3,600 bricks.

Total brickwork equals 74,710 bricks; at $6.50 per thousand (present price in Denver), equals $485.60.

Pressed Brick. From grade to the under side of plate the wall measures 22 ft. 6 ins.; to be faced with $15 pressed brick of the common size.

The door and window openings measure 384 superficial ft.

Surface of pressed brick equals 120 × 22½, equals 2,700 sq. ft.

Deduct for openings, 384

2,316 sq. ft.

Add for two chimneys, 2 × 14 × 6 ft. 4 ins. equals 177

2,493 sq. ft.

2,493 × 6½ equals 16,204 pressed bricks, at $15 per thousand, equals $243.

Total amount of bid, $485.60, + $243, equals $728.60.

The above figures are supposed to include the necessary lime, sand, water, scaffolding, etc., required to make the mortar and put up the walls, and also a profit for the contractor, but anything in the way of ironwork, as ties, thimbles, ash doors, etc., are figured additional to the above.

(*Continued.*)

* From *Rules of Measurement* adopted by the Brick Contractors' Exchange of Denver, Col.

EFFECT OF MISTAKE IN STATEMENT OF AMOUNT.

UNDER the provisions of a mechanic's lien law, that claimant must make a just and true statement of the demand due him, his lien will not be defeated, though he claims too much in his statement, it being the result of honest mistake, and not an effort on his part to place a lien on the property for a greater amount than he honestly believes is due. — *Supreme Court, Mich.*

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK.— Probably no branch of business has suffered more than the real-estate and building interests, but as many operations have been merely postponed, not abandoned, we do not feel any anxiety as to the ultimate result, and for those who have safely tided over the few months of dulness there will now be a period of activity, according to all indications.

Among the few items of real interest might be mentioned: —

In the recent competition for the new Free Public Library of Jersey City there were about fifty competitors, and the successful ones were Brite & Bacon, of New York. This was in every way a model competition and all architects and members of building committees would do well to study its history. The only criticism we would make as to the conditions is that too many small details were called for in them, matters not in any way related to the planning of the building, such as the "number of sixteen candle-power lights to be used," "provision for electric bells," etc. Messrs. James Brite and Henry Bacon, Jr., are very well known in New York and are considered one of the most promising of the younger firms of architects, the former having been associated with William Schickel & Co., and being the first winner of the Architectural League's Gold Medal. Mr. Bacon has been for many years with McKim, Mead & White, having been formerly a Boston man and winner of the Rotch scholarship. Their work is simple and dignified, showing the result of good scholarly training uncontaminated by French influence.

EAGLE ON DOME, PUBLIC LIBRARY AND MUSEUM, MILWAUKEE, WIS.
Executed by the Northwestern Terra-Cotta Company.
Ferry & Clas, Architects.

Charles C. Haight has planned a two-story brick warehouse to be built for the Trinity Corporation at a cost of $30,000.

Henry Anderson has prepared plans for an eight-story brick apartment house to be built on West End Avenue, corner 80th Street; cost, $300,000.

Ralph S. Townsend has planned a seven-story brick flat building to be erected on West End Avenue; cost, $175,000.

The same architect has also planned a six story brick apartment building to be erected on 80th Street, near West End Avenue; cost, $75,000.

C. P. H. Gilbert has prepared plans for a residence, five stories, to be built on Fifth Avenue near 74th Street; cost, $40,000.

M. W. Morris, architect, is preparing plans for two four-story brick and stone residences to be built in Brooklyn; cost, $50,000.

PHILADELPHIA. — The visitor to Philadelphia, architecturally as well as historically interested, may now note the result of recent changes in State House Row. Architect T. Mellon Rogers has had in hand for a year or more the delicate task of restoring not only the interior of the old building, but the exterior appearance of the entire group, as nearly as possible to the original condition. This required the demolishing of the wings connecting the State House with the Court Room and Congress Hall, in order to replace the low, two-story structures that originally flanked the main building to which they are connected by a high and disproportioned, but none the less quaint-looking arcade. All that remained to aid in the restoration were, over and above a very meager description, some quite inadequate cuts, but the result seems to justify the idea that we have now a fair representation of the original. The date, 1735, on the conductor heads seems to conflict somewhat with the new appearance of the brickwork, especially in the rear, where new bricks were used. Those who remember the old building as it was previous to this restoration may regret somewhat the removal of the Corinthian doorway from the front, but it is unmistakable that the entrance with its flat arch and heavy frame, as restored, looks older, more primitive, and more colonial. The first-story interior has not been changed materially, although the change seems great on account of the removal of the curios that lumbered the place before. The hallway now looks magnificent with an arcade opened up on one side, and the painting of the staircase in its old color. Altogether the changes have been instructive ones to the architect, and a material advantage accruing is the much more open side that Independence Square has to Chestnut Street.

The new width of Delaware Avenue, now being had by the moving out of the bulkhead line one hundred feet, is giving much-needed improvement to the architecture of the river front. The Pennsylvania & Reading Railroad ferry houses are nearing completion, the former being a two-storied copper front, with pilasters at intervals along the second story carrying a horizontal cornice, back of which stop the various roof slopes, while the latter takes the opposite tack, and uses the gable ends of the waiting room and shed roofs as the architectural features. The Pennsylvania work was designed by the company's architect, Mr. Cookman, the Reading work by Cope & Stewardson.

A number of old ramshackle buildings have been removed at the corner of 10th and Walnut Streets to make way for an extensive brick and stone addition to the Jefferson Hospital. Windrim & Son are the architects of the building, which, while not ornate, promises to be quiet and dignified.

The architecture of Philadelphia is perhaps best represented by suburban work. Many of the younger architects are represented solely in this way — whole districts, such as that known as Overbrook, being built up by the younger men. An architectural visitor to Philadelphia would find much to study at such places. At Overbrook is situated the Blind School, by Cope & Stewardson, which is now being finished. Its white plastered walls and dark brown tile roofs make it a prominent feature of the suburb.

Furness & Evans, architects of the Pennsylvania Railroad Station, are about to put up another skyscraper at the opposite corner of Market Street for the West End Trust Company. The designs have not yet been made public, but the firm's individual style in architecture is well known.

During a recent heavy rain storm in the city, when the unprecedented fall of over five inches took place within three hours, the drainage system of the business section was found sadly lacking in capacity. Water backed up the soil pipes, and poured out of closets, basins, and other erstwhile inlets, in many cases several stories above

ground. The City Hall suffered considerable damage in its basement, while many of the department stores turned their entire male force into a bucket brigade to save their stock.

CHICAGO.— After the failure of young Mr. Leiter's wheat venture his father is said to have raised $10,000,000 in cash within a very short period. Of this sum $2,000,000 was borrowed from an insurance company and secured by the Grand Pacific Hotel and other valuable pieces of property. But the most important transaction was the sale of one piece of business property to Marshall Field for $2,135,000. This ground had been previously leased by a department store concern, which now pays for its ground rental and some additional storerooms in the same block, more than $150,000 per year. In another year it will begin the erection of a building to cost $1,000,000, for which Messrs. Adler & Sullivan are associated architects. This same building was referred to in the June BRICKBUILDER.

Another $1,000,000 structure, but one not so certain as yet, is a coliseum, a fire-proof building, 420 by 625 ft. in extent. It has been designed by Mr. Beman, the architect of the former building. It is proposed to locate this most elaborate amusement enterprise on the lake shore, and include, beside provisions for Wild West shows and baseball games, a double-decked pier 1,500 ft. long, with pavilion for band concerts.

Omitting mention of some doubtful building schemes even greater than the foregoing, it may be noted that the University of Chicago has some new buildings under way, Henry Ives Cobb, architect.

Frost & Granger have designed several new depots for the Northwestern Railway.

In the line of commercial work, Armour & Co. are about to erect a $350,000 elevator. The Hansell-Elcock Foundry Company, who have been awarded contract for part of the $400,000 worth of constructional steel for the new post-office building, are to erect an addition to their plant 120 by 140 ft. in size. The Chicago Street Railroad is to make an addition to its office buildings.

The Chicago Portland Cement Company expects soon to erect a plant in Illinois capable of producing 500 bbls. per day. The Titan Steel Company is said to be ready to construct a large steel plant at Pullman.

For building news which is not so agreeable from a business point of view, it may be noticed that an office building was lately transferred by foreclosure of mortgage. The fine Schiller Building, which cost $850,000, has gone into the hands of a receiver. The Dubuque Apartment Building, whose construction cost three years ago over $100,000, has just been sold for $20,500, to satisfy lien holders. There are more of the same sort. Some are due to wild and questionable financiering, and others, doubtless, to "hard times."

Another disastrous fire has occurred in Chicago. This time it was an inflammable apartment building. Firemen were commended publicly for heroism in saving eighteen lives, but four others perished. What the laws fail to do public sentiment may be able to accomplish after many lives are sacrificed to pay for the education of that sentiment. Since the Wabash Avenue horrors numbers of tenants have been known to move from similar fire traps to the buildings constructed of steel and hollow tile.

FRONT ELEVATION, MUSEUM BUILDING, NEW YORK BOTANICAL GARDEN.
R. W. Gibson, Architect.
For detail sheet see Plates 61 and 62.

ST. MARK'S SCHOOL, SOUTHBORO, MASS.
Henry Forbes Bigelow, Architect.

ST. LOUIS.— There is little of interest in the architectural field, the universal complaint among architects and builders being that they never experienced less activity, but almost every one is possessed with a spirit of hopefulness, believing there will be a general awakening of the building interests with the beginning of another year.

STATE ASYLUM FOR THE CHRONIC INSANE, WERNERSVILLE, PA.
Rankin & Kellogg, Architects.

A greater part of the work commenced in the early part of the year is either completed or nearly so. The Hargadine, McKittrick Building has just been occupied. It fills the intervening space between the Mallinckrodt Building on 9th Street and the Martin Building on 10th Street, extending through from Washington Avenue to Lucas Avenue. The building is eight stories and a good example of mill construction. The architects, Messrs. Eames & Young, have handled the Washington Avenue front very interestingly. The entire façade is in white stone. The Palladian motive has been employed in the frieze story, and in the spandrels are female figures in bold relief. It is encouraging to see such an effort made to make our commercial buildings good to look upon. The Lucas Avenue front has been made much simpler, and gray brick and terra-cotta have been used instead of stone. As the building is something like 250 ft. long with light only from each street, Luxfer prisms enter largely as a feature in the fronts.

The Benoist Building, on the corner of 9th and Pine Streets, has been completed. The building was designed to be ten stories, but only six stories have been built. The face is of red brick and terra-cotta. The floors have been formed with what might be called concrete joist, that is, concrete beams with iron bars have been placed close together and terra-cotta blocks have been fitted between the beams at the bottom, forming a level ceiling. C. D. McArdle is the architect and James D. McGee the engineer.

The large nine-story warehouse on the corner of 12th Street and Washington Avenue, being built by H. E. Roach & Sons for Mr. A. D. Brown, is also nearing completion. The two first stories are of white stone, and above the building is faced on three sides with cream-enameled brick.

Work continues at intervals on the new City Hall, the contract for the finishing of the chambers for the Council and House of Delegates having recently been awarded to Porter, White & Co., for $59,000.

A movement has again been inaugurated in the municipal assembly to widen 12th Street between Choteau Avenue and Cass Avenue and is meeting with more support than any previous effort, and 12th Street property owners are hopeful that their dream of a grand commercial boulevard in the near future may materialize. Should the scheme become an accomplished fact there is little doubt but it would become the retail center of the city in a very short time.

MINNEAPOLIS.— There has been a gratifying growth in public sentiment towards the use of brick as a material for street paving. At first asphalt was the only material that our city officials would consider, owing, it is suspected, to the fact that the "asphalt combine" owned the city council, and were awarded contracts year after year, at advance of 30 or 40 per cent. over brick, and against the remonstrances of the interested property owners to a large extent. The result has been just what might have been expected. The asphalt ring soon came to believe that they had a life "sinch," and they proceeded to run matters to their own satisfaction, and ignored public opinion as well as the terms of their contracts, by not doing their work properly, and then failing, in numerous instances, to make their work good as called for. They have been turned down to a large extent this year, and we are going to have a fair and full trial of vitrified brick on some of our principal streets.

One interesting phase of this matter is the position the bicycling fraternity has taken. At the outset asphalt was the only paving material they would consider. Now that they have had a fair trial of both, they appear to favor brick, and desire a path of that material on all asphalt pavements. We have also found that the asphalt will not wear in the gutters where there is dampness, and where horses are allowed to stand. They are now laying brick in the gutters and cutting the asphalt out. We also see the advantage of brick where there is tearing up of pavement for the laying of pipes. It means a permanent disfigurement. In our climate asphalt is certainly not the ideal material for pavements.

The corner stone of our new State Capitol Building was laid at St. Paul last week with great ceremony, the venerable Ex-Governor Ramsey handling the trowel. It was made the occasion of a two days' jubilee by the St. Paulites, who see therein a settlement of the capitol removal question for the next century, at least. Work on the superstructure is being pushed at present and will be until completion.

A new factor in the brick industry has entered into the local market during the past two or three years. It is a local concern with ample financial backing, who are making a specialty of producing difficult shades of brick to satisfy the demands of exacting architects, and they appear to be meeting those demands in a satisfactory manner. They have filled special orders in the Twin Cities that no other concern pretends to be able to produce. Some of the shades they turn out are a delight to an artistic eye, and we all hope that they will be able to match these varying shades sufficiently well to establish confidence in their ability to produce them on short notice, and

STATE ASYLUM FOR THE CHRONIC INSANE, WERNERSVILLE, PA.
Rankin & Kellogg, Architects.

DETAIL, BUILDING, JOHN ST., NEW YORK CITY.
Executed in white terra-cotta by the Excelsior Terra-Cotta Company; Ralph S. Townsend, Architect.

that they are to prove permanent, which latter seems assured when one looks into their methods of manufacture. The entrance of a new competitor has had a wholesome effect on the other people, who had the field nearly to themselves.

In the line of improvements now under way and to be done this season may be mentioned the following:—

Two new school buildings, eight rooms each, to cost $15,000 each; E. S. Stebbins, architect.

Business building for Thorpe Brothers, cost, $35,000; Fred Kees, architect. City Hospital, two main buildings, 40 by 225 ft. with Administration Building, 60 by 80 ft., three stories, to cost complete $250,000; the east wing only to be built this year, at cost of $60,000. Architects, MacLeod & Lamoreaux.

The old Grand Opera House has been remodeled into a six-story business building at a cost of $125,000; Fred Kees, architect.

A new residence for S. A. Harris, cost, $30,000; Bertrand & Chamberlin, architects. Residence for G. H. Partridge on Lowry Hill, to cost $30,000; Fred Kees, architect.

Passenger Station, C. M. & St. P. Railway Company, cost, $150,000; architect, Chas. S. Frost, of Chicago.

ST. PAUL.

Addition to Union Railway Station, to cost $55,000; architect, C. S. Frost, Chicago.

New passenger station for Northern Pacific Railway Company, at Fargo, N. D., to cost $30,000; architect, Cass Gilbert.

Catholic Cathedral at Fargo, N. D., cost, $25,000; architects, Bassford & Donahue.

Norwegian Lutheran Seminary at Hamline, Minn.; cost, $50,000; architects, Buechner & Jacobsen.

All the above buildings are of brick, mostly of pressed brick. There is a growing tendency in the practise of the best architects to aim at satisfactory effects by use of unselected brick, as to shades, and the results thus far attained have amply sustained this tendency. There is also a noticeable leaning towards brick as the only building material that will stand satisfactorily through all emergencies, as demonstrated in the recent large fires at Philadelphia and elsewhere.

NEW TRADE PUBLICATION.

THE Ohio Mining and Manufacturing Company, Shawnee, Ohio, New York office 44 Pine Street, has recently issued an exceptionally interesting and attractive catalogue especially prepared for the use of architects, as a practical guide in drawing up specifications for the Shawnee Brick.

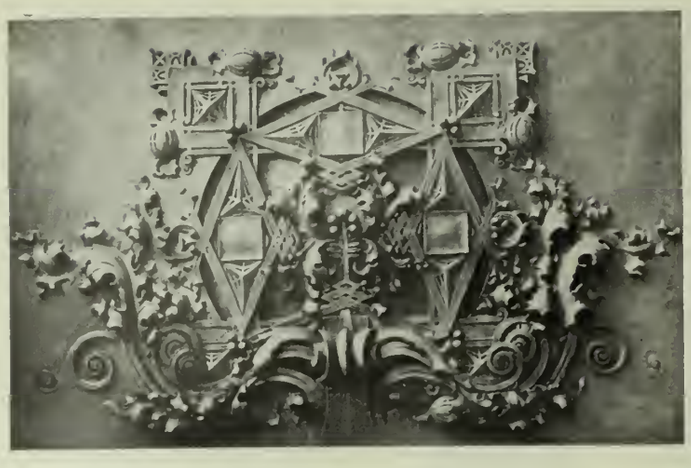
BRACKET, BAPTIST PUB. SOCIETY BUILDING, PHILADELPHIA, PA.
Executed by the Conkling, Armstrong Terra-Cotta Company.
Frank Miles Day & Bro., Architects.

The able and consistent manner with which the purpose of the catalogue is maintained throughout is particularly gratifying, every page being devoted to pertinent information relative to the subject in hand. In the opening pages the character and quality of the product are conservatively mentioned in a brief introduction. A short description follows of the various colors, grades, and sizes of their brick. To facilitate ordering, there is explained a simple yet comprehensive system of distinguishing by a method of classification any brick desired. Several pages are devoted to scale drawings of arches, with rules for specifying brick for same.

A particularly interesting feature of the catalogue is the half-tone illustrations (one half reduction) and full-sized profile drawings of over ninety different shapes of molded brick made by the company.

Lack of space permits us to touch upon only a few of the salient

UNITED STATES APPRAISERS' WAREHOUSE, NEW YORK CITY.
Seven hundred and sixteen thousand face brick used in this building, furnished by the Washington Hydraulic-Press Brick Company through their agents, Fredenburg & Lounsbury, New York City.
William Martin Aiken, Architect.



PANEL, FOURTH STORY BAYARD BUILDING, NEW YORK CITY.
Executed by the Perth Amboy Terra-Cotta Company.
Louis H. Sullivan and Lyndon P. Smith, Architects.

features of the catalogue. A perusal of its pages will develop many other points of interest. We are confident that the book will be highly appreciated among the architectural profession as a work of reference. Parties desiring copies should communicate with the company either at Shawnee, Ohio, or 44 Pine Street, New York.

CURRENT ITEMS OF INTEREST.

The Union Akron Cement Company, Buffalo, N. Y., are furnishing their cement for a large business block at Akron, Ohio, and also for the brick paving being laid at Meadville, Pa.

H. F. Mayland & Co., New York agents of the Burlington Architectural Terra-Cotta Company, are supplying the architectural terra-cotta for a large store building being erected at Brooklyn, N. Y.

Sayre & Fisher Company are furnishing the limestone gray brick being used in the construction of the new Metal Exchange Building, corner John and Clift Streets, New York City, Clinton & Russell, architects.

H. E. Fuller & Co., Boston, New England agents for the Burlington Architectural Terra-Cotta Company, have contracted to supply the architectural terra-cotta for a new business block at Holyoke, Mass., George P. Alderman, architect.

The Illinois Supply and Construction Company, St. Louis, Mo., who represent the Tiffany Enameled Brick Company in that district, are supplying 100,000 9 by 4½ in. enameled blocks, to be used in the new Brown Building, 12th Street and Washington Avenue, St. Louis.

Sayre & Fisher Company are furnishing the limestone gray brick being used in the construction of the addition to the main building of the Metropolitan Museum of Art, Central Park, New York City, R. H. Hunt, architect. The brick are of common size, and the order calls for more than 200,000.

The Fall River Bleachery, at Fall River, Mass., have placed the contract for their new mill with the Berlin Iron Bridge Company, of East Berlin, Conn. The building is 65 ft. wide and 200 ft. long with side walls of stone, the supporting framework being made of steel.

The New Haven Gas Light Company, of New Haven, Conn., have placed the contract with the Berlin Iron Bridge Company, of East Berlin, Conn., for their new fire-proof coal shed. The building is 60 ft. wide and 500 ft. long. The framework of the building is steel.

The American Mason Safety Tread Company has established agencies in a dozen of the larger cities throughout the country, from which good returns are expected, as real-estate owners and architects learn the efficiency of Mason Safety Tread as a protective device, and one to lengthen the wear of stairways. Great interest is being shown, especially in the use of this product for stairs in schoolhouses, as it provides a convenient and economical solution to a serious problem.

The American Enameled Brick and Tile Company are furnishing the enameled brick for lining the swimming tank of the new University Club, New York City, McKim, Mead & White, architects; C. T. Wills, builder; and about 80,000 semi-glazed brick to be used in the side and rear elevation of the Gugenheimer mansion, Fifth Avenue, New York City, Robert Maynicke, architect. These bricks will have the same finish as those used in the new Dunn Building, New York City.

The New England Sanitary Product Company are erecting at Old Harbor Point, Mass., near Boston, an absolutely fire-proof building 120 ft. wide and about 130 ft. long. The building is two stories high, and is of skeleton steel framework style, consisting of steel columns built in the walls, carrying heavy steel floor beams and girders, and clear span roof trusses which support the roof. The structural steel work in this plant was designed and is being furnished and erected by the Berlin Iron Bridge Company, of East Berlin, Conn.

The White Brick and Terra-Cotta Company has secured

WELLS & RICHARDSON CO.'S MANUFACTURING BUILDING, BURLINGTON, VT.
W. R. B. Willcox, Architect.

contracts to furnish the architectural terra-cotta for the following buildings: Public school at Queens, L. I., architects, Boring & Til-

ton; apartment house, 327 W. 83d Street, New York City, architect, H. E. Hartwell; primary school, New Rochelle, N. Y., architect, Geo. H. Pierce; Stores and lofts, 56 Thomas Street, New York City, architects, Quinby & Broome; Cheeseborough Building, corner State and Pearl Streets, New York City, architects, Clinton & Russell; Hopkins apartments, 216–218 W. 16th Street, New York City, architects, Boring & Tilton; residence and stable at Great Neck, L. I., for Mr. James E. Martin, architects, Little & O'Connor.

MELLON BLOCK, PITTSBURGH, PA.
Alden & Harlow, Architects. Architectural terra-cotta furnished by the Northwestern Terra-Cotta Co.

THE copartnership heretofore existing between R. W. Allison, S. B. Goucher, W. B. Goucher, Samuel McAdoo, Frank Bowles, and W. H. Garlick, under the firm name of Empire Fire-Proofing Company, has been dissolved by mutual consent, and the assets and good-will have been assigned to a new company, organized under the laws of the State of New Jersey, which will continue the business under the name of Empire Fire-Proofing Company. Mr. R. W. Allison is the president and general manager of the new company; and Mr. John A. Hammett, who has had charge of the business at the Chicago office, under the former management, will continue same as vice-president of the new company. The general offices of the company are in the German National Bank Building, Pittsburgh, Pa., with branch offices in Monadnock Block, Chicago, Ill., 874 Broadway, New York, and Builders' Exchange, Philadelphia.

THE CELADON TERRA-COTTA COMPANY, LTD., have secured through their Buffalo agent, John H. Black, the contracts to furnish their roofing tiles on the three following buildings:—

Office Building, American side Niagara Falls, for Clifton and Niagara Falls Suspension Bridge Company (6 in. Conosera), R. A. Wallace, of Buffalo, architect.

Francis Xavier Parish House, Black Rock, N. Y. (10 in. Conosera), Carl Schmidt, of Buffalo, architect.

Band Stand, Delaware Park, Buffalo (8 by 2 in. Conosera), Loverin & Whelan, of Buffalo, architects.

INDEX TO ADVERTISEMENTS.

Renwick, Aspinwall & Owen, Architects,
New York City.

SEAM-FACE GRANITE

Furnished by

Gilbreth Seam-Face Granite Co.

See May issue of this magazine.

(Floor Plans Shown on Page 195.)

WHEELWRIGHT & HAVEN, Architects.

THE HARBISON & WALKER CO.

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Made by Mud Process, Hand Pressed, Fire Flashed.

OLD GOLD and CHOCOLATE-BROWN COLORS.

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. . . Ten years ago I built a residence here, using your "POMPEIAN" brick. These brick are to-day as bright and clean as when laid. They are impervious to water, and a driving rain clears the wall from dust and soot, instead of soaking the dirt into them, as it will with porous material.

PITTSBURGH, Jan. 14, 1896.

It is five years since my house was completed. So far as can be seen, the brickwork is as clean as on the day the building was finished.

CLEVELAND, O.

Your "POMPEIAN" brick stands the Cleveland climate better than any other brick I have observed, retaining their bright, clear appearance.

BUFFALO, N. Y.

The brick to-day look brighter, cleaner, and more attractive than they did when the building was first erected, and every rain storm seems to freshen them.

Send for descriptive pamphlet showing photographs of buildings and mantels in which our brick have been used.

RESIDENCE, THEODORE HOOPER, ESQ., BALTIMORE, MD.
C. L. CARSON, ARCHITECT.
BRICKS FURNISHED BY HARBISON & WALKER CO.

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Makers of the Superior

Shawnee Brick

in a variety of artistic shapes and colors, for Exterior and Interior Facing, Mantels, Floors, etc.

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Samples and catalogues delivered free to architects and builders.

AGENCIES.

BOSTON . . . . . Waldo Brothers, 102 Milk St.	CLEVELAND, . . Cleveland Builders' Supply Co., 734 Garfield Bldg.
NEW YORK . . Meeker, Carter, Booraem & Co., 14 East 23d St.	CINCINNATI . . . . Mendenhall, Neff & Co., 237 West 4th St.
CHICAGO . . . . . Engle Brick Co., 142 Washington St.	TOLEDO . . . . . Kind & Kuhlman Builders' Supply Co.
PITTSBURGH . . . . . Burgy & M'Neill, 531 Wood St.	DETROIT . . . . . F. B. Stevens, Griswold & Atwater Sts.

Office, 44 Pine St., New York. Works, Shawnee, Ohio.

THE DELMONICO BUILDING, 44TH STREET AND FIFTH AVE., NEW YORK CITY.
JAMES BROWN LORD, ARCHITECT

TERRA-COTTA AND BRICK BY THE

NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY,

PHILADELPHIA. 38 PARK ROW, NEW YORK CITY. BOSTON.

VOLVME VII SEPT. 1898 No. 9

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

ROGERS & MANSON,

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RESPONSIBILITY OF THE ARCHITECT.

IT used to be said of a well-known Boston architect, long since gone over to the majority, that he had a number of wealthy clients who every year would make over to him a considerable sum of money, telling him to invest it in real estate at his discretion, and would give the matter no further thought until the completed building which the architect saw fit to erect was turned over to its owner. This particular architect enjoyed a high reputation, was deserving as an investor no less than for his ability as an architect, and to that extent was exceptional; and yet though few of us have the opportunities which he seemed to be able to utilize to such good advantage, it is a fact that the responsibilities of the architect are large. The obliging owner who will hand his architect ten thousand dollars before departing for Europe, as described so felicitously by Mr. Rich in his article in our last number, are few and far between; but the number who, perhaps without knowing it, entrust their fortunes and their future happiness to the architect are many, and we fancy are becoming more numerous every year. An educated architect in good practise enjoys a degree of responsibility such as falls to the lot of few professional men. A client sometimes thinks he knows what his house is to be. He has a feeling that he has designed his own house and simply told his architect what to do, when, as a matter of fact, it is the architect's house that is built and not the owner's, and the owner is obliged to depend upon the taste, discretion, and good judgment, as well as the honesty of his professional adviser. We believe an architect is more inclined to err by avoiding responsibility of this sort than by accepting it, and that the success of a building is in no inconsiderable degree measured by the extent to which the architect imprints thereon his own ideas and his own methods. It would perhaps be an incomplete statement to say that the architect should never consider the client's wishes, for, quite aside from the commercial inadvisability of such a course, it very often happens that the restrictions under which the architects may most chafe are spurs in the side of his good intent, prompting him to do his best work; but certainly the architect who is conscientious, who wants to do the best possible thing, will have the largest measure of success if he always refuses to do or lend himself to anything which his trained artistic intelligence tells him is not right. That is to say, an architect, considering all the responsibilities which are thrust upon him, as well as those which he is glad to assume, must, if he is to succeed, be a man not only possessing the courage of his convictions, but possessed as well of very tangible convictions. With such a man, given the problems which come to the average practitioner, his opportunities and his influence in molding public taste, in fostering artistic thought, are very large. Indeed, this phase of architectural practise is the redeeming element which draws into the profession so many bright, capable minds. The pecuniary rewards of architecture are certainly not excessive. In most cases they are small, but the mental satisfaction of leadership, of guiding the taste of the community, is a recompense which atones for much of the lack of personal financial possibilities. This power of the architect, of course, works both ways; it is a responsibility which must be met.

WE can imagine no more disagreeable condition for an educated, conscientious man than to feel that a building which has been entrusted to him is beyond his reach; that he is out of his depth in a sea of artistic troubles, and that he cannot quite keep up with his responsibilities. It is bad enough when he has that uneasy feeling, which we all share at times, that he isn't quite doing his best, but when he tackles a job which he has to admit to himself he isn't able to solve, the very responsibilities which lend so much to the profession may at times become unbearable. Some one has said, not inaptly, that all humanity is divided into two classes, — one the vast majority, including those who are led, the other, the extremely small minority of those who lead, and that it belongs to every one to say in which category he shall be classed. The architect who is not a leader, who cannot take a position of influence, is in the wrong profession. He is in a calling that absolutely demands ideas, that obliges leadership, and if he cannot meet that demand, if the opportunities the profession gives him he is unable to respond to, the quicker he finds it out and turns his energy to something else, the less mortification he will have in comparing his work with those around him. The successful architect is always a leader, a molder of thought.

ALTHOUGH it is easy for the architect to arrogate to himself a high position in the creative art world, it must not be forgotten that a very large share of the success of any architectural work belongs to the silent workers who are able to carry out to at least relative perfection the ideas of the artist. Therein is the function of the trained mechanic, and the debt which architecture owes to some of our mechanics is a large one. Take the single department of terra-cotta; we have at different times illustrated in this journal some of the best of the modeled work which has been executed in various parts of the country, and the names of the architects have been quite

rightly associated with the buildings and with the work. The ideas were theirs, the design, the arrangement they could wholly claim: and yet we are supposing no lack of ability when we make the statement that it is doubtful if one architect in a hundred could actually model the terra-cotta which goes into his building, or be able to more than approximately indicate the style of detail in modeled work. It is not necessary that the architect should be a fine modeler, nor even a remarkable draughtsman. The drawings which Michael Angelo made for the dome of St. Peter's, measured by the work of some of our modern accomplished draughtsmen, are mere rude, illiterate scrawls, but the ideas are there. To execute the work, however, we must have trained mechanics, trained not only in manual dexterity, but in the appreciative artistic sentiment which will enable them to grasp the suggestion of the architect and carry it out in its full richness.

WITHOUT the help of the mechanic, the artisan, and the manufacturer, the art of the architect would avail him but little and his leadership would be barren of results. A large modern building represents an extent of cooperation which is almost inconceivable to one who has not been through it all; and while the inception is with the architect, and the merit of the work is measured by the correctness of his ideals, the actual building operation is a result of coordination of forces which the architect can only start in motion and guide in their course. And just as responsibility is measured in a certain sense by its limitations, so the responsibility of the modern architect becomes the greater because of the interdependence of the arts, sciences, and manufactures which enter into a modern structure; nor is the responsibility to the mechanics who put themselves under his direction by any means the least of the obligation which the architect has to assume.

CORRESPONDENCE.

FRESNO, CAL., Sept. 1, 1898.

EDITORS BRICKBUILDER: — In the April number of THE BRICKBUILDER, Professor Baker, in his interesting article on the "Strength of Brick Masonry," propounds this query: "Why did the pier fail in the larger portion under less than half the stress the smaller portion bore without any signs of failure?"

This peculiarity in the cracking of brick masonry is of frequent occurrence in building construction, and I think it can be scientifically explained.

We will assume in this case that the pressure was applied uniformly per square inch on the top of the pier by the plate covering its entire surface.

The lines of pressure would then be vertical, and save for the weight of the brick, the pressure would be uniform per square inch for any height of the pier, the section remaining uniform.

At the enlargement of the pier, the tendency would be for the pressure to distribute itself over the entire section. The amount of this pressure distributed outside of the vertical lines of the smaller top part of the pier would be upon the cumulative principle, similar to that which obtains in metal construction where stress is transferred to reinforcing plates through the rivets.

In the case of this pier, and all similar construction, the mortar joints directly under the initial lines of pressure become compressed, and the tendency to transmit a portion of this stress to the enlargement of the pier brings a tensile stress upon the under surface of the bricks due to flexure, which, I think, is the explanation of the rupture.

If Professor Baker will examine the brick buildings in his city, he will probably discover instances of this kind of failure. Where beams supporting heavy front walls are improperly placed upon the supporting piers or side walls cracking of this kind may be found.

Very respectfully yours,

A. C. SWARTZ.

THE writer's answer to the foregoing question, *i. e.*, the explanation of the cause of the failure, is found in the middle of the first paragraph at the top of the second column, on page 78, April number. It is as follows: "The failure is due to the compression of that portion of the bottom section directly under the top section, thereby causing the compressed portion to shear off from the uncompressed part of the base section."

Mr. Swartz's explanation does not differ materially in principle from the above, except that he directs attention to the bending that always accompanies shear. The writer believes that the phenomenon is more an example of shear than of bending. However, the knowledge of this method of failure of piers and its application in design is the important fact to be kept in mind.

IRA O. BAKER.

CHAMPAIGN, ILL., Sept. 15, 1898.

PERSONAL.

BROUSE & AREND, architects, of Trenton and Asbury Park, N. J., have opened an office at 931 Chestnut Street, Philadelphia, and would be pleased to receive samples and catalogues.

WALTER I. GIDEON, architect, has opened an office in the Sheppard Building, Springfield, Mo. Samples and catalogues desired.

ILLUSTRATED ADVERTISEMENTS.

IN their advertisement, page x, Fiske, Homes & Co. show another of their series of Brick and Terra-Cotta Fireplace Mantels.

A residence at Baltimore, Md., of which C. L. Carson is the architect, is shown in the advertisement of Harbison & Walker Company, page xv.

The White Building, Boylston Street, Boston, Winslow & Wetherell, architects, is shown in the advertisement of the Boston Fire-proofing Company, page xxii.

TYMPANUM IN DORMERS, PUBLIC SCHOOL, 108TH AND 109TH STREETS AND AMSTERDAM AVENUE, NEW YORK CITY.
Executed by the New York Architectural Terra-Cotta Company.
J. B. Snyder, Architect.

In the advertisement of Henry Maurer & Son, page xxiii, there is illustrated a section of their new "Eureka" Floor Arch. This arch is especially designed for light fire-proof construction.

The Celadon Terra-Cotta Company, Limited, illustrate in their advertisement, page xxvii, four patterns of decorative roofing and siding tiles.

The American Schoolhouse. XI.

BY EDMUND M. WHEELWRIGHT.

IT goes without saying that every plumbing system should have a line of soil pipe of extra heavy cast-iron pipe, which has been subjected to the water test when in position, that this pipe should be

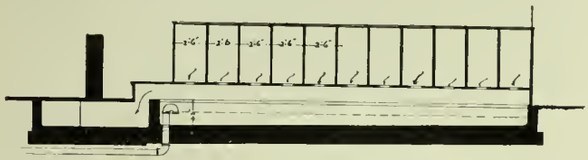


FIG. 1.

extended above the roof, and that, where the conditions admit, the house trap should be placed outside the building in a brick man hole of sufficient size to be of ready access.

In the installation of plumbing in any building, but especially in schoolhouses, the three things most essential for the fixtures themselves are, first, metal or submerged joints for all fixtures; second, in view of the usually poor janitor service, fixtures of types readily cleansed; and, most important of all, free and constant local ventilation of the fixtures.

No fixture should be used which has a putty, wax, or otherwise packed or gasketed joint, and in water-closets, if the trap is not of iron or brass, the joint between the trap and the soil pipe should be below the water line of the trap, so that if there is the slightest disconnection at the joint, as is liable through shrinkage, settlement, or violence. the dripping water will make the defect immediately noticeable.

When the janitor service is thoroughly efficient the question of possible external uncleanliness of soil-disposal fixtures is eliminated, and separate water-closets with strong local ventilation are preferable to latrines or ranges. Water-closets, however, involve greater first cost and are subject to danger of breakage. Given either a water-closet, brick latrine, or range, if arranged with strong and constant local ventilation, it is on the outside and not the inside of these fixtures that the conditions detrimental to health are generally to be found. The inner surfaces are constantly wet, and hence keep the germs out of the air; and these inner surfaces are, besides, subjected to cleansing currents of air constantly moving away from the inclosure. Outer surfaces become coated with dirt, which, as it dries, flakes off, and, becoming dust, is breathed in with the air. In the brick latrine the external surface is minimized, and if properly constructed can readily be cleaned both inside and out; in the intervals between the flushing the fecal matter is submerged in water, and at a lower point than in the water-closet ranges. These latrines can be perfectly ventilated at a relatively slight cost. Figs. 1 and 2 show a readily cleansed form of brick latrine which has proved in use to be effective and unobjectionable.

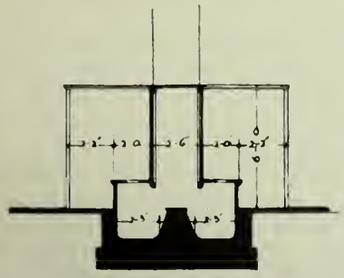


FIG. 2.

Brick latrines must, however, be constructed with great care, so that there shall be no possibility of the pollution, through leakage, of the ground below the basement floor; these latrines must be also connected with an ample vent shaft, which must be kept constantly heated summer and winter: and if given strong and constant ventilation, they may even suffer considerable neglect by the janitor without danger to health of the occupants of the building. In the construction of brick latrines, Portland cement only should be used; thoroughly plastered outside and in with Portland cement, with a final coat of neat cement smoothly hand floated, and covered from the air until it has set perfectly hard. The latrine seats are preferably made of iron, and where wood is used the under side of the woodwork should be lined with sheet lead. The seats should be self-closing. Latrines should have automatic flushing attachments arranged to flush every two or three minutes, and should be provided with a 3 or 4 in. stand-pipe, which should be removed just before recess, by the janitor, to give a thorough flushing and change of water.

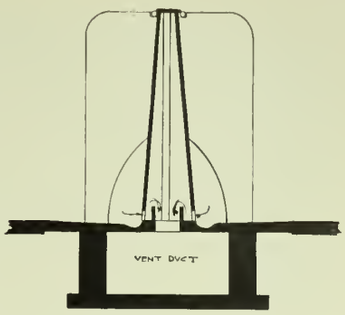


FIG. 4.

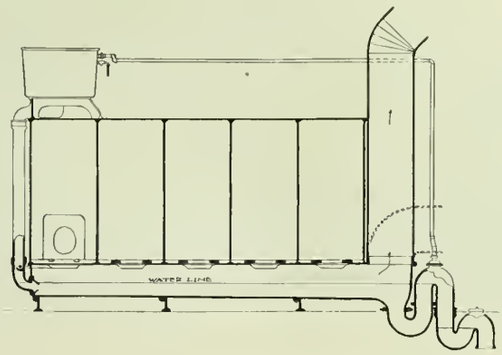


FIG. 3.

The water-closet ranges are arranged so that but little water stands in each section, and when flushed the trough is thoroughly cleansed. The outer surface is more easily kept clean than is that of an equal number of water-closets. Previous to 1895 such fixtures as were then on the market had no provision for local ventilation. Fig. 3 shows a water-closet range with an attachment suggested by Mr. Frederic Tudor which obviates thoroughly this advantage.

The so-called "dry systems" of soil disposal should not be used where there is a sewer system, and even where there is no sewer the use of such systems is not advisable. The soil, reduced as it is to powder by heat, is in a condition most menacing to health, and if the draught of the vent stack is at any time defective, as it may often be through the neglect of the janitor to maintain the heat in the stack, there is a reverse current. This powdered matter may pervade the building and spread contagion.

FIG. 5.

The privy vault is an expedient which is not to be considered. For a building without sewer connection, earth closets are most advisable. They should have thorough local ventilation and should be in a separate building, which should be heated.

Any system of soil disposal which has sewer connection may be placed in the basement of a building with perfect safety, providing a strong and constant ventilation is maintained through the fixtures themselves to a vent shaft carried above the roof. Such vent shafts should have at least 5 sq. ins. of cross-section area for each

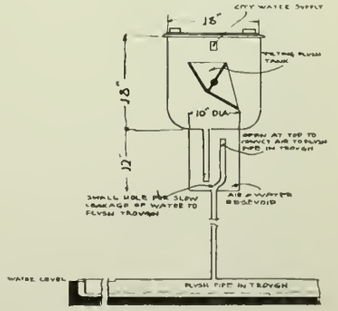


FIG. 6.

seat, and to insure a powerful aspiration at the least expense the boiler or furnace chimney may best be utilized. In this chimney the smoke flue of boiler iron will furnish all the necessary heat when the heating apparatus is running; and to provide for the periods when heating of the building is not required, a small stove or open hard coal grate should be placed at the base of the shaft. It should be made absolutely incumbent on the janitor to maintain this small fire when the heating apparatus is not being run.

In the opinion of Mr. Tudor, these stoves or grates should have a capacity of 20 sq. ins. for each schoolroom. There should be one water-closet for every fifteen girls and one for every twenty-five boys.

Urinal bowls require even more care in cleansing than do water-closets; indeed they require care that is not given by the average janitor, and must, therefore, for practical reasons be rejected in schoolhouse work, except in special cases: as, for instance, in some high schools, where usually a better class of janitors is employed than in the lower grades.

A sloping slate slab provided with ample means of ventilation at the bottom, as shown in Fig. 4, and with an automatic flushing apparatus, as shown in Figs. 5 and 6, has proved to be suitable and cleanly. If it were certain that the whole of the fixture would be washed daily with hot water, the "dry system" of urinals is satisfactory, for there is not absolute need for water flushing of the slate while in use, providing the ventilation of the fixtures is strong and constant. The back slabs of slate urinal constructions should have a slope of 1 in 10 and the foot slab should incline inwards 1 in 20. All joints of the slate work must be waterproof.

PROPOSED HIGH SCHOOL BUILDING, MARLBORO, MASS.
Wheelwright & Haven, Architects.

To avoid the spread of skin diseases, set bowls should not be used in schoolrooms; sinks fitted with faucets or with a row of small nozzles should be provided.

For the same reason, where bathing facilities are given, set tubs or swimming tanks should not be used unless they are subjected to careful supervision by the master. Shower and needle baths are entirely unobjectionable.

If the best results are to be obtained in the heating and ventilating of schoolhouses, as indeed in any buildings where ventilation is an important consideration, it is requisite that the heat and air ducts should be planned when the building is first designed. It is not to be expected that an architect can be intimately conversant with a subject to which accomplished men are forced to devote all their energies if they are to master its difficulties. Few architects can therefore do their full duty if, without consultation with a heating engineer, they undertake to design a heating and ventilating system, unless it is such a one as has been almost exactly paralleled in a former building constructed by him with expert help, and even then the assistance of an expert is very requisite if the proper adjustment of the work and its best construction is to be assured. Except in rare cases, if the architect seeks without expert professional advice to select a system presented by a contractor in competition, it is almost certain that the result will be disappointing. If a client is unwilling to compensate the expert, the choice of a system by commercial competition is all he can fairly expect his architect to furnish. The architect should not certainly pay for such service, as it is rendered primarily for the client's benefit; and if the expert is competent, the expense of such service will be offset, if not by the first cost, certainly by the greater efficiency and practical economy of the plant above that usually furnished by the lowest commercial bidder upon plans and specifications prepared by that bidder.

The following notes in regard to the subject of heating and ventilation may prove of service in the preparation of plans: —

1. When a plenum fan is used 5-boiler horse power should be reckoned for each schoolroom or other room of equal size; an assembly hall to be reckoned as two schoolrooms.

For an indirect system of heating and ventilating a boiler capacity of 7 horse power per schoolroom is required.

2. The fan should not be relied upon to supply heat as well as fresh heated air; the building should be heated by direct radiation, and for ventilation fresh air heated to 70 degs. should be supplied by a plenum fan. This method is advisable in any school except the very smallest, and indeed in the schools of four or six rooms a gas engine may be advantageously used as a source of power, so that a definitely directed air supply may be had without requiring the services of a skilled engineer as janitor. In such cases, however, the janitor must have sufficient capacity and conscience to appreciate that the engine should be kept clean.

3. Another advantage of the use of direct radiation for heating is that the rooms may be quickly warmed. It is desirable, also, that the fan should be used in the early morning hours, but that the air should be drawn not from outdoors, but from the building itself. But when the building is occupied the air should be invariably taken from outside the building.

Where space for direct radiation is limited, as is usually the case in laboratories, the temperature of fresh-air supply may be increased to compensate for lack of direct heating by passing the air for the room through a supplementary heater at the base of the air duct for the room.

"Indirect heating," dependent as it is upon the direction and velocity of the wind, is less certain than the method of heating and ventilating advocated above, and it involves a greater combustion of fuel to procure the same results. This extra cost is largely due to the necessity of inducing the flow of air through the vents by means of steam coils. The percentage of the additional consumption of fuel required by heating by "indirect radiation" with heated vents above the cost of heating by direct radiation and with fresh heated air supplied by the fan is reckoned to be twenty-five to thirty-five per cent.

4. To thoroughly heat by direct radiation a room with a southerly or easterly exposure, 1 sq. ft. of radiating surface should be allowed for every 100 cu. ft. of the enclosure. For rooms with westerly and northerly exposures the heating surface should be 1 sq. ft. for every 70 cu. ft. of the enclosure.

5. In a schoolroom 28 by 32 ft. the air inlets and outlets for "indirect radiation" should be 4½ sq. ft. for the lower rooms, ranging up to 6 sq. ft. in the third story. Where plenum fan is used the air outlets remain as above, but the air inlets are reduced 25 to 30 per cent. Under ordinary conditions the architect may safely give the maximum areas to the flues, for the volume of air

which passes through can be regulated by dampers; and if on account of some constructional necessity he wishes to reduce their sizes in any particular case, he can get the advice of an expert. It should be borne in mind that the minimum advisable air capacity per pupil is 30 cu. ft. In assembly halls and other large rooms, or in rooms with but one outer wall, there should be two air outlets.

The best results are attained where air outlets are placed on inner walls only. Air inlets may be placed where most convenient. To avoid draughts, air inlets for schoolrooms and assembly halls should be placed with bottom of register face 7 ft. above the floor. In small rooms the air inlet may be near the floor. If properly protected from the lodgment of dirt, the most effective position of an air inlet is the floor.

Inlet and outlet ducts should be fitted with dampers, the former to be mixing dampers, so that the external air admitted to the room may have its temperature regulated at will. The air inlets should be fitted with deflectors, so that the air will be thrown towards the ceiling and be given proper diffusion. Air outlets should have openings for winter ventilation as close to the floor as possible, and for summer ventilation close to the ceiling. The summer opening for ventilation should be fitted with a register; that for winter ventilation requires a face only.

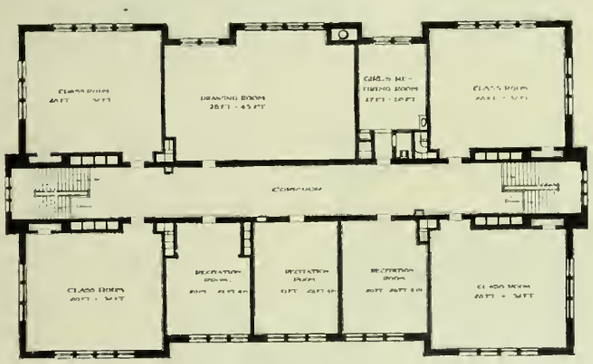
Unless a school is certainly to be blessed by the services of a thoroughly efficient and faithful janitor the heating system should be regulated by automatic control. No excuse should be afforded the teachers of cooling off the rooms by the opening of windows; in doing this the advantages of double windows are nullified, the heat is wasted, the flow of air through the designed channels is disturbed, and dangerous draughts are caused.

The ventilation of a schoolroom may be through its wardrobe. Heat is in this way given to the smaller room, a cleansing current of air passes through the clothing, and the possibility of air from the wardrobe finding its way to the schoolrooms is avoided.

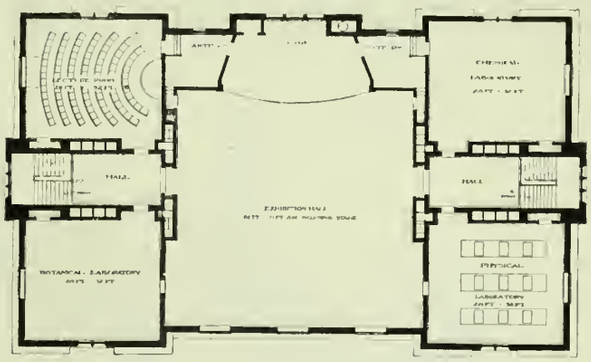
As noted in regard to plumbing, the soil-disposal fixtures and urinals should have strong local ventilation which should be adequate to insure a constant current of air through the toilet room to the aspirating shaft, so strong that by no peradventure the air of the toilet room shall pass into other portions of the building. In corridors the movement of air should be so arranged that it passes thence to the schoolrooms, and not *vice versa*.

It should be better recognized than it is by school committees, that upon the faithfulness and knowledge of the janitor depends to a great degree the health and comfort of the inmates of the school. Janitors are too often found to be either faithless or ignorant, or both, and consequently not only does unnecessary discomfort result, but waste of fuel, injury of apparatus and fixtures, and serious sickness and deaths. The writer knows of no city where an effective system of janitor control has been adopted, the only organization of the janitors being that made by themselves, which have not the object of self-improvement, but that of any like "political" organization. Twenty-five years ago Mr. Philbrick, Superintendent of Boston Public Schools, recommended that the janitor service of the schools of that city should be placed under the control of a chief who should have full power of appointment and removal. No steps have as yet been taken to this end.

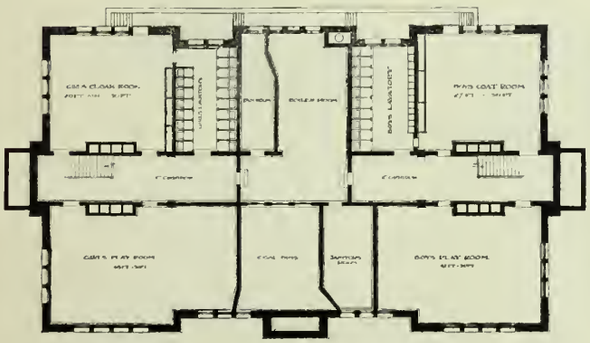
There should be certainly such direct executive control of janitors. At stated times, together with other duties, the janitors should be required to make record of the outside temperature as well as in all portions of the building, and they also should keep a record of the amount of coal consumed each day. They should be at any time subject to visits from their chief, and subject to his discipline without resource to the school committee.



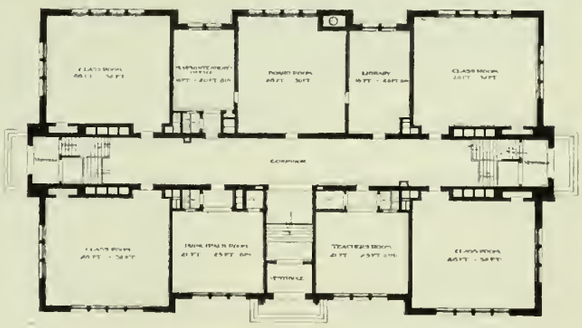
SECOND FLOOR.



THIRD FLOOR.



BASEMENT.



FIRST FLOOR.

PROPOSED HIGH SCHOOL BUILDING, MARLBORO, MASS.
Wheelwright & Haven, Architects.

Suburban Residence Built of Brick.

COST, TEN THOUSAND DOLLARS.

BY EDWARD B. GREEN.

IN preparing these sketches, the requirements of the program have been kept in mind, — the use of clay products; a home for a family of moderate means, of quiet and refined tastes, preferring a suburban to a city home; a lot 75 ft. wide, facing the south.

The requirements seem to limit the style of the exterior to the Italian or English Domestic, the latter style being adopted in these drawings.

The house facing south, two and a half stories in height, and the lot on which it is placed being lower by 10 ft. on the west side (the left-hand side facing the house) than on the east, the more effective approach is on the west or low side. This will give, as one enters the gate, a view of the lot unbroken and rising to the building, and a better effect can be gained of the lay-out and planting of shrubbery and trees. No effort has been made to lay out the grounds in a formal manner. The taste of most of us who wish to live in a suburban home is to "throw off our coats," so to speak, and be unconventional. An unbroken expanse of grass leading to hardy shrubbery and trees surrounding the house and lot lines, and the house itself well covered with vines — no unnecessary walks or roads, and these without curves — will make the most charming home scene to be imagined — no "fuss or feathers." A pool of water near the entrance — not a fountain — will, if rightly placed, add to the effect and quiet by reflecting the home and surroundings as one enters.

The main entrance of the house is approached by a series of wide and broad steps, built of hard, rough (paving) bricks, balustrade, a brick wall, and all more or less covered with vines and shrubs, leading onto the terrace, which may be paved with brick or gravel, but preferably covered with grass. The reflection of a pavement or floor would be disagreeable, and at times hot. At least some part of it should be of grass, — that part which shows from the windows, leaving sufficient amount of space to sit, to be paved. With a double awning of dark colors, to let down, the reflection will not be strong, and a most cozy place can be arranged.

The family, for general use, will find the side entrance more convenient; it is easily approached from the carriage road (a suburban home means a horse and depot wagon). On entering, one finds a side hall running widthwise of the house, between the kitchen wing and the main building, and ending in a large coat room under the landing of the stairs, also provided with a lavatory. This will be found most convenient for the rubbers and storm coats of the family. It will also prove a convenience for guests on rainy nights, and even on more formal occasions, as the side staircase can be used as the guests arrive and depart. It will be noticed that the door of this side entrance enters at the level of the ground, on the low side, so from the landing of the stairs it is but a few steps to descend to the level of the cellar floor, or but a few steps to the level of the main floor; it will, therefore, be convenient to put your "wheel" in the room provided for it under the dining room. This being well lighted, and 14 by 14 ft., can also be used as a shop for those members of the family — always to be found — who delight in tinkering and mechanical devices.

To the rear across the side hall is the kitchen portion. It is designed that this part of the house and the portion directly above it shall be devoted to the servants and their work, and both floors are carefully separated from the rest of the house, — the butler's pantry on the first floor, as well as the kitchen, is separated from the dining room by the width of this cross hall, — not sufficient space to cause any inconvenience in serving, yet so separating the "business end" of the house that odors or noise are not perceptible.

The kitchen, by some, might be considered small (10 by 14 ft.), but with large pantries, — the range placed in the corner out of the way, and provided with a large ventilating flue, — and with a servants' dining room (a necessity in suburban life), store room, and refrigerator room in such position as to be most convenient. It saves labor to have these things as small as practicable.

The servants' quarters, on the second floor of the kitchen por-

tion, include two servants' rooms, bath, house-maid's closet, and linen room.

It will be seen that advantage has been taken of the southern exposure. From the street this gives the house a broad appearance, but it is done with a view of getting the sun in every room, not to make the house look big.

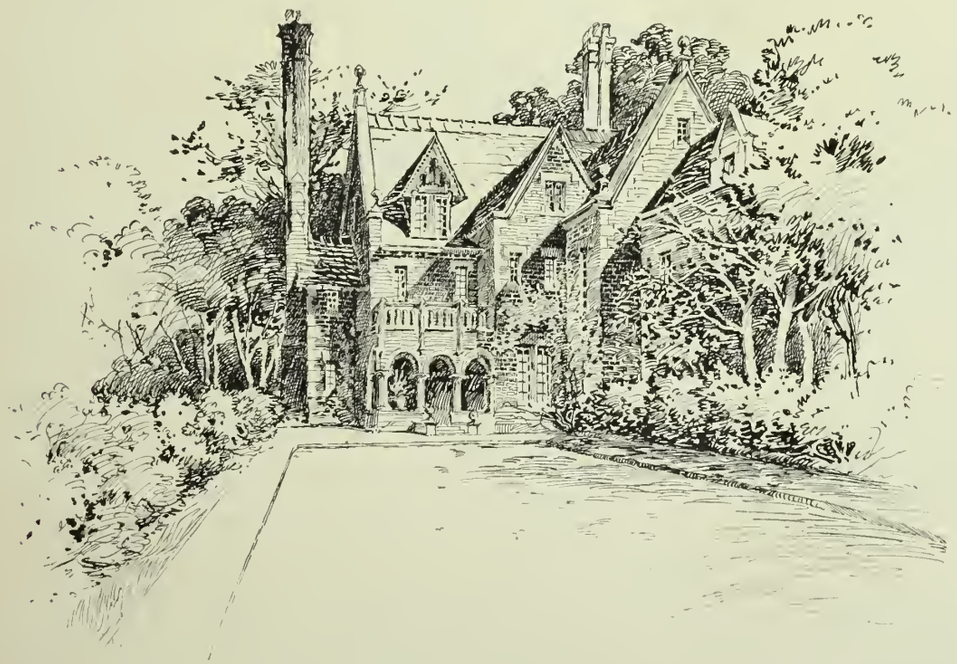
The main entrance and enclosed porch of glass (which can be taken down in hot weather) leads into the hall; the south end, being cut off by pilasters and beams on the ceiling,— rather than doors,— forms a small reception room. The social life of the suburbanite being more informal than that in the city, a large reception room seems unnecessary. The most space and greatest effort should be devoted to the library, or living room — it should be *the* room of the house.

Next in importance to the living room is the dining room. Off from the library is a little "study" or "den," — a most useful room for a student, — or it is a room where the man of the house can retire to do thoughtful work, or smoke or grumble to his heart's content, or see a friend.

The inglenook fireplace at one end of the library is cozy and warm on a cold day. As people who love a wood fire want the least excuse to have one, it is therefore convenient to have it somewhat retired, so that it will not overheat the room in warm weather.

It will be noticed that the arrangement of the house has the advantage, on entering, of making the house appear large, the full length of the house being lengthwise of the living room and dining room, stairs at one end and reception room at the other end of the hall — the lines of the longest dimensions are shown.

The porch on the north side of the library is covered, and overlooks the court or private garden; this could be made large enough



for the tennis court. It is suggested that this court be surrounded by a pergola or a hedge 6 or 8 ft. high, shutting out the kitchen yard, to make an entirely private or enclosed space. It also makes a shady walk.

The dining room is designed to be a square room, in order to accommodate a round table. In a small house this is desirable, because it will always accommodate more guests than the same number of square feet in a narrow, long room, and yet not appear to be as crowded The round table need not be changed in its dimensions, except for extraordinary occasions. An ordinary round table 4½ to 5 ft. in diameter does not seem too large for only two, and will conveniently seat six or even eight, if two or three are children. The dining room has a corner fireplace, and a sideboard built in, balancing the mantel.

The idea is to finish the library and hall in dark quartered oak; the dining room white, with mahogany furniture, tapestry walls, the library surrounded by low bookcases to form a wainscot, and, if a great number of books are to be accommodated, the cases should run to the ceiling; use the books as *the* feature.

The stairs, first and second floor, run up at the rear of the hall, with a large landing on the second floor. The guest room opens directly from this hall, and has its separate bath, corner fireplace in corresponding position to the fireplace in the dining room below.

The family rooms (three) are in a row, facing the south, and all opening onto a corridor, which corridor, in turn, by a sliding door, opens into the main hall. By this arrangement the family rooms are made a suite, which is cut off from the rest of the house. This separation of the family apartments gives additional privacy, and prevents the children from being disturbed by music or unusual noise from below; and, on the other hand, the children do not disturb those below. Each of these family rooms has a fireplace and one or more closets. From the family room on the southeast a

balcony opens to the north, which is most useful for airing clothing, and will be a cool retreat in hot weather.

Rooms could be finished as a trunk room, store rooms, and, perhaps, one or two small bedrooms in the attic.

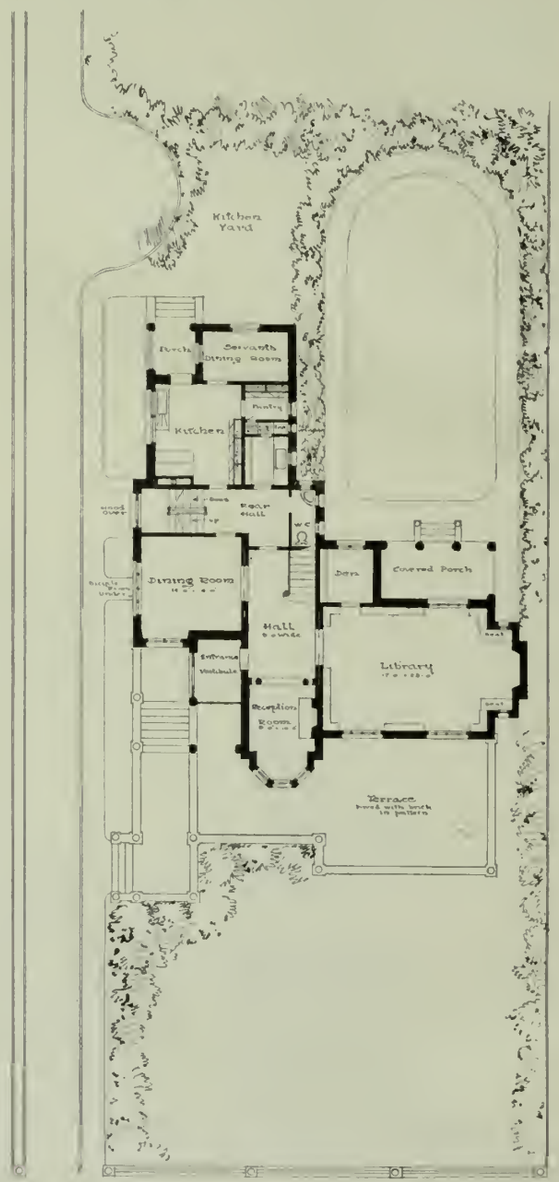
In the cellar the usual things are provided for,—space for heating apparatus, store rooms, wine cellar, laundry, bicycle room, etc., etc.

Materials: The house is designed to be built of rough common sand brick, hard burned, brown in color, preferably not of an even color, being darker at the bottom and growing lighter toward the top, the idea being to reproduce somewhat the exquisite colors of a meerschaum pipe, rich browns, the brick to be selected from those that are nearest to the fire and being "fire marked." They are to be carefully laid up, with wide joint, joints "struck." The bricklayer can show a great deal of ingenuity and artistic feeling in bricking out the design, in the use of his colors. The mortar is to match as nearly as possible the color of the brick. All the moldings, string-courses, copings, sills, and mullions are to be of molded brick and terra-cotta, as the case may be, as indicated on the plans.

The house, if placed in among a number of large trees, to have a dark red tile roof; if standing pretty well in the open, a shade of green slightly glazed.

The exterior walls to be laid with a hollow space 2 ins. wide, the exterior course being tied to the interior wall with any of the patterns of metallic ties. This will give a thoroughly dry wall, and also do away with wood furring on the interior; or, a solid wall can

be built and furred on the interior with terra-cotta, or the ordinary brick furring, but a clear air space must be given between the furring and the wall, if it is desired to have a dry wall. The additional cost of making fire-proof floor partitions is little, probably in this scheme not over five or six hundred dollars. There are a great many methods that could be followed out, and which might give even more satisfactory results than the ones mentioned above. When the general public find that fire-proof work can be built for a very little additional price over the present work, and that the more it is used and the more accustomed the masons get to it the cheaper it can be done, its use will be greatly extended. The hall could be floored and the stairs built of brick or slabs partially glazed, the treads being of slabs of marble, balustrade of terra-cotta glazed; all the mantels and fireplaces to be of brick and terra-cotta, shelves or seats being glazed (this does not mean a high glaze). Cellar



walls to be built without the use of stone, over-burnt brick being used to the grade line. At this point a glazed course of terra-cotta or brick.

PROFESSIONAL ETHICS.

IF good professional ethics in relation to one another were the rule among architects, while the conditions of practise would be more conducive to doing good work, the total result in the distribution of employment would be much the same as if the "get there" idea were to prevail. Professional habits, as followed by those of the profession who have, as the French say, "arrived" are rather an index of how they achieved their position than, as is sometimes supposed by the irregulars, a creation to help them to keep it. The only way to permanent success is expertness, and this is to be attained not by working for work but by working at it.—*Canadian Architect.*

Balcony and Parapet Balustrading.

BY THOMAS CUSACK.

WHAT has been said in depreciation of sheet-metal cornices applies with equal force to the misuse of that material in balustrading. Many a creditable and, otherwise, well executed design has been marred beyond redemption by a hollow pretense of make-believe balusters ranged along the parapet. It is, of course, customary to paint tin and galvanized iron affairs of this kind in simulation of the stone or terra-cotta used elsewhere on the building. Indeed, some of the most experienced artificers in this line go the length of sanding the receptive pigment, hoping to complete the deception. Viewed from afar, the counterfeit may pass as currency, but on closer acquaintance the hollowness and insincerity of the whole thing become painfully apparent. Not only is the building thus placed at a discount; the disillusion has a far-reaching suggestiveness in its bearing on things of real merit, detracting from their value in a, perhaps, disproportionate degree.

In situations where it may be expedient to obtain a desired effect on walls not calculated to carry much additional weight, copper becomes permissible — providing it be used frankly, and left to tell its own tale. At this point, however, a discriminating architect usually draws the line — unless overruled by a client in whom the penny-wise commercial instinct is paramount. In the latter case, all that may be said about consistency, homogeneity, or architectural continuity falls upon ears that hear not. To such a one an appeal, to be successful, must be made to his pocket, and in language with which he is familiar — the relative cost, for instance, is a turning point to which he will give due attention. The relative durability, and cost of maintenance, etc., are items that cannot be disregarded; for, even on his own ground, it is not the initial but the ultimate outlay that must be taken as a basis of comparison.

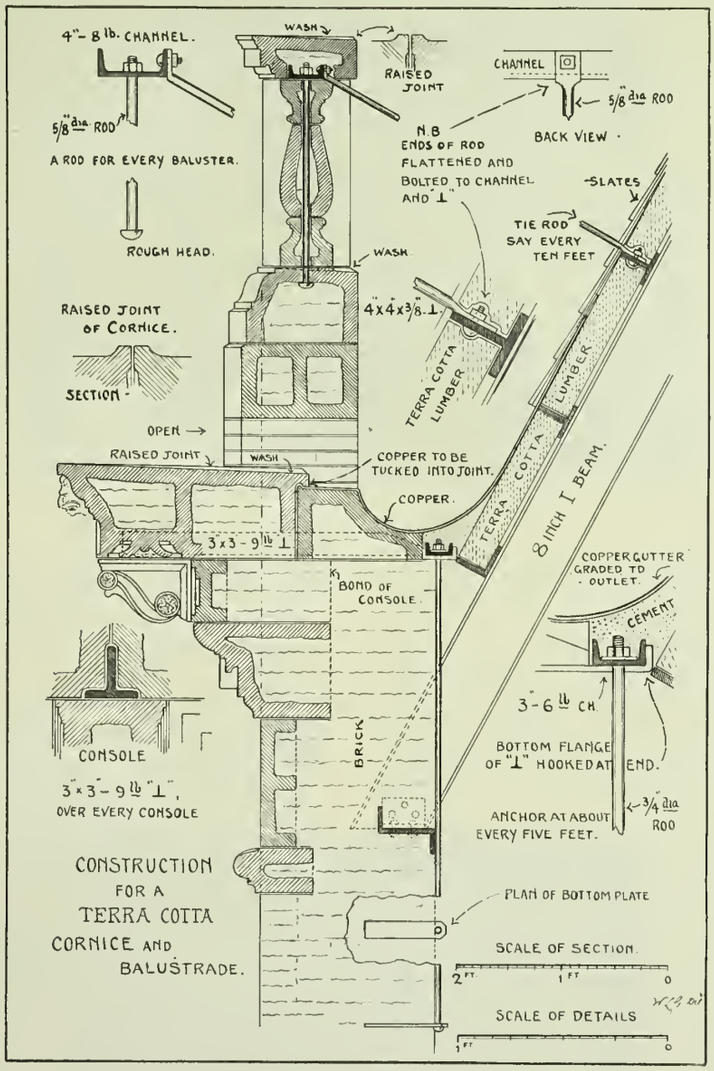


FIG. 62.

The cost of terra-cotta balustrading will depend largely upon the design, and the extent to which it is possible to render its execution simple and direct. A baluster of the shape shown at Fig. 62 should be jointed into three pieces. Not that it is by any means impossible to make such a baluster in a single piece, but, all things considered, it is not worth while to attempt it. To do so, two half balusters are pressed simultaneously, and the soft clay counterparts being brought into contact are united under pressure. When taken from the mold the seams are cleaned off, the imperfections filled in, and, to all appearance, the two are made one. Many of the unions so made are lasting, the two halves cleaving together under the most exacting conditions; but they are not all equally reliable. Some will show signs of dissolution after burning; others, that have passed through that ordeal apparently unscathed, may split from the effects of frost. Then, having to stand on end in the kiln, they are very liable to twist because of the extreme variation in sectional area. When this occurs the only remedy — one that may be resorted to in case of an emergency — is to cut the baluster horizontally, at suitable places, cementing the pieces together again on an iron core. It may as well be conceded that balusters made in one piece are subject to these defects, besides being more expensive in the first instance, with no compensating advantages.

A much better plan is to accept these adverse conditions, providing against the contingencies that arise from them by making the baluster in three pieces at the outset. This will allow each of them to be pressed into the mold from its widest end at one operation, therefore free from the vertical fissures incident to the method previously described. Our present illustration shows a ⅝ in. bolt passing up through the balusters, with head below and nut on top to hold the channel in position; also ⅝ in. staybolts to roof at intervals of 10 ft. Allowing for piers at angles, with intermediate dies in brick or terra-cotta placed at convenient intervals, the channel-bar would in itself afford sufficient lateral stiffness. The diagonal stays to roof being no longer necessary, would then be omitted altogether. We are, therefore, inclined to the opinion that some of the expedients introduced in this example err on the side of superfluous strength. A ½ in. rod as a core for the baluster, one end passing through a bar (or light channel), the other extending down into base in the form of a dowel, is usually sufficient without either head or nut. On this bar the coping is bedded down, and if the rebate in the ends be filled with cement, each piece locks itself and the adjoining pieces so securely that nothing further is required to hold them permanently.

A view of this particular cornice and parapet is given at Fig. 63, which is a residence at Madison Avenue and 39th Street, New York. The first story of the building is limestone, all above that point being terra-cotta and brick. In color the terra-cotta is an exact match for the stone, with brick walling of a somewhat darker

shade. This is a combination that has given much satisfaction here, and may be repeated elsewhere with equally happy results; which is more than can be said for some of the experimental "color schemes" with which we have been made acquainted. Instances of parapet balustrading constructed on the same general lines might be multiplied indefinitely. The present one, however, has been selected merely as a type of the class to which it belongs. Subject to the modifications suggested in the preceding paragraph, the construction does not differ greatly from current practise. Similar methods were adopted in nearly all of the balustrading with which we have been dealing of recent date, and from them there has not, as yet, been any reason to depart. It is likewise encouraging to note, in this connection, that the architectural idea has not succumbed to sordid commercialism, full justice being done to it in design, material, and workmanship. In these respects this building stands out in marked contrast with another corner residence not many blocks distant, in which a much more pretentious frontage is topped out with a painted imitation in sheet metal.

FIG. 63.

With a tier of balusters, a portion of which is shown at Fig. 64, the conditions differ materially from those of last example. They are less than a full circle on plan, with an ashlar engagement which, though usually made separate, may as well be attached. This admits of the two members being pressed at one operation, without horizontal joints, each block representing one baluster and one space. The vertical joint follows the contour of the baluster, and is therefore invisible when the work is assembled. In this method we have two distinct advantages; one contributing to better construction, the other, to a decided saving in the cost of production, and against which there is no offset whatever.

FIG. 64.

Pierced, double-faced balustrading such as shown at Fig. 40 (BRICKBUILDER, October, '97, p. 218), and again at Fig. 60 (BRICKBUILDER, July, '98, p. 143), though not free from inherent difficulty, can be made very successfully, provided the right methods are adopted. In the first place, it should not be cut up into small pieces, but made in sections, and they as large as are at all practicable. The number and location of the joints must depend somewhat on the ratio of voids, and also on the character of the design. In no case, however, should there be more joints than are absolutely necessary, and they should be placed so as to become inconspicuous when pointed. In pressing a piece of this description, a wood (or iron) core is embedded in each of the arms, and the clay built over on all sides of it. The hollow spaces remaining after these cores have been withdrawn allow the moisture to escape during drying, likewise the heat to pass clear through in burning. This makes it possible for the whole block to shrink uniformly, a precaution which goes far to prevent its cracking, or the undue twisting otherwise likely to ensue in the final stages of manufacture.

Some of the pieces in the parapet just referred to were as much as 3 ft. wide, all of them being 3 ft. 7 ins. high, and 8 ins. thick. At Fig. 60 they were 2 ft. 6 ins. each way, and only 5 ins. thick, yet in both instances the full complement was obtained, free from defects of any kind. Reasonable skill in the pressing, coupled with a little extra care in the succeeding stages, was enough to disprove the adverse dictum of certain wiseacres who, having failed themselves, were wont to decry less difficult undertakings as being wholly impracticable.

At Fig. 65 we have a section of balustrading recently made for the parapet of an important public building in which gray terra-cotta, in combination with brick of the same color, is used exclusively above grade level. This perforated panel is rather less than 4 ins. in thickness, a circumstance which adds considerably to the ordinary difficulties of manipulation. Yet more than seventy of these panels were produced without a single failure. The size is 2 ft. 6 ins. by 4 ft. 6 ins. with but one joint, which, passing through the hub vertically, becomes hardly noticeable when pointed.

The cross section of the arms was too small to admit of a core being inserted, as in previous examples; but a 1 in. hole should be bored through the diagonal members before the clay has lost too much of its plasticity. If pressed solid, and allowed to remain so, there will be a disposition to crack which can only be overcome by the exercise of extreme care in the drying. This is due to the difference in shrinkage between a relatively quick drying surface and a slow drying interior. To obviate this we must equalize the evaporation of moisture, and in that way render the shrinkage as nearly uniform as may be. The first expedient that suggests itself here is to ventilate the interior, and so accelerate the escape of moisture; the second, to cover up the exposed surface with damp cloths, or paper, to retard evap-

oration. In this way the natural tendency to crack, which if left to itself would prove fatal, has been controlled with gratifying success.

We have spoken of the drying as though it were a more delicate operation than that of the burning. In work of this kind, with refer-

FIG. 65.

ence to freedom from cracking and warping, it certainly is so. Assuming that the chemical constituents of the clay are such as will give the requisite degree of tenacity, also that the clay has been sufficiently ground and pugged, thence delivered to the presser at a uniform consistency, the result then depends chiefly upon the condition in which the unburned pieces reach the kiln. If cracked or warped on going in, they will assuredly be in the same, or a worse, condition when coming out of the kiln; but if the foregoing conditions are favorable, and the pieces free from defects when placed on the bearings, the elements of uncertainty are largely eliminated. It was not always so, as we have good reason to know; but of late years successful firing has come to be looked upon as a matter of course in all well-regulated factories.

Most of the preceding remarks will apply to the panel shown at Fig. 66, the maximum size of which piece would depend somewhat

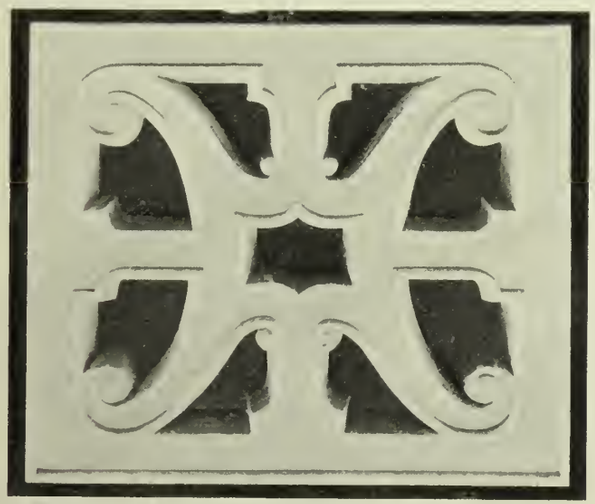


FIG. 66.

on its third dimension. With a thickness of, say, 6 ins., it would be quite practicable up to an approximate size of 3 ft. by 3 ft. 6 ins. In the hands of an architectural designer of average resource, single pieces of balustrading of these dimensions will, we think, be found equal to any possible requirement.

Tensile Tests of Cement.

(Concluded.)

BY IRA O. BAKER, PROFESSOR OF CIVIL ENGINEERING, UNIVERSITY OF ILLINOIS.

Dry Mortar. As a rule, dry mortar is put into the mold by a macnine, although it may be pounded in by hand.

The German standard rules are: "On a metal or thick glass plate five sheets of blotting-paper soaked in water are laid, and on these are placed five molds wetted with water. 250 grams (8.75 ozs.) of cement and 750 grams (26.25 ozs.) of standard sand are weighed, and thoroughly mixed dry in a vessel, then 106 cubic centimeters (100 grams or 35 ozs.) of fresh water are added, and the whole mass thoroughly mixed for five minutes. With the mortar so obtained the molds are at once filled with one filling, so high as to be rounded on top, the mortar being well pressed in. By means of an iron trowel 5 to 8 centimeters (1.96 to 3.14 ins.) wide, 35 centimeters (13.79 ins.) long, and weighing about 250 grams (8.75 ozs.), the projecting mortar is pounded, first gently and from the side, then harder into the molds, until the mortar grows elastic and water flushes to the surface. A pounding of at least one minute is absolutely essential. An additional filling and pounding in of the mortar is not admissible, since the test pieces of the same cement should have the same densities at the different testing stations. The mass projecting over the mold is now cut off with a knife, and the surface smoothed. The mold is carefully taken off and the test piece placed in a box lined with zinc, which is to be provided with a cover, to prevent a non-uniform drying of the test pieces at different temperatures. Twenty-four hours after being made, the test pieces are placed under water, and care must be taken that they remain under water during the whole period of hardening."

The French Commission recommend the following for sand mortars: "Sufficient mortar is gaged at once to make six briquettes, requiring 250 grams of cement and 750 grams of normal sand. The mold is then placed upon a metal plate, and upon top of it is fitted a guide having the same section as the mold, and a height of 125 millimeters (5 ins.). 180 grams of the mortar are introduced and roughly distributed in the mold and guide with a rod. By means of a metallic pestle weighing 1 kilogram, and having a base of the form of the briquette, but of slightly less dimensions, the mortar is pounded, softly at first, then stronger and stronger until a little water escapes under the bottom of the mold. The pestle and guide are then removed and the mortar cut off level with the top of the mold."

The Böhmé hammer apparatus is much used, particularly in Germany. It consists of an arrangement by which the mortar is compacted in the mold by a succession of blows from a hammer weighing 2 kilograms (2.2 lbs.) upon a plunger sliding in a guide placed upon top of the mold. The machine is arranged to lock after striking 150 blows. A high degree of density is thus produced, and more regular results are obtained than by hand. The apparatus is slow.

The Tetmajer apparatus is similar in character to the Böhmé hammer. "It consists of an iron rod carrying a weight upon its lower end, which is raised through a given height and dropped upon the mortar in the mold. The ram weighs 3 kilograms. This machine is used in the Zurich laboratory, and Professor Tetmajer regulates the number of blows by requiring a certain amount of work to be done upon a unit volume of mortar, — 0.3 kilogrammeter of work per gram of dry material of which the mortar is composed. This apparatus is subject to the same limitations in practise as the Böhmé hammer, in being very slow in use, and somewhat expensive in first cost."

STORING THE BRIQUETTES.

It is usual to store the briquettes under a damp cloth or in a moist chamber for twenty-four hours, and then immerse in water at a temperature of 60 to 65 degs. Fahr. For one-day tests, the briquettes are removed from the molds and immersed as soon as they

have begun to set. The volume of water should be at least four times the volume of the immersed briquettes, and the water should be renewed every seven days.

The briquettes should be labeled or numbered to preserve their identity. Neat cement briquettes may be stamped with steel dies, as may also sand briquettes, provided a thin layer of neat cement is spread over one end, in which to stamp the number.

AGE WHEN TESTED.

Since in many cases it is impracticable to extend the tests over a longer time, it has become customary to break the briquettes at one and seven days. This practise, together with a demand for high tensile strength, has led manufacturers to increase the proportion of lime in their cements to the highest possible limit, which brings them near the danger line of unsoundness. A high strength at one or seven days is usually followed by a decrease in strength at twenty-eight days. Steadily increasing strength at long periods is better proof of good quality than high results during the first few days. The German standard tests recognize only breaks at twenty-eight days. The French standard permits, for slow-setting cements, tests at seven and twenty-eight days, and three and six months, and one, two, etc., years: and for rapid-setting cements, from three to twenty-four hours for neat mortar, and twenty-four hours for sand mortars. In all cases the time is counted from the instant of adding the water when mixing the briquette. The briquettes should be tested as soon as taken from the water.

THE TESTING MACHINE.

There are two types in common use. In one, the weight is applied by a stream of shot which runs from a reservoir into a pail suspended at the end of the steelyard arm; when the briquette breaks the arm falls, automatically cutting off the flow of shot. In the other type, a heavy weight is slowly drawn along a graduated beam by a cord wound on a wheel turned by the operator. The first is made by Fairbanks Scale Company, and the second, by Riehle Bros., and also by Tinius Olsen, both of Philadelphia.

Fig. 2 represents a cement-testing machine which can be made by an ordinary mechanic at an expense of only a few dollars.

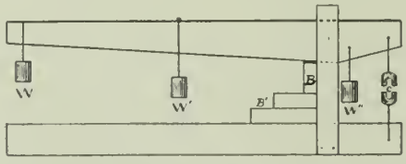


FIG. 2. HOME-MADE CEMENT TESTING MACHINE.
W = fixed weight. W' = rolling weight. W" = counterpoise.
B = block for shearing. B' = block for crushing. C = tension clips.

Although it does not have the conveniences and is not as accurate as the more elaborate machines, it is valuable where the quantity of work will not warrant a more expensive one, and in many cases is amply sufficient. It was devised by F. W. Bruce for use on United States government work at Fort Marion, St. Augustine, Fla.

The machine consists essentially of a counterpoised wooden lever 10 ft. long, working on a horizontal pin between two broad uprights 20 ins. from one end. Along the top of the long arm runs a grooved wheel carrying a weight. The distances from the fulcrum in feet and inches are marked on the surface of the lever. The clamp for holding the briquette for tensile tests is suspended from the short arm, 18 ins. from the fulcrum. Pressure for shearing and compressive stresses is communicated through a loose upright, set under the long arm at any desired distance (generally 6 or 12 ins.) from the fulcrum. The lower clip for tensile strains is fastened to the bed-plate. On this plate the cube to be crushed rests between blocks of wood, and to it is fastened an upright with a square mortise at the proper height for blocks to be sheared. The rail on which the wheel runs is a piece of light T-iron fastened on top of the lever. The pin is iron, and the pinholes are reinforced by iron washers. The clamps are wood, and are fastened by clevis joints to the lever arm and bed-plate respectively. When great stresses are desired, extra weights are hung on the end of the long arm. Pressures of 3,000 lbs. have been developed with this machine.

For detail drawings of a more elaborate home-made cement-testing machine, see *Proceedings Civil Engineers' Club of Philadelphia*, Vol. V., p. 194, or *Engineering News*, Vol. XV., p. 310.

The Clips. The most important part of the testing machine is the clips by means of which the stress is applied to the briquette. (1) The form must be such as to grasp the briquette on four symmetrical surfaces. (2) The surface of contact must be large enough to prevent the briquette from being crushed between the points of contact. (3) The clip must turn without appreciable friction when under stress. (4) The clip must not spread appreciably while subject to the maximum load.

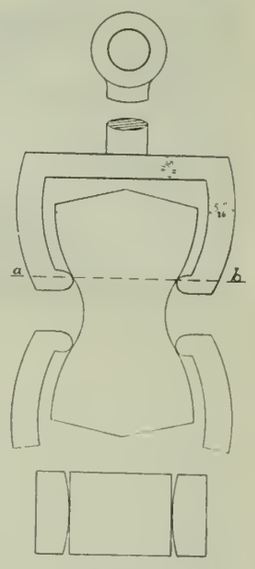


FIG. 3. AMERICAN TENSION CLIPS.

The form of clip recommended by the Committee of the American Society of Civil Engineers is shown in Fig. 3. This form is not entirely satisfactory, since it does not offer sufficient bearing surface, and the briquette is frequently crushed at the point of contact. The difficulty is remedied somewhat by the use of rubber-tipped clips.

The clips and the molds to fit should be purchased of the regular manufacturers, as home-made ones will not give at all satisfactory results.

Whatever the form of the machine or clips, great care should be taken to center the briquette in the machine.

The Speed. The rate at which the stress is applied makes a material difference in the strength. The following data are given by H. Faija, an English authority, as showing the effect of a variation in the speed of applying the stress: —

Rate.	Tensile Strength.
100 pounds in 120 seconds	400 pounds.
100 " " 60 "	415 "
100 " " 30 "	430 "
100 " " 15 "	450 "
100 " " 1 second	493 "

Other experimenters do not get as great differences as above, but all agree that the apparent strength is greater the more rapidly the load is applied.

The French Commission recommends 660 lbs. per minute. The American Society of Civil Engineers recommends 400 lbs. per minute for strong mixtures, and half this speed for weak mixtures. The Canadian Society of Civil Engineers recommends 200 lbs. per minute. The German standard requires "13 lbs. per minute," which refers to the load applied at the end of the steel yard arm and not to the stress on the briquette. Apparently the multiplication of the German machine is thirty, and consequently the rate of stress is 13 x 30 = 390 lbs. per minute.

DATA ON TENSILE STRENGTH.

Owing to the great variation in the manner of making the tests, it is not possible to give any very valuable data on the strength that good cement should show. In 1885 a Committee of the American Society of Civil Engineers recommended the values given in Table I. At least the minimum values there given are required in ordinary specifications, and the maximum values are sometimes employed. Many of the better cements commonly give results above the maximum values in Table I.

TABLE I.

TENSILE STRENGTH OF CEMENT MORTARS.

Age of Mortar When Tested.	Average Tensile Strength in Pounds per Square Inch.			
	Portland.		Natural.	
CLEAR CEMENT.	Min.	Max.	Min.	Max.
1 day—1 hour, or until set, in air, the remainder of the time in water	100	140	40	80
1 week—1 day in air, the remainder of the time in water	250	550	60	100
4 weeks—1 day in air, the remainder of the time in water	350	700	100	150
1 year—1 day in air, the remainder of the time in water	450	800	300	400
1 PART CEMENT TO 1 PART SAND.				
1 week—1 day in air, the remainder of the time in water	...	...	30	50
4 weeks—1 day in air, the remainder of the time in water	...	. .	50	80
1 year—1 day in air, the remainder of the time in water	...	...	200	300
1 PART CEMENT TO 3 PARTS SAND.				
1 week—1 day in air, the remainder of the time in water	80	125	...	...
4 weeks—1 day in air, the remainder of the time in water	100	200	...	...
1 year—1 day in air, the remainder of the time in water	200	350	...	...

Natural cement, neat plastic mortar, will generally show 50 to 75 lbs. per square inch in seven days, and 100 to 200 lbs. in twenty-eight days. Good Portland cement, neat plastic mortar, will show 100 to 200 lbs. per square inch in one day, 400 to 600 in seven days, and 600 to 800 in twenty-eight days. With 3 parts sand, Portland cement, plastic mortar, will give at least 100 lbs. per square inch in seven days, and 200 in twenty-eight days. Of course the strength varies greatly with the method of testing. In consulting authorities on this subject, it should be borne in mind that the strength of cement, particularly Portland, has greatly increased in the past ten years. The specifications should be drawn to correspond with the personal equation of the one who is to test the cement.

The German standard requirement for dry mortar pounded into the molds is 227 lbs. per square inch at twenty-eight days.

EQUATING THE RESULTS.

It not infrequently occurs that several samples of cement are submitted, and it is required to determine which is the most economical. If the cement is tested with the proportion of sand usually employed in practise, then only strength and cost need to be considered; but if the cement is tested neat, then cost, strength, and fineness must be taken into account. Table II. shows the method of deducing the relative economy when the cement is tested with sand. The data are from actual practise. In a similar manner, results could be deduced for the relative economy at any other age. The circumstances under which the cement is to be used should determine the age for which the comparison should be made.

TABLE II.

RELATIVE ECONOMY OF CEMENTS TESTED WITH SAND AT 7 DAYS.

Cements.	Tensile Strength, 1 C. to 3 S.		Cheapness.		Relative Economy.	
	Pounds per Square Inch.	Relative.	Cost per Barrel.	Relative.	Product of Relative Strength and Relative Cost.	Rank.
A	168	95.4	$2.30	100.0	95.40	2
B	176	100.0	2.34	98.3	98.30	1
C	166	94.3	2 40	95.8	90.33	3
D	135	76.7	2 45	93.8	71.94	4
E	135	76.7	2.47	93.1	71.40	5

However, this principle should be employed with caution, particularly with short-time tests, since the method gives the advantage to a cement which gains its strength rapidly and which may therefore be unsound. If this method is employed, care should be taken that the minimum strength specified is not unduly low.

Fire-proofing.

A CONSENSUS OF OPINION AMONG LEADING ARCHITECTS OF CHICAGO ON THE USE OF BURNED CLAY FOR FIRE-PROOF BUILDINGS.

(Concluded.)

IN the last issue of THE BRICKBUILDER we published the results of interviews with some of the leading Chicago architects in regard to the use of burnt clay for fire-proofing purposes. Reports of further interviews are published herewith. In order to bring again before our readers the distinct lines upon which the inquiries were based, we reprint the questions to which reference is made in the interviews. These questions cover the whole field of our proposed inquiry, and a comparison of the replies suggested thereby shows how firm is the belief in burnt clay as a medium for fire-proof construction and how thoroughly this material has been able to accomplish the desired results. These interviews, as compared with the opinions we published some time since of some of our leading Eastern architects, show that the use and appreciation of terra-cotta does not materially differ in the West from what is recognized as the best practise in the East.—ED.

The following questions were submitted to those whose names appear hereafter:—

1. Do you employ burned clay in fire-proof buildings, and if so to what extent?
2. Do you prefer it to other so-called fire-proofing systems, and if so for what reasons?
3. What kind of burned-clay material do you prefer? or would you employ different kinds for different purposes?
4. Have the recent attacks on the burned-clay systems of fire-proofing by promoters of other systems influenced your judgment?
5. Do you think that the makers of burned-clay fire-proofing are trying to improve and perfect their material and its method of application?
6. What do you think is the lesson to be learned from recent fires in buildings fire-proofed with burned clay?
7. Do you think it right for architects to consent to their clients always taking the lowest bid for this kind of work without regard to the differences in what the parties intend to furnish?
8. What do you think is the reason why the price and quality of burned-clay fire-proofing have been reduced during the last ten years?
9. Do you agree with the opinions given by Mr. Jenney in the July BRICKBUILDER?
10. Do you think it desirable for architects to employ fire-proofing experts to design the details of fire-proof work and supervise its erection, as is now done in the case of steel constructions?

Louis H. Sullivan, formerly of the firm of Adler & Sullivan, has had a large experience in the erection of fire-proof buildings, not only in Chicago, but in St. Louis, Buffalo, New York, and other cities. He said: "Yes, I have used burned clay largely, and in nearly all of the fire-proof buildings that I have designed. I prefer it to other so-called fire-proof materials, because it is, on the whole, better adapted to the contingencies of building construction. It is best adapted to winter building and rapid work; in fact it is unwise to employ plastic methods for large buildings, even though it is proposed to do this part of the work in summer, for contingencies might arise to compel part of it to be done in freezing weather, when no dependence could be placed upon the results. The use of plasters and concretes in solid bodies demands practically laboratory conditions and constant inspection, and further, it is for these reasons also that I agree with Mr. Jenney that it is best for filling over flat arches to use as little concrete and as much tile as possible, and, when concrete is necessary, to make it as he suggests. I prefer porous to hard tile, but I would prefer a semi-porous tile to either, if I could get it, because it has great strength and is less liable than hard tile to

crack when suddenly cooled by water. I wish some manufacturer would put such a material on the market in this city. I have heard of its having being used elsewhere."

In answer to the fourth question, Mr. Sullivan said emphatically "No," which requires no enlargement or explanation of his views on that subject. In answer to question five he said: "In the West, that is including Buffalo and Pittsburgh and points west of those, yes; east of those points, no. The Eastern tile seems to be the same that it was years ago, very rough and uneven, both in form and quality. I very much dislike the Eastern system of making a soffit tile out of an extension of the skew-back carried under the beam on both sides. In recent work done under my direction in New York, many of these extensions were broken off in setting. They did not fully cover the space under the beams, and I required the contractors to use mortar combined with a reinforcement of metal buried within it, to supply the deficiency. But I do not like this as well as the independent soffit tile with an air space." Referring to Mr. Jenney's girder system as used in the extension to the New York Life Building at Chicago, and illustrated in the July BRICKBUILDER, he said: "I like it. It is a very simple and strong system of construction so far as the steel is concerned, and capable of thorough fire-proofing, so as to make flat ceilings throughout without disclosing the girders." In answer to the question, "What do you think is the lesson to be learned from recent fires in Pittsburgh, where the steel structure was saved though the fire-proofing was considerably damaged?" he said that the work was imperfect, but could, with slight improvement, have been made thoroughly reliable. "The lesson is that all fire-proofing is worthless unless thoroughly done."

In answer to question seven he said: "That is a good question that applies to everything, no matter what it is. I cannot control the commercial instincts of my clients, but try to do it."

In answer to question eight, he thought that the price and quality of burned-clay fire-proofing had been reduced during the last few years, because of the stringency of the money market and severe competition for contracts. As to whether or not he agreed with the opinions given by Mr. Jenney in the July BRICKBUILDER, he said: "In the main I do, yes." Mr. Sullivan is preparing to finish all the columns in a large store he is now designing for Chicago, to a round section, and to avoid sharp angles wherever possible.

During the absence of Henry Ives Cobb, in Washington, Christian A. Eckstorm, the manager of his offices, consented to give his own views, which he thought would reflect those of Mr. Cobb. In answer to the first question he said: "Entirely; except in one building now being erected (one of the Chicago University buildings), where we are using Makolite lintels between the floor beams in place of flat arches, but this has been done entirely for economic reasons, and not because we preferred them.

To question two he said, evidently referring to interior work: "Yes; and for one reason, that less depends upon the character of workmanship in putting up. That is not to say that we admit inferior work, if we can help it, but with setting hollow-tile fire-proofing the chances of getting inferior workmanship are less than with other materials and methods. For instance, in winter work and rapid construction the advantages are all with hollow tile.

In answer to question three he said: "We have used the hard-burned tile in all but two buildings. We used porous tile in the Chicago Athletic Club, which you know was severely tested by fire during construction, and when the protecting material was not in sufficiently complete condition to do its work as effectively as if the building had been finished, and also in the Chemical Building in St. Louis. That used in the latter was made at St. Louis. It was of about the same consistency as the Chicago porous tile, but the pieces had thicker webs than the Chicago make. I tried the heat and water test on it with satisfactory results."

To question four his answer was "No." To question five he said: "Not within the last three or four years. The Pioneer Fire-proof Construction Company, of Chicago, are now proposing to furnish hollow-tile lintels for floor construction to reach from beam to beam, in place of end-pressure arches, which will do away with the expense of centering, and I think it may reduce the cost of setting, though perhaps the tile may cost more."

In answer to question six he said: "I can speak only from our own experience. After the fire which attacked the Chicago Athletic Club, before completion, which was the only actual test ever given to any of our buildings, we removed some pieces of steel which seemed to have been most exposed to fire and had them tested exactly the same as new steel, and found that they had not been depreciated in any respect."

To question seven he said: "No. It is against the practise of this office to let work to the lowest bidder regardless of difference of material offered." He thought that competition and the stringency in the money market were the reasons why the price and quality of burned-clay fire-proofing had been reduced during the last ten years, and added, "It must be admitted that too many people are unwilling to pay for a good article when they can get a cheaper one which seems to answer the purpose." He had not sufficiently examined Mr. Jenney's article to give a definite answer, but in answer to question ten said: "Yes, it would be desirable for architects to employ fire-proofing experts, as is now done in the case of steel constructions."

N. Clifford Ricker, head professor of the Department of Architecture in the University of Illinois, and Dean of the Engineering Faculty, while not a Chicago architect, has always been in practise, and has not only had experience in the use of fire-proof materials, but has been a keen observer of the works of others, so that their experience has had an influence in shaping the course of instruction in practical construction at the University. THE BRICKBUILDER is glad to be able to add the expression of his analytical judgment to the opinions of more active practitioners. Taking the questions *seriatim* for his text, he said: —

"1. Since nearly all my buildings have not been required to be fire-proof, I have seldom had occasion to employ burned clay for fire-proofing.

"2. I certainly consider hollow burned-clay tiles for floors, partitions, and external walls to be more durable than any other fire-proofing materials for these purposes. With proper supervision and careful construction, the safe strength of floors may be computed with greater certainty; burned clay resists water, fire, and dampness more efficiently than any other system with which I am acquainted. The expanded-metal-concrete system was employed in the Library Building of the University because somewhat cheaper, thus obviating the necessity of reducing the size of the building.

"3. I should prefer to use fire-clay products for fire-proofing, though porous terra-cotta might be as efficient, though weaker.

"4. Not at all.

"5. This is doubtless the case, and would be the natural result of experience and competition.

"6. That this is the most efficient fire-proofing material used, if buildings are properly designed, so long as it is impossible to construct them entirely of brick masonry.

"7. No more than for any other kind of work. The advice of the architect to his client should be based on the greatest permanent or ultimate benefit to him.

"8. Results of experience, discoveries of new deposits of materials and new processes of manufacture, increased product, economies in management, competition in manufacturing and application, invention of new forms of finished products.

"9. Generally, although it is probable that failure of burned-clay fire-proofing to resist fire and water is due more to defective fixing and attachment, than to quality of material. It will not always be true economy to drop ceiling to bottom of girder, except perhaps in large rooms. Cinder concrete is lighter and cheaper, but is inferior to concrete of cement, sand, and gravel. No doubt plastering may still be greatly improved and made to resist fire and water without material injury.

"10. This will doubtless become necessary in case of a very important structure."

Masons' Department.

ESTIMATING BRICKWORK.

(*Concluded.*)

BY F. E. KIDDER.

IN any system or method of estimating there is necessarily a certain amount of guess-work involved as to the labor that will be required, and to some extent in regard to the materials, and the ideal system is that which most nearly eliminates this feature. In figuring by the method explained in the previous article, the contractor must, to a greater or less degree, guess at the price per thousand wall measure to use as a basis in making up his bid. True, if he has built similar buildings in the same locality and kept an accurate account of the cost, he can come very close in his guessing, but when the building has an unusual amount of openings, or has towers, or an elaborate brick cornice, or other special features, this method of estimating involves a good deal of guess-work. Again, a rise in price of one or more of the materials required, or in wages, will affect the rate per thousand, but not in the proportion that it bears to the article affected. To figure a job close, therefore, the writer is of the opinion that the quantities of all of the materials required should be estimated, and then the cost of the different items, including labor.

If part of the work is more difficult than another part, the labor on the two parts may be figured separately. The actual cost of the materials can be pretty closely estimated, the labor being the most variable item.

To separate the different items takes a little more time, it is true, than the method of figuring by the thousand, and requires more data, but one cannot expect to make a success of any business without putting a good deal of intelligence into it. The writer believes that one reason why the average contractor does not succeed better is that he is so careless in keeping accounts of the cost of the work that he does and the quantities of materials used.

Ask half a dozen brick contractors how much lime and sand it takes to lay 1,000 common bricks, and nearly as many different answers will be received, and few contractors can tell just what it cost per thousand to lay the bricks in any particular building. All of these points should be carefully determined at the end of every job, and the results itemized and recorded for future use. This will not only enable the contractor to figure more closely, but may enable him to discover leaks in his business.

The following data relating to a building built about a year ago, in Denver, was obtained from the contractor and is given to illustrate the way in which some of the items may be determined, although the relative amount of labor, lime, and sand for the pressed bricks was not kept separately on this job. The building was an ordinary two-story brick residence, 29 by 48 ft., with stone foundation walls and faced with pressed brick on all four sides; the walls were 12 ins. thick from foundation to wall plate.

Several contractors figured on the job, and their estimates varied but little from 93,000 brick, solid wall measure. There were 2,900 superficial feet of pressed brickwork, after deducting openings.

The writer figures that there are 2,426 cu. ft. of common brickwork, after deducting for all openings, and allowing nothing for the chimneys above the roof, as they were built of pressed bricks. There was no fancy brickwork.

The materials actually used in this building, and their cost, are as follows: —

18,300 pressed bricks, at $14.25, delivered	$260.75
42,000 common bricks, at 4.00, „	168.00
75 bushels of lime, at 46 cts.	34.50
21 loads of sand (about 1½ yards to load), at 60 cts.	12.60
2 bbls. mineral red (for red mortar)	10.00
Labor	202.50
	$688.35

This job, therefore, ran at the rate of 6⅓ pressed bricks to the square foot, after deducting openings, and the total number of bricks was a little less than two thirds of the wall measure.

It also took 17.3 common bricks to the cubic foot of actual brickwork.

Estimating as closely as possible the cost of the pressed bricks and the materials and labor required for laying them, and deducting from the total cost, we find that the 42,000 common bricks cost $315.18 laid in the wall, or $7.50 per thousand; the lime, sand, and labor costing $3.50 per thousand. Or, deducting the actual cost of the pressed bricks, without laying, and dividing by 93,000, we find that the work was done for $4.60 per thousand, wall measure. The wages paid on this job were $2.50 per day of eight hours, for bricklayers, and $2 per day for laborers. The masons lay the pressed bricks from the inside, and each man always backs up his pressed brick. The cost of laying the pressed brick, including lime and sand, was $6.15 per thousand.

The prices quoted above are extremely low, and probably cannot be duplicated elsewhere, but the quantities should run about the same in all localities.

For estimating brickwork in Denver, the writer finds that the following data is quite close for the average job: —

Pressed brick per net square foot, 6⅓.

Actual bricks required (pressed and common) two thirds wall measure.

Actual number of bricks to the cubic foot of common brickwork, after deducting openings, and calling a 13 in. wall 12 ins. thick, 17⅔.

A brick mason will lay 800 pressed bricks, or from 1,500 to 1,600 common bricks, on an average in a day of twelve hours.

To lay 1,000 common bricks (kiln count) requires 1½ bushels of white lime (80 lbs. to the bushel, or 2½ bushels to the barrel), and ⅝ yard of sand.

To lay 1,000 pressed bricks will require ¾ bushel of lime and ¼ yard of sand; and if colored mortar is used, about 50 cts. per thousand should be allowed for the coloring matter.

With wages at $3 per day for masons, and $2 per day for labor, the cost of labor per thousand bricks will be about $6.25 for pressed bricks and $3.33⅓ for common bricks.

Taking these figures as a basis, then, the writer would figure a job of brickwork as follows: —

2,493 sq. ft. (net) pressed brick at 6⅓ = 15,789 pressed bricks.

1,945 cu. ft. of common brickwork at 17⅔ bricks per ft. = 34,360.

15,800 pressed bricks at $15 per thousand, delivered	= $237.00
34,400 common bricks at $4.50 per thousand, delivered	= 154.80
Lime for 15,800 pressed bricks, 12 bushels.	
„ 34,400 common bricks, 51½ „	
63½ bushels at 46 cts.	= 29.21
Sand for 15,800 pressed bricks, 4 yards.	
„ 34,400 common bricks, 21½ „	
25½ yards at 55 cts.	= 14.02
Mortar color, 15,800 bricks, at 50 cts. per thousand	7.90
Labor, 15,800 pressed bricks, at $6.25	98.75
„ 34,400 common bricks, at $3.33⅓	114.66
Extra for laying 2,000 bricks in cornice	8.00
200 molded bricks, at 4 cts.	8.00
3 iron ash doors, at $1.75	5.25
Thimbles	1.00
Flue lining, 32 ft. at 25 cts.	8.00
Cleaning down and pointing	25.00
Total	$711.59
Add for profit and contingencies	70.00
Amount of bid	$781.59

As prices and methods of working vary in different localities, the contractor must, of course, determine the various prices for the different items, for himself, and when each job is completed, he should sum up from his bills and time-book the actual materials used and the cost of labor, and compare with his bid, and in a short time he can estimate very closely indeed.

Many Denver contractors now estimate in this way, except that they determine the number of common bricks by first computing the solid wall measure, and taking a certain proportion of this for the actual number of both common and pressed bricks. Thus, if the job figured, say, 72,000 brick wall measure, they would allow about one third, or 24,000 bricks for openings, and difference between 22½ and 17^2_3, which would leave 48,000 bricks, kiln count. Subtracting from this the pressed bricks gives the number of common bricks. Having determined the number of bricks, the bid is made up in the foregoing manner. There is an advantage in this method, that the contractor knows just about what he has got to pay for materials where he is doing part of the work himself.

The writer would suggest that contractors might help each other by furnishing for publication in this column data along the lines above indicated, taken from their accounts. Such data would certainly be interesting to all and of great value.

MIXING CONCRETE BY GRAVITATION.

CONCRETE has generally been mixed in two ways, either by hand with a shovel or by steam machine mixers. The advantages of the different ways of mixing concrete are too well known to be spoken of here but briefly. The three principal advantages of mixing concrete with steam machines are economy of cost, thorough mixing, and reducing the time of mixing to a point where the full advantage of the initial set of the cement is obtained. Concrete can be mixed with shovels by hand thoroughly if the proper amount of care and time is taken, but it takes so long to mix a batch of concrete by hand that many of the quick-setting cements began their initial set before the concrete is deposited in place.

Until recently there has not been, to our knowledge, a machine on the market costing less than several hundred dollars that could mix all the concrete that four men could shovel into it, and without taking up considerable room for the mixer and the boiler for furnishing steam, and without the expense of a skilled workman to handle the boiler and the engine of the mixer.

We have recently seen in Boston a concrete mixer consisting of a trough about 10 ft. long with a hopper at the top into which the stone, sand, and cement are thrown and with an arrangement of pins from one end to the other, and with a stream of water entering the mixer approximately half way down its length, which will give exactly the same process and result as mixing by hand, *i. e.*, the broken stone or gravel, sand, and cement are thoroughly mixed dry by striking a large number of pins in the upper half of the mixer and then coming in contact with the jet of water are thoroughly mixed wet through the rest of the mixer, coming out at the lower end into a wheelbarrow, bucket, or other suitable apparatus for conveying it to the desired place. The advantages of this mixer are self-evident. The concrete is mixed precisely as it is by hand or with the steam machine by being mixed thoroughly dry and then mixed again thoroughly after it is wet; and as the only power required is gravitation, there is no cost for power, fuel, or a skilled man to operate it. This machine is made so light that three or four men could lift it up and set it in place without the use of rollers, skids, or derricks. The cost of transportation and setting up the mixer is nominal.

This mixer can be used not only on large jobs where a thoroughly first-class concrete is desired in large quantities, but it can also be set up on small jobs where the cost of teaming a mixer, engine, and setting up would cost nearly as much as the labor to mix the concrete by hand.

EXTERIOR SCAFFOLDING.

THE custom in regard to scaffolding for the erection of the exterior of buildings differs in various parts of the country. In New England it is usual to erect an outside staging constructed usually of 4 by 4 uprights spaced 6 or 8 ft. apart, in double rows, and connected and braced by 6 in. boards, the scaffolding being carried to the top of the building. In New York more commonly the scaffolding is projected on putlogs, from story to story or the work of laying the face brick, etc., is done from each floor.

The question of which is the best is largely a matter of usage, but there is one way of looking at it which we think is worthy of consideration. If the building is anything more than the plainest kind of commercial structure, the architect likes to study it as it goes along. If the outside of the building is covered with staging from top to bottom, it is like working a typewriter which letters upside down. You cannot see what is being done until perhaps it is too late to make any change. On the other hand, if the staging covers only one story at a time, any imperfection, irregularity, or undesirable combination can be seen at once from the outside in its true proportions and full effect and can then be altered or remedied before the building is carried any higher.

It is the fond belief of New England contractors that they get better bricklaying in and around Boston than anywhere else in the country. We doubt if our New York brethren would quite agree to that; at any rate, we hardly believe that the alleged superiority is due entirely to the fact that outside stagings are used here. Certainly the opportunity of watching the building as it goes along is something that would be welcomed by every architect, and we all know how anxiously at times we have waited for the final removal of the staging, often in serious doubt as to whether this pet scheme of color or that detail would have its true effect, and we certainly should advise inside staging in every case where it is possible, in order to study the building as it goes along.

ELECTRIC CONDITION OF MODERN BUILDINGS.

THERE have been several paragraphs in some of the technical journals, which have been frequently repeated in the dailies, calling attention to the possibilities of destructive action by electrolysis, or by some possible but even more obscure process due to what is vaguely termed free electricity, which is supposed in some way to escape into the frame of a structure and work havoc with all its knuckles and joints.

No less an authority than General Sooy Smith has stated a belief that this is a tangible source of danger to the steel frames of the huge Chicago buildings.

If this is a danger, which is truly imminent, it certainly ought to be carefully considered and guarded against, and yet we can hardly believe that the amount of electricity which gets into the frame of a modern building is ever sufficient in amount to be even appreciable.

If electricity were in the habit of wandering around in the eccentric manner which sometimes characterizes the lightning flash, there might be more reason to fear for its action on the frame of a building; but no such eccentricity is habitually observed in any structure with which we have ever been familiar. In our Boston Subway, which is constructed with steel columns at the sides, and overhead steel beams, the possibility of electricity leaking from the overhead conductor to the overhead beams, thence to the columns and through the earth to the return conductor, is perfectly plausible, and, indeed, we are inclined to believe will in time present a real source of danger to the structure; but no such arrangement of conductors is ever met with in a commercial building, and we cannot believe that there is the slightest danger of electricity playing any such pranks with our steel frames as to endanger to any appreciable extent the security of its parts.

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK.—This is a period of transition and preparation in the real-estate and building world. Once fairly started on its course in September, business in ordinary years is likely to travel along prosperously and without serious interruption until the Christmas holidays, only the possibility of an unsound election being sufficient to make it pause in the late autumn. This year, fortunately, there is no issue in sight that is calculated to destroy confidence or upset the financial world, the only danger in that line at present being the remote possibility of a free silver victory in the Congressional elections — a possibility so remote that it may be dismissed without a thought.

ST. JAMES HALL, PHILADELPHIA, PA.
Rankin & Kellogg, Architects.

It would seem, therefore, that we are to enter upon a season of steady business. It is true that the business of the past month has not even given a hint of coming activity, nevertheless the conditions are now right and we hear expressions of confidence on all sides. A feature that should not be lost sight of, and which is sure to be an improving factor, is the radical change that is coming to the transit facilities of the city within the next few months. I refer particularly to the near completion of the under trolleys on Sixth and Eighth Avenues. This will greatly help the outlying districts and the suburban towns, for in the long run it is accessibility that tells. Old New Yorkers may have their preferences and their prejudices, but to the newcomer the advantage of a single fare from his house to the City Hall is almost decisive when he selects his home.

TERRA-COTTA DETAIL, PRESS BUILDING, 7TH AND SANSOM STREETS, PHILADELPHIA, PA.
Executed by the Standard Terra-Cotta Company.
T. P. Chandler, Architect.

We are no nearer to the possibility of having our great Public Library than when we last referred to the matter, owing to the economy of the present administration and the necessity for placing street lamps 10 ft. apart throughout all the adjacent corn fields, which act we of course do not criticize, as it is probably a charitable act to assist some starving contractor.

Among the few items of new work reported last month are:—

Charles C. Haight, architect, has prepared plans for a two-story brick warehouse to be built for the Trinity Church Corporation at a cost of $30,000.

George F. Pelham, architect, has planned a six-story brick store and loft building to be built at numbers 203, 205 Wooster Street; cost, $30,000.

Franklin Bayliss, architect, has planned a six-story brick mercantile building to be built on Prince Street, corner West Broadway; cost, $40,000.

Alexander M. Welch, architect, is preparing plans for three five-story brick flats to be erected on Riverside Drive near 87th Street; cost, $100,000.

I. G. Perry, State Architect, Albany, N. Y., has prepared plans for a three-story brick hospital building to be erected on Ward's Island; cost, $150,000.

PITTSBURGH. The expectation among architects during the spring and summer has been that when the war was over building operations would improve rapidly; but peace, which now seems assured, has come so late in the season that little improvement is looked for before the first of the year. While work of any importance is practically at a standstill, a great deal of small work is being done. This is principally small dwellings costing from $3,000 to $10,000; many are doubtless taking advantage of low prices and building homes for themselves, but the large number of them, and especially the fact that so many are going up in groups of from three to six or more, would seem to show that the high rents obtained here have attracted investors, and particularly those who have only a small ready capital, who see here an opportunity for obtaining a good return from their investments. When we remember that a house costing about $5,000 will rent for $50 a month, it seems that they are receiving at least a fair percentage.

A noticeable fact here has always been the almost complete absence of apartment buildings and of flats, but this has also lately been receiving more attention. The new Schenley Apartments on Fifth Avenue, East End, will supply, for a time at least, the demand for a high-priced building, and a number of moderate

priced ones are now being put up or will be commenced soon, while several are being contemplated but are not far enough along to give particulars.

Rutan & Russell have recently let the contract for the new Edgeworth Club House to be built at Edgeworth, Pa.

Work has been commenced on the new building for the United Presbyterian Seminary Building in Allegheny. It is to be of brick and terra-cotta, and to cost $90,000. Struthers & Hannah are the architects. This firm is also preparing plans for an addition to the residence of Charles Lockhard, Highland Avenue, to cost about $45,000.

Alden & Harlow have prepared plans for a summer home for

CHEMICAL BUILDING, ST. LOUIS, MO.
The front brick used in this building was manufactured by the Illinois Supply and Construction Company.

Mr. Sol Smith Russell; it is to be built at Edgartown, Mass., and to cost $10,000.

Geo. S. Orth & Bros. are at work on a new house for Dr. Halleck, to cost about $12,000.

A new six-story apartment house to be built at Friendship Park has been planned by Architect De Arment.

Miss Mercur has planned the St. Francis de Sales Roman Catholic Church at McKee's Rocks; it is to be built of brick, and cost $40,000. She has also prepared plans for a new building for the Young Women's Seminary at Washington, Pa; cost, $25,000.

The Diamond National Bank has opened a competition for a new office and bank building, which they will erect next spring. T. D. Scott is the only local architect at work on this.

J. D. McShane will erect an apartment house on Highland Avenue. It is to be built of Roman brick and terra-cotta, and cost $100,000. Topp & Craig are the architects.

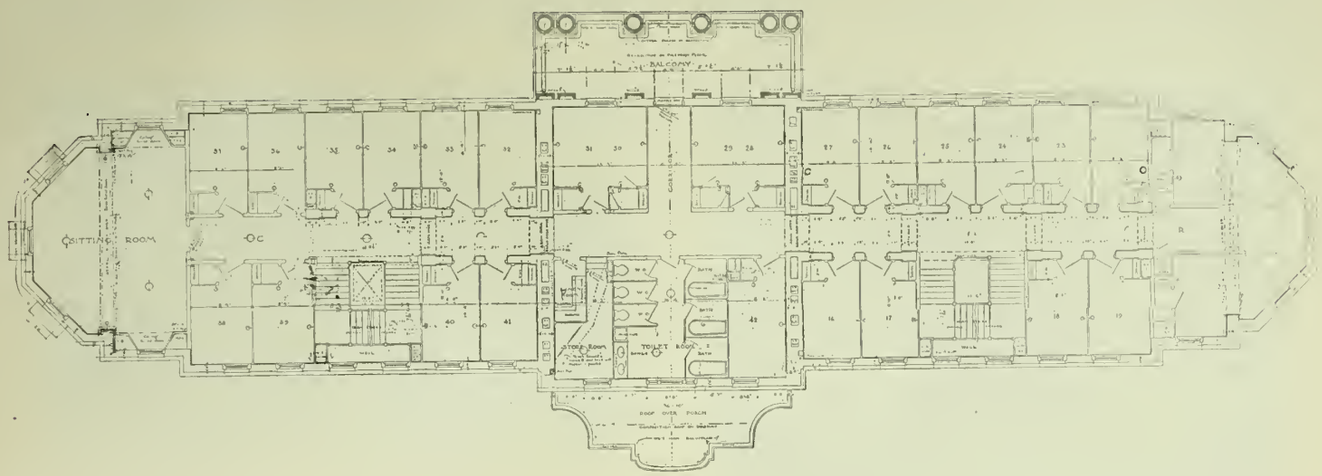
TERRA-COTTA CAP FOR SCHOOL NO. 7, BAYONNE, N. J.
Executed by the New Jersey Terra-Cotta Company.
Hugh Roberts, Architect.

Great preparations are being made for decorating the city during the triennial conclave of the Knights Templars, which will be held here next month. Many large arches are being planned, to be built of staff. It is to be hoped that, with a material which lends itself so readily to work of such a character, they will surpass in design and artistic merit the arches ordinarily built on such occasions.

NEW TRADE PUBLICATION.

The Conkling, Armstrong Terra-Cotta Company has published an attractive portfolio containing photographic reproductions of work executed by them, including general views of buildings, and carefully selected details. We have heard of an astute individual who undertook to collect an epitome of modern American architecture in the shape of the annual trade catalogues of the art industries. These really constitute a by no means bad measure of progress, and certainly in such a collection the representation of this company could be given a high place. Few of the art industries can show so entertaining a lot of really excellent work both in design and execution, and the terra-cotta which is shown by this portfolio of some seventy-eight plates is of a character which marks the publication as more than a mere trade catalogue. It has been a pleasure to illustrate some of the work of this company from time to time in these

TERRA-COTTA DETAIL, DOYLESTOWN BANK, DOYLESTOWN, PA.
Executed by the Conkling, Armstrong Terra-Cotta Company.
Baker & Dallett, Architects.



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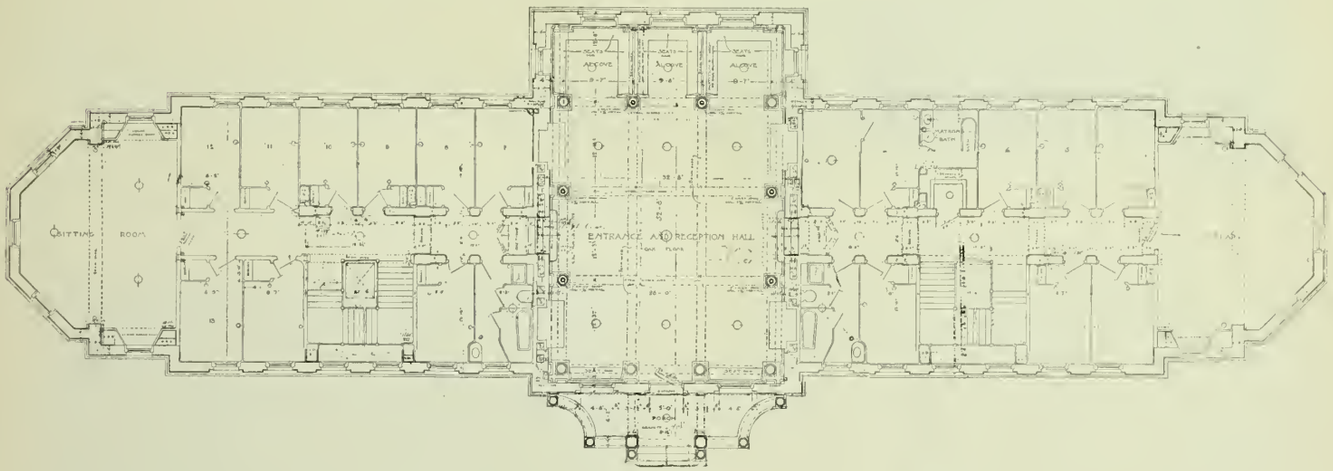

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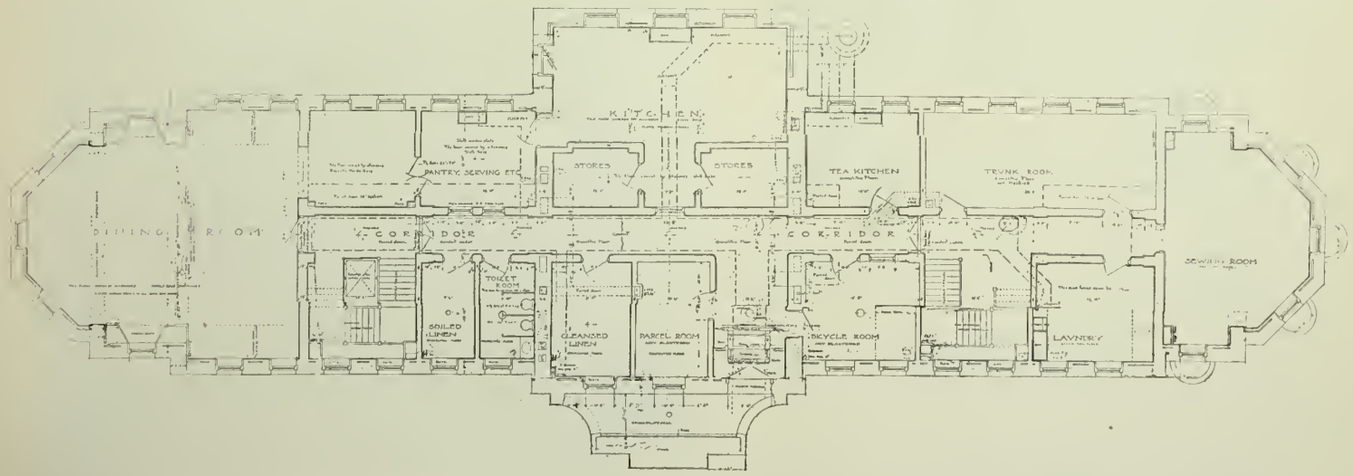


BASEMENT.

CITY HOSPITAL, BOSTON. THE ANN WHITE VOSE BUILDING. DWELLING FOR NURSES.
Wheelwright & Haven, Architects.

columns, and the company has been fortunate in having opportunities of executing some of the best work which has been put on the market. The company is also fortunate in the possession of the

FINIAL OVER MAIN ENTRANCE, BAYARD BUILDING, NEW YORK CITY.
Executed by the Perth Amboy Terra-Cotta Company.
Louis H. Sullivan, Lyndon P. Smith, Architects.

artistic mechanics who are able to turn out work of this high character; and now it is the architectural public which is fortunate in having these various fragments collected in permanent shape where they can be, perhaps, more fully appreciated in detail than even in the building itself. We suppose that in common with every large manufacturer of terra-cotta the Conkling, Armstrong Company is not always allowed to do its best, that some of its terra-cotta is necessarily of the nature of pot-boilers which it would not care to illustrate, but the selection manifested in this catalogue shows the possession of a degree of good taste which argues well for the cooperation the architect may expect who looks to them for the artistic execution of his ideas.

CURRENT ITEMS OF INTEREST.

POWHATAN cream-white bricks have been specified for fronts of three flats and store buildings, East Broadway, Clinton, and Division Streets, New York City.

THE DAGUS CLAY MANUFACTURING COMPANY is supplying buff and fire-flashed brick for a new block at Philadelphia for which John Anderson is architect.

GABRIEL & SCHALL report increasing sales of their Precipitated Carbonate of Barytes among the leading clay-workers of the country.

THE ILLINOIS SUPPLY AND CONSTRUCTION COMPANY have rebuilt entirely of brick their plant recently destroyed by fire, and began on the fifteenth of the month the execution of several new orders.

THE Chesebrough Building, an eleven-story structure now being erected at Pearl and State Streets, fronting Battery Park, New York City, will be of Powhatan cream-white brick.

SANDERSON & PORTER, contractors for the Meriden & Compounce Electric Railroad Company, have let the contract for furnishing several bridges and buildings on the line of this road to the Berlin Iron Bridge Company, of East Berlin, Conn.

THE KITTANNING BRICK AND FIRE-CLAY COMPANY are furnishing interior linings for the Toombs, New York City, and Collins Farm Hospital, Collins, N. Y., also exterior brick for school buildings at Brookville, Pa., and Corry, Pa.

THE DAGUS CLAY MANUFACTURING COMPANY is supplying through their Buffalo agent, John H. Black, the fire-flashed Roman brick being used in the new Park Theater, Niagara Falls, N. Y., Orchard & Joralemon, architects.

JOHN H. BLACK, representing the Kittanning Brick and Fire-Clay Company, at Buffalo, is supplying the buff bricks being used in the addition to the Collins Farm Hospital, Collins, N. Y., Aug. C. Essenwein, architect.

THREE hundred thousand buff Norman face bricks, manufactured by the Kittanning Brick and Fire-Clay Company, will be used in the new Third Ward Public School Building, Allegheny, Pa. This is said to be the largest building of its kind in the State of Pennsylvania.

THE BRICK, TERRA-COTTA, AND SUPPLY COMPANY, Corning, N. Y., have recently closed contracts for furnishing the terra-cotta for the following new buildings: Public School, Utica, N. Y.; German Evangelical Church, Elmira, N. Y.; St. Joseph's Church, Hoboken, N. J.; Diven Block, Elmira, N. Y.; R. C. Church, Auburn, N. Y.; House of Friendless, Williamsport, Pa.

THE TIFFANY ENAMELED BRICK COMPANY, of Chicago, has been awarded the contract to furnish their white English size *dull finish* enameled brick for the front (six stories) of the Mithoff

DESIGN OVER WINDOWS OF CENTRAL PARK PUMPING STATION, CHICAGO, ILL.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.
Bruce Watson, City Architect.

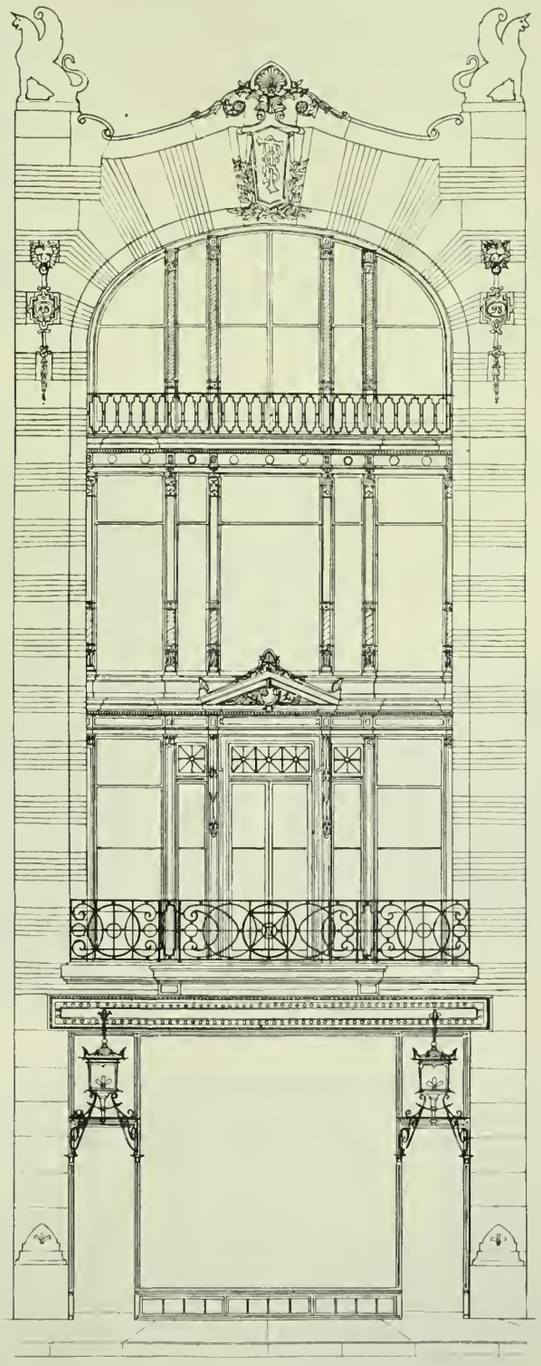
Building, at Columbus, Ohio. The trimming will be of white enameled terra-cotta furnished by the American Terra-Cotta and Ceramic Company, also of Chicago. Messrs. Stribling & Fox, of Columbus, are the architects.

ROWE DEPARTMENTAL STORE, PITTSBURGH, PA.
Architectural terra-cotta furnished by the Winkle Terra-Cotta Company, St. Louis.
Brick by the New York Hydraulic-Press Brick Company.
Alden & Harlow, Architects.

The Evans & Howard Fire-Brick Company are supplying 75,000 buff Roman brick for a building at Spokane, Wash., Cutler & Malmgren, architects; an order for buff standards at Green Bay, Wis.; buff standards for a new building at Platteville, Wis., of which Henry Ives Cobb is the architect; also the terra-cotta for the new building of the Electric Railway and Light Company, at Milwaukee.

MAIN ENTRANCE, ROWE DEPARTMENTAL STORE, PITTSBURGH, PA.
Alden & Harlow, Architects.

The Pittsburgh Terra-Cotta Lumber Company has added to its works one at East Palestine, Ohio, where they intend making only fire-clay tile. This, with the works now at Port Murray, N. J., and Pittsburgh, Pa., gives the largest production of any company in the hollow-tile or porous terra-cotta fire-proofing business and enables them to reach north, south, east, and west with the lowest freight rates obtainable.



STORE AND OFFICE FRONT, TORONTO, CAN.
Arthur E. Wells, Architect.

THE estate of C. M. Robertson, Montville, Conn., recently lost by fire their boiler house. In order to obviate, if possible, a like experience in the future, they have decided to put up a thoroughly fire-proof construction in its place. The building will have steel framework, brick side walls, and an absolutely fire-proof roof, consisting of corrugated iron covering laid on the Berlin Iron Bridge Company's Patent Anti-condensation Roof Lining.

MR. ROSS C. PURDY, of Buffalo, was the successful contestant for the scholarship in the Department of Ceramics of the Ohio State University, established by the National Brick Manufacturers' Association, and will accordingly have charge of the experimental work under Professor Orton's direction for the next school term, which began September 14.

THE following contracts are reported by the Celadon Terra-Cotta Company: Sherman School Building, St. Louis (flat shingle); Eliot School Building, St. Louis (flat shingle); residence for W. D. Orthwein, St. Louis (flat shingle); a row of residences for Union Mutual Life Insurance Company, Chicago, S. S. Beman, architect; building for Cook County Normal School, Chicago (closed shingle), N. S. Patton, architect; station for Union Railway Company, Des Moines, Ia. (10 in. Conosera).

THE NEW JERSEY TERRA-COTTA COMPANY will furnish the architectural terra-cotta for the following buildings: Apartments, corner 139th Street and St. Ann's Avenue, New York City, John C. Burne, architect; Manhattan Improvement Company, owners and builders; apartments, West End Avenue and 106th Street, New York City, Neville & Bagge, architects; Daily & Carlson, owners and builders; School No. 7, Bayonne, N. J., Hugh Roberts, architect; T. Burke, builder; factory, Bridgeport, Conn., Dowling & Bottomley, builders for The Union Metallic Cartridge Company.

THE ATLANTIC TERRA-COTTA COMPANY, office, 287 Fourth Avenue, New York City; factory, Tottenville, Staten Island, N. Y., wish to announce that they are now prepared to furnish architectural terra-cotta for all styles of work and would be pleased to render estimates on same.

The plant at Tottenville which the company has recently erected is thoroughly equipped with the most approved machinery for the manufacture of terra-cotta, and is in charge of men of skill and experience in this line of work. The location of the factory is such that material can be shipped either by rail or water to any part of the country.

The company guarantee the prompt and satisfactory fulfilment of all contracts undertaken by them.

HOLMES, BOOTH & HAYDENS, Waterbury, Conn., are making extensive repairs and additions in their plant. The Berlin Iron Bridge Company, East Berlin, Conn., have secured the contract for the steel roof work for the boiler room, 40 by 80 ft.; the new muffle room, 35 by 80 ft.; and the new brass mill, 118 by 90 ft. These new additions are to be fire-proof throughout. The side walls are of brick, the roof supports are of steel, and the covering corrugated iron. The roofs are arranged with skylights for lighting the interior of the building, and monitors for ventilation.

THE works of the Cummings Cement Company, of Akron, N. Y., are running night and day in order to supply a number of large contracts, among which may be mentioned that of supplying fifty thousand barrels of Obelisk brand of rock cement in the construction of the Ohio Steel Company's new plant at Youngstown, O.

Renwick, Aspinwall & Owen, Architects,
New York City.

SEAM-FACE GRANITE

Furnished by

Gilbreth Seam-Face Granite Co.

See May issue of this magazine.

THE DELMONICO BUILDING, 44TH STREET AND FIFTH AVE., NEW YORK CITY.
JAMES BROWN LORD, ARCHITECT.

VOLVME VII OCT. 1898 No. 10

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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HARD TIMES AND HIGH IDEALS.

WE remember a very interesting friend of an extremely religious turn of mind who used to assert that one could not be in a truly pious frame of mind unless he was a little bit hungry. Applying the same reasoning to hard times and art, architecture and building ought to show some pretty high ideals just at present, for, notwithstanding the repeated asseverations of the daily press that good times are upon us, we know by sad experience to the contrary. The volume of business may be large, but the margin is extremely small. The hope that springs perennially leads us to anticipate all sorts of delightful possibilities for 1899; but while we are passing through the hard times, it is, perhaps, not amiss for us to prepare for the fat years by brushing up our morals and adjusting our ideals. In the scramble for work, the keen, relentless competition which always accompanies the dull season, it is very easy to drop some of our restraints and to feel that we must get work, honestly and fairly if we can, but we must get it, and the temptation to ignore ethical ideas is one which assails the mechanic and tradesman no less than the architect and constructor. The lean years which are upon us are surely not warmly desired, and yet, like many of our earthly discomforts, they may be turned to a good purpose. We know of one large manufacturer whose output has been largely reduced, profits cut almost to nothing, and expenses increased beyond expectation, who deliberately sets himself to take advantage of the dull season by improving the quality of his product, experimenting with new methods, and, by developing his present methods, striving to be ready for the boom when it shall come. We have in mind a prominent dealer in building material who takes advantage of the slack times to cultivate the acquaintance of his business friends, making new connections and incidentally gathering many ideas which in the rush of business would be beyond his reach. We hear of several architects who are now able, for the first time in several years, to have long, serious talks with some of their contractors, with mutual benefit, and who are utilizing the enforced period of leisure by kinds of study which have been denied them when their offices were more crowded. We regret the hard times, we all want the income; but if we can build up our ideals, thereby making our occupation a part of ourselves, making it less a drudgery, the experience may not lack in positive value for the future. At any rate, because we are not building palaces we need be no less conscientious in our henhouses, and if we are not all of us occupied with State capitols, we can at least get some pretty good results out of the spare tables and chairs which our kind friends allow us to design.

THE time may have been once when success in architectural design was a matter of accident, or when those to whom the creation of great buildings was entrusted could depend upon their instincts and the inspiration of the Muses; but we have changed all that with our modern civilization, and if there is any one profession of to-day that requires long and arduous preparation, it is that of the architect. Constant, unremitting study is the only safe program for the man who would take rank. It has been our editorial privilege to be called upon repeatedly for advice to those who contemplate becoming architects. The usual rule is to find the young man eager to enter an office, anxious to begin actual work, looking forward to immediate worlds of conquest. Even when a kindly restraining influence has harnessed him into the routine of one of our best technical schools, his impulse after graduation is still to build, to hang out his shingle, to get to work, and the idea seems to be that if by some mental *tour de force* he can compress into three years the amount of study that is laid out for five or six, it is well worth the effort. The difference between this point of view and the principle which seems to actuate the French students of architecture goes, perhaps, a considerable way towards explaining the manifest superiority of the French school in its methods. With us the aim is to complete the studies as speedily as possible and start to work. With them it is not in how little time can education be acquired, but rather how many years can the student devote to preliminary training. It is often discouraging to the aspirant, who has, perhaps, come from the Institute flushed with his diplomatic honors, to be told to take a humble seat and keep on studying for five or six years more before he allows his kind friends to give him a job, but all experience shows that our young men are apt to start too soon rather than to delay too long, and that, other things being equal, the man who hangs out his sign and begins his professional career with the greatest amount of experience behind him will have the richest measure of true success. The secret of success in any profession, in these days, is not inspiration, not native talent, nor even that *sine qua non* of the architect, good and complacent friends, but thorough preparation and unlimited, hard dig.

PERSONAL AND CLUB NEWS.

James L. Chesebro, architect, Hartford, Conn., has moved his office to 50 State Street.

B. Hammett Seabury, architect, has moved his offices to the Besse Building, 368 Main Street, Springfield, Mass.

Alonzo T. Harmer, architect, has opened an office at 114 Liberty Avenue, Jamaica, N. Y. Catalogues and samples desired.

H. E. Bonitz, architect, Wilmington, N. C., will be glad to receive manufacturers' catalogues and samples.

Walter H. Kilham, architect, has opened an office in the Phillips Building, 120 Tremont Street, Boston. Catalogues and samples desired.

Walter I. Gideon, architect, formerly of Washington, D. C., has opened an office in the Sheppard Building, Springfield, Mo. Catalogues and samples desired.

The firm of Brainerd & Holsman, architects, Chicago, has been dissolved by mutual consent. Mr. Holsman will continue the business with offices in the Young Men's Christian Association Building, Chicago.

On the evening of September 28, the Builders' Club, of Chicago, tendered a "smoker" to the members of the Chicago Architectural Club.

Bohemian Night was observed at the Chicago Architectural Club on the evening of September 19. Messrs. Frank W. Kirkpatric, Wm. H. Eggebrecht, August C. Wilmanns, J. C. Llewellyn, N. Max Dunning, A. G. Zimmerman, and Clarence Hatzfeld were hosts.

Mr. Fritz Wagner, of the Northwestern Terra-Cotta Company, has offered three prizes: first, of $50; second, of $30; third, of $20, for the three best designs for a terra-cotta column and lintel with wall surface above, to be competed for by members of the Chicago Architectural Club.

The T Square Club, of Philadelphia, with its usual and commendable spirit, appointed a special committee to consult with the municipal authorities in regard to the decorations and architectural accessories which were to be erected and displayed along the line of march for the Peace Jubilee. Although their services were not accepted on this occasion, arrangements having progressed too far to permit of alterations, as a result of their overtures they have been promised the supervision of the work on the occasion of the next national reunion of the G. A. R., which will be held at Philadelphia next year.

The St. Louis Architectural Club met on Saturday evening, October 1. Reports of the different committees were received; $40 was appropriated for the use of the Lantern and Lecture Committee, and $100 for the Library Committee. Mr. B. H. Brown gave the club Owen Jones's "Grammar of Ornament," and Kidder's two volumes on "Building Superintendence"; Mr. Neimann, the first volume on "Architecture," by T. Roger Smith, and Mr. Enders gave the four volumes of the "Kensington Schools on Construction." The committee reported that the controversy between the club and the local chapter A. I. A. had been amicably settled, and Mr. C. K. Ramsey, of the chapter, was present and gave a little talk.

The T Square Club held its first regular meeting of the present season on Wednesday evening, October 5, at which a large number of members were present. The subject for competition at the meeting was "Sketches Made by Club Members During the Past Year," and mentions were awarded as follows: First mention, John J. Dull; second mention, Oscar M. Hokanson; third mention, James P. Jamieson. The third annual exhibition of the club, in conjunction with the exhibition of paintings and sculpture, is to be held at the Academy of the Fine Arts, Jan. 14, 1899, to Feb. 2, 1899. The Jury of Selection and Hanging Committee for the Architectural Exhibit will be composed of Mr. John Galen Howard, of New York, Mr. C. Howard Walker, of Boston, and Messrs. Edgar V. Seeler, Adin B. Lacey, Herbert C. Wise, Horace H. Burrell, David K. Boyd, James P. Jamieson, and William L. Bailey, of Philadelphia. All correspondence regarding the exhibition should be addressed to Albert Kelsey, Corresponding Secretary, 931 Chestnut Street, Philadelphia.

The Chicago Architects' Business Association has passed a resolution declaring that it is the duty of the Illinois State Board of Examiners to prevent the practise of the profession of architecture by all unlicensed persons, and to cause actions to be brought against offending parties. The association, at its annual meeting, decided that it would instruct its attorney to institute proceedings to compel the examining board to enter these actions, and to prevent the board from paying the funds it collected into the State treasury until the expense of such prosecutions had been paid. The Architects' Association also passed a resolution sustaining the professional character of the work of Normand S. Patton as school architect. — *Const. News.*

HARWOOD HOUSE, ANNAPOLIS.

PLATES 73 and 74. This house was designed by Buckland, and built between 1770 and 1780. It was made low in order not to intercept the harbor view of the Chase House, which stands directly opposite. The brick is laid in Flemish bond, with quarter-inch mortar joints, and is of the rich color peculiar to Southern colonial work. The exterior detail is finely carved wood, and the interior is handsomely decorated throughout in a similar manner. The parlor in the rear of the first story leads directly out on the garden and is handsomely decorated in arabesque.

The house was built for William Hammond, an Annapolis lawyer. It was sold to Chief Justice Chase, and has remained in the family of his granddaughter, wife of William Harwood.

TERRA-COTTA WINDOW MULLION.
Executed by the New York Architectural Terra-Cotta Company.

ILLUSTRATED ADVERTISEMENTS.

THE Bank of McKeesport. McKeesport, Pa., Longfellow, Alden & Harlow, architects, is illustrated in the advertisement of the Harbison & Walker Co., page xv.

Townsend Memorial Hall, Ohio State University, Peters, Burns & Pretzinger, architects, is illustrated in the advertisement of the Celadon Terra-Cotta Co., Ltd., page xxvii.

The American Schoolhouse. XII.

BY EDMUND M. WHEELWRIGHT.

(As the writer has been unable to collect all the material requisite for the completion of these papers following the order first intended, it has been found necessary, in order not to break the issue, to give now the specifications for a school building which was promised in the announcement of the editors. The other subjects will be treated in later issues.)

SPECIFICATIONS FOR A SCHOOL BUILDING.

SECTION 1. THE WORK TO BE DONE IS TO — (*a*) Erect and complete with materials and workmanship of the best quality and character, unless definitely specified to be otherwise constructed, the [Blank] School Building upon a site, at the corner of [Blank] and [Blank] streets, [city,] [State;] the building is to be of brick with stone trimmings, and the contractor is to furnish and do to the satisfaction of the architect everything required therefor, except that the contractor, unless otherwise specifically provided in these specifications, is not to furnish or install the plumbing, or the heating, or ventilating apparatus, including all metal ducts, registers, screens, netting, etc., required for any of said apparatus, or the movable furniture, or the wiring for the electric lighting, electric clocks, bells, or telephones; but the contractor is to do all jobbing required in connection with the work of installing the plumbing, heating, and ventilating apparatus, and the placing of said electric wiring, tubing, and fixtures, including the furnishing and putting up of boards for the support and covering of pipes, and the doing of all cutting, fitting, and filling necessary for the completion of the building in connection with said plumbing, heating, and ventilating apparatus, wiring, tubing, and fixtures, or any of them. No cutting shall be done without permission of the architect.

THE DE LANCEY SCHOOL, PHILADELPHIA, PA.

George C. Mason, Architect.

This school has a twofold purpose — first, to prepare boys for college, or a school of science, and secondly, to give a satisfactory English education to such boys as do not expect to take a collegiate course.

(*b*) The contractor shall carefully protect the work from injury from the weather and from water, frost, accident, or other cause, and repair any such injury; shall make good any defect, omission, or mistake in the work within such time as shall be required in any notice so to do, signed by the architect and given to the contractor or mailed to him at the business address stated by him in his proposal, whether so given or mailed during the progress of the work or after its completion, and whether any inspection or approval of, or payment for, the work or any part thereof may have been made or certificate for such payment given.

(*c*) The contractor shall furnish and maintain temporary doors and screens for all openings in the building, and protect the work from the weather whenever the architect shall so direct. The contractor shall supply heat and attendance for drying out and protecting the building during construction.

(*d*) The owner will permit the use of the boilers by the contractor when the mains and returns for addition have been installed and when the contractor has installed the temporary radiators as hereinafter provided. Before such possible use of the boilers, etc., for heating the building the contractor shall, when required by the architect, furnish temporary heaters, stoves, fuel, and competent attendance for the same, and shall maintain the heating as required until otherwise directed in writing by the architect. The contractor shall leave the boilers in perfect condition at the termination of his use thereof and he shall then supply and set new grates for same.

When mains and returns are installed the contractor shall furnish and connect temporary radiators, and is not to remove the same until so ordered in writing by the architect. Heating will be required for the protection of the work, for the drying of plaster, and continuously while interior finish is being set and painted, and for thirty-one days after the acceptance of the building by the architect.

(*e*) The contractor shall furnish and lay all water-pipes, gas-pipes, and drains from inside the walls of the building to, and connect the same with, the street mains, as shown on plans or as directed by the architect.

(*f*) The contractor shall furnish and maintain a temporary water-closet approved by the architect, in the place shown on the plan or as directed by the architect, and allow the same to be used by every person doing anything relating to the erection and completion of the building, whether under this contract or others, and carry out all directions relating to such water-closet and its placing and removal given by the architect.

(*g*) The contractor shall take charge of and be liable for any loss of or injury to any materials delivered on, or in the vicinity of, the work to be used thereon, whether furnished by the owner or otherwise; notify the architect as soon as any such materials are so delivered, and furnish men to handle them for examination by the architect or his assistants; and keep trimmed up in piles so placed as not to endanger the work all such materials, and all refuse, rubbish, and other materials not removed.

(*h*) The contractor shall pay all water rates for water required for anything in connection with any work on the building until its completion, and pay all other charges and fees incident to the doing of the work.

(*i*) The contractor shall leave an unobstructed way along public and private ways for travelers, street cars, and teams, and for access to hydrants; from the beginning of twilight through the whole of every night maintain near all places in the public ways obstructed or made unsafe by him sufficient lights to protect travelers in such ways from injury; provide proper walks for travelers over and around such places; provide and use all other lights, fences, guards, and watchmen on and about the work as directed by the architect; provide all necessary bridges and ways for access to

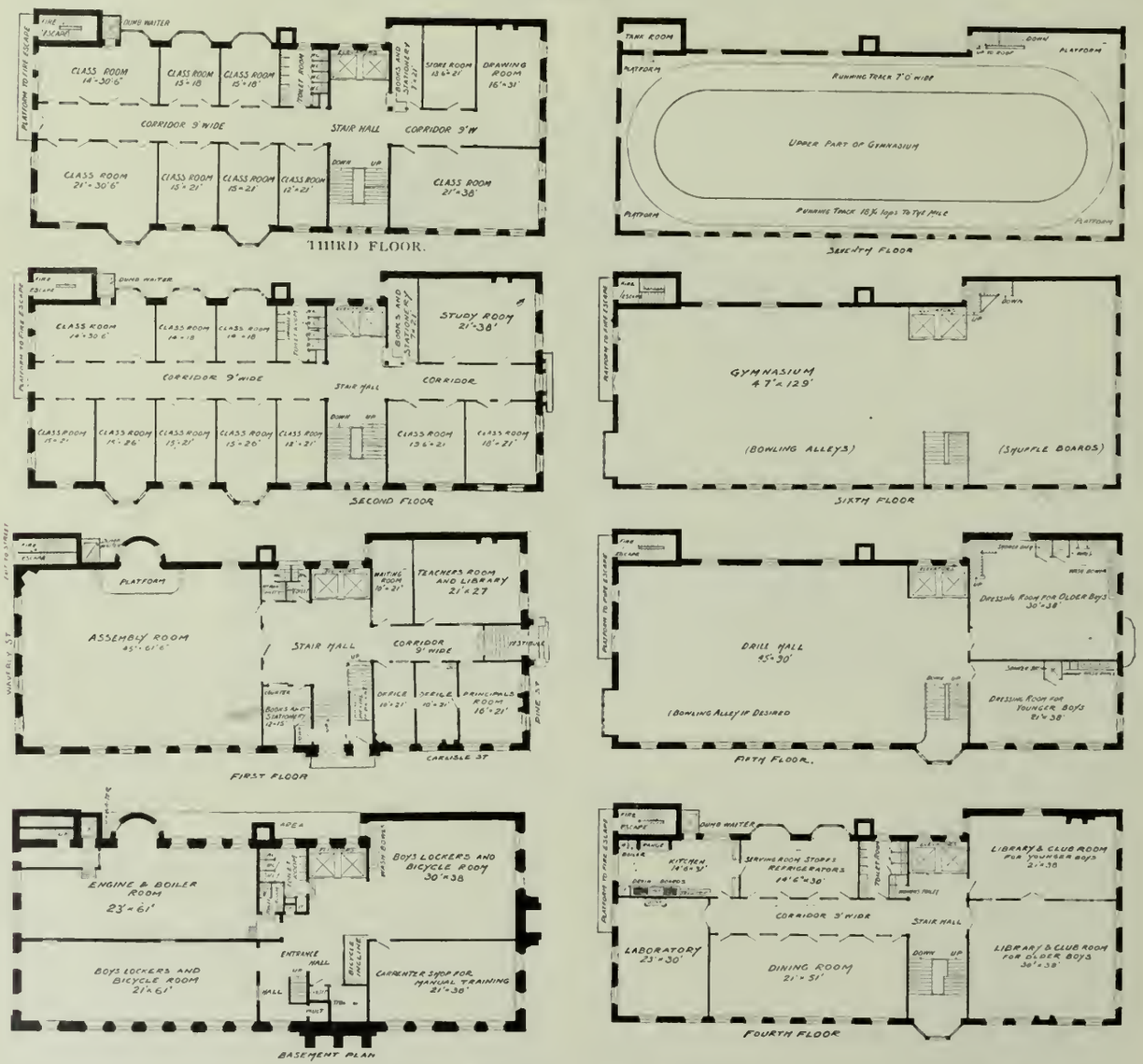
property where the existing access is cut off by him, and see that the neighboring residents are not unnecessarily inconvenienced; take all proper precautions to protect persons and property from injury by the carrying on of the work.

(*j*) The contractor shall replace or put in good condition, satisfactory to the architect, any tree, or public or private way, or sewer or drain, or water, gas, or other pipe, or catch-basin, wire, building, fence, or other structure interfered with by him, and not required to be removed under this contract.

(*k*) The contractor shall promptly remove from the work and its vicinity all materials rejected when

manner as not to flow upon or hinder the other work or cause any nuisance.

(*m*) The contractor in doing the above shall, so far as they go, conform to — these specifications, to — the plans and drawings marked [here quote in full the title given to the drawings] and numbered 1 to (say) 15 inclusive, furnished by said [here give in full the name of the architect and the business address], to — any directions given, and detail plans and working drawings furnished by said architects and to — all orders in writing of said architects when approved by the owner, increasing the quantity or taking away any part of the work, or making any



THE DE LANCEY SCHOOL, PHILADELPHIA, PA.

so directed by the architect and he shall remove promptly all rubbish when so ordered by the architect.

(*l*) The contractor shall maintain the flow in all water-courses, sewers, drains, and pipes interfered with by him, or convey the flow in covered channels to a suitable point of discharge, in such a

change in the form, materials, plans, or specifications of the work, or requiring the contractor to furnish any extra work or materials relating to the above: and shall cause all directions, relating to the work, given by the architect, to be promptly carried out, and everything to be completed on or before [Blank]. Said architects

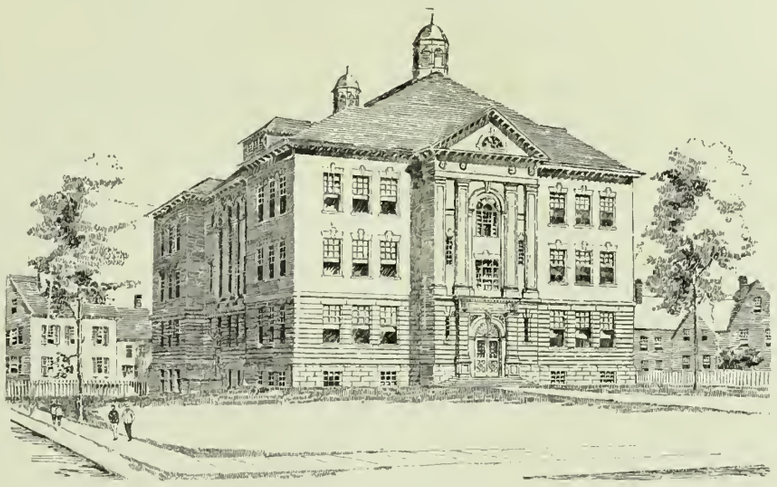
are meant wherever the word architect is used in these specifications.

SECT. 2. GENERAL DIRECTIONS. — (*a*) The contractor shall not assign or sublet the work unless with the consent of the architect in writing; he shall keep the control and charge of the work and of every part thereof, and give his personal supervision thereto; he shall keep a competent foreman always present when anything is being done on the work; and he shall allow all other persons doing work for the owner free access to, and not interfere with them in, their work.

(*b*) The building laws relating to buildings in said city, and all other regulations of law or public authorities, controlling or limiting the method or materials to be used, or the actions of those employed in doing the work, are to be carefully observed by the contractor, and all necessary permits are to be taken out, and all notices required are to be given by him. The contractor shall begin the work promptly and shall do the several portions thereof in the order designated in writing by the architect, but he is not to proceed with any portions of said work until so authorized in writing by the architect.

(*c*) The contractor shall follow figure dimensions in preference to scale dimensions in all plans and drawings, and in case of any discrepancy between the figures, or the figures and scale, or the drawings and specifications, the matter is to be submitted to the architect for adjustment, and any work done by the contractor before such adjustment is made shall, if the architect so requires, be replaced by work satisfactory to him.

(*d*) The contractor shall employ an engineer, competent and satisfactory to the architect, who shall lay out the work and shall establish all lines upon batter boards, and shall indicate grades; the contractor shall furnish substantial and convenient batter boards, shall maintain the same, shall have the lay-out tested from time to time by said engineer, and shall be responsible for all damage arising from any disturbance of the same.



NEW BROWN SCHOOL, HARTFORD, CONN.
Wm. C. Brocklesby, Architect.

(*e*) Full-sized detail drawings are to be furnished by the architect for such parts of the work as he shall desire; the contractor shall call for such drawings, and anything done relating to such parts, after such detail drawings are furnished, and not done in accordance with such drawings, is, if the architect so requires, to be replaced by work satisfactory to him.

(*f*) When for any reason the work is suspended, the contractor shall protect all the work, and the roadways and sidewalks shall be left by him unobstructed, and in a safe and satisfactory condition.

(*g*) The contractor shall keep himself fully informed as to the size, shape, and position of all openings and special accommodations required for heating and ventilating apparatus, plumbing, steam-pipes, tubing, wiring, boxing, and other things; and, in the absence of special drawings and information upon these several points, shall require and obtain such drawings or instructions before proceeding with any work which is affected by such requirements.

(*h*) The contractor will allow free use of his staging by other persons working upon the building.

SECT. 3. EXCAVATION. — Do all excavating required for the work covered by these specifications. Such excavated material as is suitable for refilling shall be used for this purpose; the contractor shall supply all additional material for same which may be required, as directed by the architect, and he shall remove from the site all unsuitable or unneeded material.

SECT. 4. PILE-DRIVING. — (*a*) Do all necessary boring and sounding, and keep a record of the movement of piles at each blow of the hammer for the inspection of the architect.

(*b*) Furnish and drive the piles as shown by plan; all to be driven to hard pan, to be good, sound, straight, spruce piles, not less than 10 ins. diameter where cut off for capping-stone, or 6 ins. at the bottom.

(*c*) If any pile is split or driven out of position, the contractor is to drive a new one to take its place.

(*d*) Cut the piles off at grade 5.

SECT. 5. FOUNDATIONS. — (*a*) Build the foundations of the height and thickness shown on drawings, starting same on granite levelers, of the dimensions shown by drawings, and 18 ins. in thickness; the whole foundation to be of even-split block granite the full thickness of the walls, the length of the blocks to be about one third more than the width, to give a good lap to the bond, laid in pure, fresh hydraulic cement, having good beds, builds, and faces, and laid solid, a true and even face showing on the inside, and also on the outside where exposed, all thoroughly pointed.

(*b*) Plaster wall below grade, and above cellar bottom in Portland cement on outside of wall and give one thick coat of hot asphalt. (See Asphalt, section 12.)

(*c*) Bond all walls and angles thoroughly.

(*d*) Finish level and true on top, ready to receive the superstructure.

(*e*) Leave holes in walls for drain, gas, and water pipes, and for ducts where shown and directed.

SECT. 6. CUT GRANITE. — Furnish and set the granite work; to be of best quality [Blank] granite six-cut work; and to be as shown on general and detail drawings.

SECT. 7. BRICKWORK. — (*a*) No mason work is to be laid in freezing weather, except by written permission of the architect, and then only in accordance with such precautions as he may require.

(*b*) Construct all the brickwork indicated by the drawings, except where otherwise specified, of best quality hard-burned bricks, uniform in shape and size, and well wet, when necessary, before laying.

(*c*) Lay all door and window heads, jambs, arches, and stools in basement with round-cornered brick.

(*d*) Neatly rule all joints of exposed brickwork in basement.

(*e*) Bed each and every brick in mortar, under its bottom, sides, and ends, and bond the walls, unless otherwise specified, with course of full headers every eighth course, and lay in mortar as specified above.

(*f*) Set all the ironwork as called for by the plans and specifications; all plates to be set in cement mortar. Firmly bed and fill in around all beams, girders, etc.

(*g*) Point around all window and door frames with cotton and elastic cement; staff beads to be removed to do this work.

(*h*) All gas and electric pipes on plastered walls must be cut in to be flush.

(*i*) Fill up neatly all putlog holes, and clean down and point the entire work at completion, inside and out, where brickwork is exposed, using no acid stronger than vinegar, and oil with linseed oil, one coat, the exterior after the bricks have thoroughly dried from cleaning down.

(*j*) Carefully protect all work and leave the whole in a thoroughly clean and perfect condition at completion. Turn arches of required number of rings where iron beams or lintels are not called for.

(*k*) Furnish all wall ties and clamps not especially mentioned, but required by the building laws, of sizes and dimensions as directed by the architect, and build in all ironwork.

(*l*) Bed all wall plates in cement mortar on the walls.

[(*m*) Furnish and set molded brick where shown in accordance with detail drawings.]

(*n*) Except where otherwise shown, the exterior brickwork is to be of selected Eastern water-struck brick, laid "Flemish" bond or as shown on general and detail contract drawings.

(*o*) Line the exterior walls, where plastered on inside, with hard-burned, hollow-clay brick 4 ins. thick, but all bonding brick and brick about door and window openings are to be solid hard-burned bricks as above (*b*).

(*p*) Lay the whole with perfectly level, plumb, and true bond, rule neatly the joints of all exposed work, and give the rough brickwork of all exterior door and window jambs one thick coat of hot asphalt. (See Asphalt, section 12.)

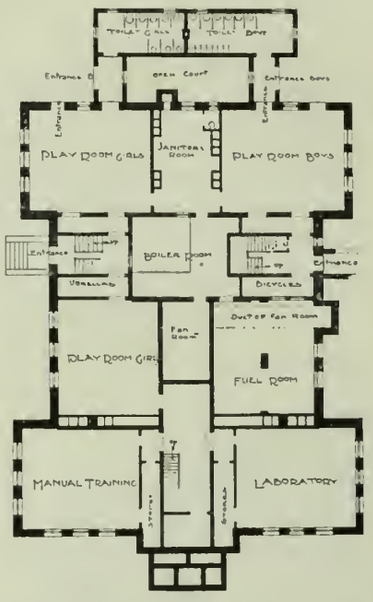
(*q*) Line the walls in basement with selected Eastern face brick, joints ruled for painting.

(*r*) Pave bottom of trenches and conduits in basement with best quality hard paving brick laid in Portland cement mortar.

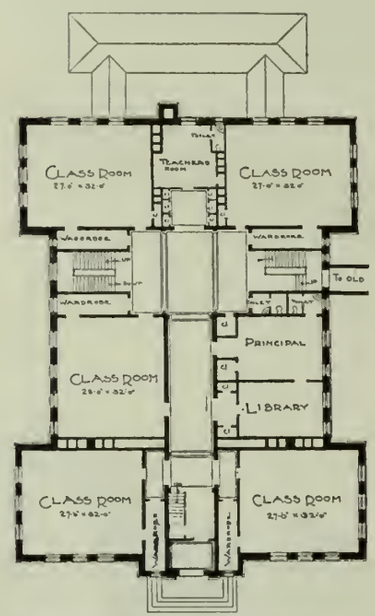
(*s*) Build trenches and conduits of 8 in. brick walls, laid in cement, for all pipes inside building and as shown on drawings: the outside of walls of these trenches to be plastered with Portland cement and then given two thick coats of hot asphalt. (See Asphalt, section 12.)

(*t*) Line with hard brick the sides of trenches and conduits for pipes.

BASEMENT.



FIRST FLOOR.



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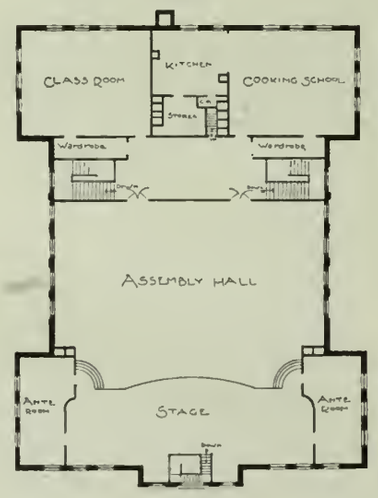

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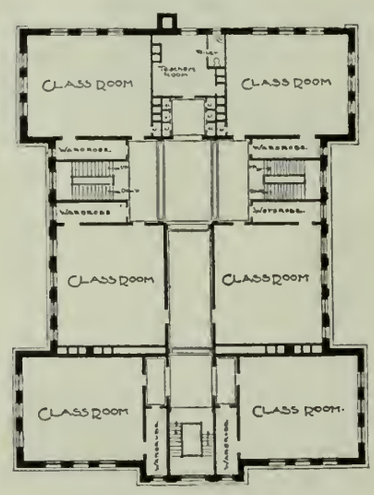


NEW BROWN SCHOOL, HARTFORD, CONN.

SECT. 8. CONCRETING. — (*a*) Level off the basement bottom and fill in with clean gravel 12 ins. thick to the grade required, and settle and ram the same solidly for concrete.

Concrete 6 ins. thick throughout basement, with concrete composed of three parts of clean, coarse, washed gravel, and one part of cement, truly leveled, well smoothed off and left perfect at completion. [N. B.: This thickness of concrete is advised only for buildings built on "made ground"; elsewhere 3 in. concrete is sufficient and Rosendale cement is sufficiently strong.]

(*b*) Furnish and lay concrete foundations as shown on drawing in proportions of one, two, and four.

(*c*) Imbed all iron or steel work below grade in concrete as in (*b*).

(*d*) For concrete work required for fireproofing, see section 16.

SECT. 9. CEMENT. — (*a*) Portland cement shall be used for the concrete floor of basement, for concrete foundations, for pointing joints and plastering of face masonry, and for all brickwork below top of ground. American natural hydraulic cement shall be used in other parts of the work. The American cement shall be equal in quality to the best Rosendale cement, and the Portland cement equal in quality to the best imported Portland cement; both kinds shall be made by manufacturers of established reputation, and shall be fresh and very fine ground and put up in well-made casks.

(*b*) All the cement will be subject to inspection and rigorous test by the architect, and if found of improper quality will be branded, and must be immediately removed from the works: the character of the tests to be determined by the architect.

(*c*) The contractor shall at all times keep in store, at the site of the work, a sufficient quantity of the cements to allow ample time for the tests to be made without delay to thew ork of construction. The architect shall be notified at once of each delivery of cement. All cement shall be stored in a tight building, and each cask must be raised above the ground by blocking or otherwise.

SECT. 10. SAND. — The sand used to make mortar shall be clean and sharp, sufficiently coarse, free from loam and pebbles, and equal to the best Plum Island sand.

(*Continued.*)

Suburban Residence Built of Brick.

COST, TEN THOUSAND DOLLARS.

BY ALFRED B. HARLOW.

THE requirements for a suburban dwelling of moderate cost and extent, ever new and varied for each individual case and governed by varying conditions of exposure and contour of surface, present an every-day problem always of interest to the practising architect, but particularly engaging when he may from the beginning consider the house and its surroundings together, not merely as to the location of the cellar wall and its height above grade, but giving place to gardens, hedges, and walks as essential and important factors of an harmonious whole.

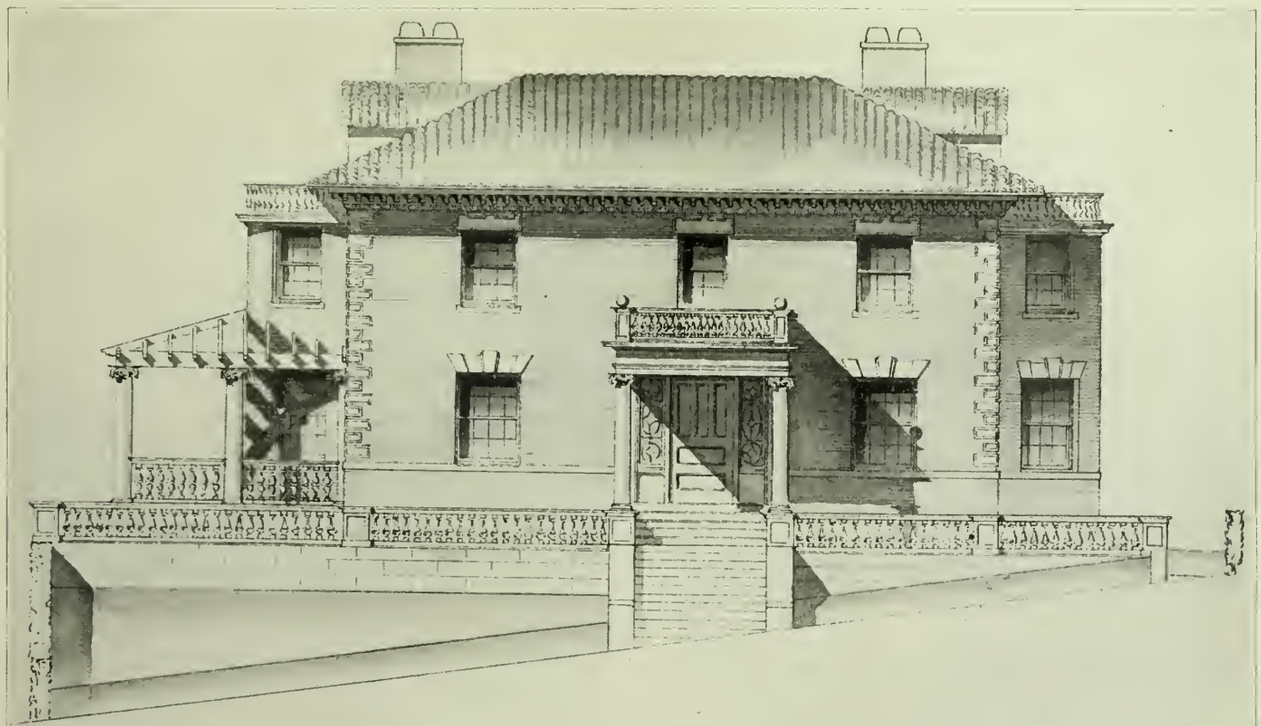
It seems as easy and quite more satisfactory to consider the walks and gardens along with house walls and rooms, and so study the whole plan rather than the house plan only; the walks expressive of entrances and halls, and beds and sodded areas standing for room space plotted out within. True, in execution they may not be seen together, but the influence of relationship will be felt and unconsciously recognized.

In the plan presented such a study has been made and a scheme indicated for an arrangement of plan and grounds in a simple and unpretentious way, well within the lines for a place of moderate cost and extent, and suggestive of a method of study that would result in harmony and individuality in the arrangement and composition of house and grounds, in place of ill-considered planting and approaches, arranged as best may be after the structure is completed, and so much in evidence in all suburban districts.

In the problem presented the conditions of grade are such as to involve a system of terracing, or a frank acceptance of the natural lay of the land with a more or less picturesque treatment of the architectural part of the problem.

As the latter method would give no level lawn spaces or garden spots,— so essential an adjunct to a suburban place,— I have adopted the wall and terrace treatment which could be economically carried out by bringing the earth to the front from the rear, and building necessary retaining walls of any local stone that would present an approximately even and formal surface. The house thus rests on a level plateau of which it becomes a part by the continuation of its lines in the architectural treatment of balustrade, steps, and walks, and its severity is relieved and interest added by dropping again to the natural grade on the front, the slope contrasting pleasantly with the level line of the balustrade capping the wall at the terrace.

The easy approach to the floor level of the house over the several groups of steps and level spaces, worked out with and required by natural conditions, would possess a charm and interest not to be acquired by straight and level approaches or forced and irregular pathways. The level of the terrace reached, the grass plots and walks behind the balusters suggest a desirable privacy, and the garden or porch is at hand on the left or the main entrance for the formal caller directly in front. A side path at the right leads from the natural street grade directly back to the kitchen, basement and kitchen gardens, and a gradually rising retaining wall following the lot line on this side gives a practically level walk to the rear.



FRONT ELEVATION.

On the left of the house the porch and sunken garden with its arbor shelter along the line of a high dividing wall afford seclusion and a restful spot not disturbed by adjacent property or the domestic machinery of the house, which goes on on the opposite side of the place.

At the rear of the house a series of terraces on the rising land may be arranged, occupied by kitchen gardens, tennis courts, etc., a small gateway through the hedge opening to a walk on the left, and the service walk continuing along the right side.

The walks may be a red brick for the approaches, or perhaps the very practical though less artistic artificial stone may be used for both steps and walks, with the garden walks of fine gravel.

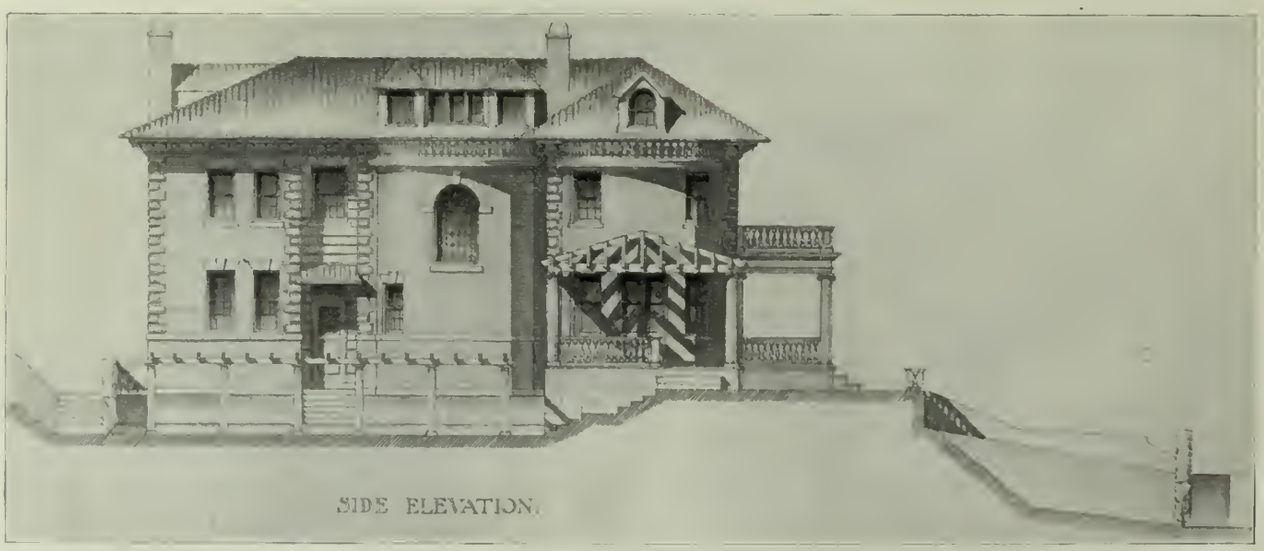
Coming now to the material for such a house, and leaving out of account any question of a frame building, we naturally turn to brick

as the most satisfactory material within our means; and combining, as it does, an air of domesticity with good color and scale, it is on the whole the most satisfactory substance we could choose.

It is proposed that this house shall be built of brick of the simplest character, the plain gray-red stock brick laid with wide lime-mortar joints, making an unpretentious wall, but, with its varied and sparkling surface, a wall that is always good, that belongs to the vines that cover it, and the grass and shrubbery that grow up against it and make it a part of themselves.

The pressed brick in its varied shapes and colors finds a wide field in the requirements of formal town architecture, but in the country or for such a suburban dwelling as this article considers, its surface lacks the desired texture and touch of time that is found in the more modest but picturesque article proposed, and with the Flemish bond, which, of course, is used in laying our brick, we have already a smack of quaintness to our wall before the roof is on.

For the masonry details of the exterior terra-cotta is adopted as a mobile material of enduring qualities and slight expense. By its use we are enabled to adopt the decorative line of cornice topping out the wall, with its richly modeled egg and dart and modillion courses carrying the wide-spreading eave of light wooden beams, and to give a touch of refinement to corners and angles and window lintels by the introduction of ornamental detail.



SIDE ELEVATION.

For the proper rendering of delicate detail the terra-cotta will be white, finished with a combed surface to keep in touch with the texture of the brick wall, to which it will also be related by the echo of its color in the woven lines of white joints. The gain in quiet and repose in a red and white combination of materials by the use of white mortar in the brick joints is surprising, the impression made being that of a white mass with the bricks imbedded in it rather than that of a red wall trimmed or outlined in its mass by white cornices and belt courses.

The porch at the end of the living room is shown with an open roof, suggestive of a pergola, a form easily covered with canvas for use in the summer, while in the winter it has the great advantage of allowing light and warmth free access to the windows behind it.

All porches, arbor, and balustrade to be wood, painted white to correspond with the terra-cotta in color without in any degree affecting it in substance and texture.

The color scheme is completed at the roof with tiles of brown shading to a suggestion of green, as a quiet topping out of the red house in its setting of grass and trees.

In the arrangement of plan the rooms have been so disposed as to gain the maximum of sunlight and air: the stairways and kitchen toward the north, the dining room properly accessible from the china closet and kitchen, and catching the morning sunlight, as it always should; the reception room having the morning as well as afternoon sun, and the living room receiving the whole afternoon and the sunset light. The most wholesome and desirable house is that receiving all the sunlight possible, and to so locate the rooms that they may receive the sun as nearly as possible in the order of their use from morning on through the day seems most desirable. The English fashion of a separate or detached staircase hall has many advantages, and the idea has been adopted here. The entrance hall of moderate size can be handsomely treated in wood, and it gives a long vista from end to end of the house and forms an attractive focal point, from which the rooms radiate, and which they directly adjoin as they cannot do in a small hall blocked with a staircase; neither is the attractive feature of a staircase lost, as it is seen from the main hall, out of which it directly opens. In itself, too, the staircase hall is an attractive feature opening on the axis of the dining room with its windows overlooking the garden, and its side entrance giving from the dining room directly to a raised terrace somewhat above the garden level, and on a path directly in the garden axis. The living room, which, with its porch, overlooks the garden, forms with the latter the household suite during the summer time, and is well isolated at all seasons from the service portion of the house.

The second-floor plan provides four family bedrooms of good size, each getting a goodly portion of sunshine for a large part of the day.

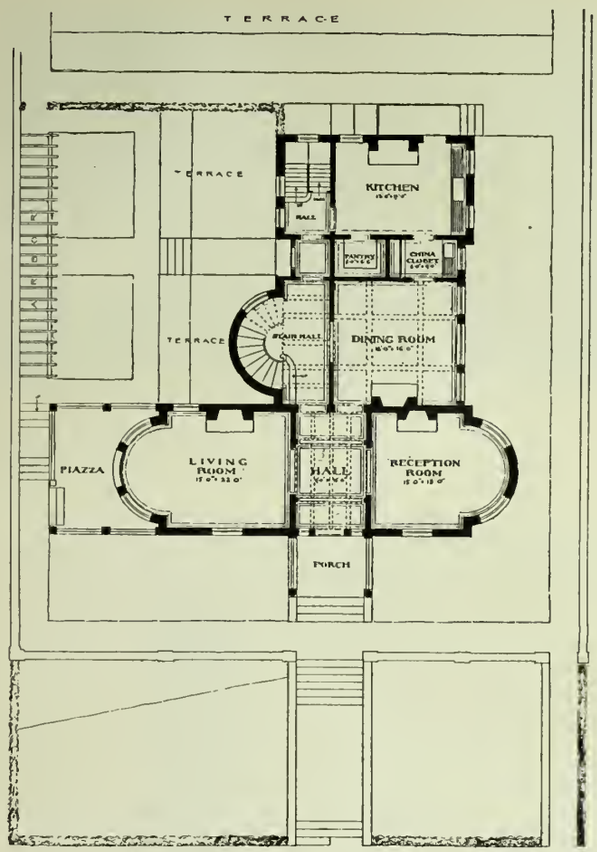
The bath room is accessible, and from the staircase arrangement is isolated from the lower hallway, a feature well worth striving for.

Servants are provided for in the roof story, a flat deck over the wide central portion giving space for two rooms.

In the basement there is space for laundry, servants' closet, furnace, storeroom, coal bins, etc., all well lighted from windows in walls across the front and on elevations not here shown, but which, from the fall in grade, will give light and air, and insure a dry, well-ventilated area under the entire building, with cement floors and lime-washed walls and ceilings.

The interior finish of our house must of necessity be plain and simple, nor is highly polished hard woodwork at all desirable here.

The hall and staircase and dining room may be of oak with the simple ceiling beams indicated, and each may be treated with a certain amount of paneled woodwork; the halls paneled to the height of the doors (the spaces are small) and the dining room wainscoted three or four feet high; the oak to be aged with acid stain, not filled, but finished with shellac and rubbed with wax. For the remainder of the house, painted finish with refined details gives



FIRST FLOOR AND GROUND PLAN.

elegance and home atmosphere in place of obtrusive and uncompromising polished wood.

The most satisfactory method of heating within reach is by means of a hot-air furnace with large pipes and registers to supply a goodly volume of warm air, rather than a smaller and more rapid delivery of intensely heated and frequently burnt air. No direct hot water or steam heating should be introduced in any part of a house other than in hallways, pantries, and perhaps bath rooms. A combination of direct and indirect steam or hot-water heating is most desirable, but involves an expenditure of too large a sum for a house of moderate cost. If care is taken to put in a furnace of large capacity that will do its work without forcing and scorching the air, a house may be kept at a comfortable temperature without difficulty. Every room in a house should have an open fireplace; not only is it a necessity in the cool of the spring and autumn before furnace fires are lighted, but in the winter a smoldering hearth fire helps out the furnace, and radiates cheery warmth and light, while the draught pulls air from the room, causing a correspondingly increased flow from the registers. Even where the fireplaces are not in use, the flue supplies an outlet for furnace-heated rooms and aids the draught from the registers, which cannot deliver air into a tightly closed apartment, thus insuring a circulation and constant change with a gratifying degree of purity. To insure success, careful attention should be given to the arrangement for supplying cold air to the furnace. If the air is brought directly to the heating surface by means of a cold-air box, the result when the wind blows into the duct will be quite different from the result when it blows from the opposite direction. In the one case, with a high wind it is difficult to supply enough warm air to the registers, as the damper of the box must be nearly closed or the air will be forced so rapidly over the dome of the heater that it does not become sufficiently heated; while in the other case, with a very cold wind blowing on the opposite side of the house, the pressure down the registers from that side has been known at times to actually create a back draught through the cold-air duct. The most satisfactory method is to bring the air into a small brick chamber, carrying it by a galvanized iron duct to the smoothly cemented floor, and on the opposite side place the furnace connection. Such an arrangement eliminates the factor of wind pressure as far as it is possible to do so and has shown most uniform results in actual experiment.

It is well to add a partition 2 or 3 ft. in height across the cold-air chamber to intercept dust and dirt. Such a chamber may be made 4 or 5 ft. square, with 4 in. brick walls extending from the cellar floor to the ceiling, with an air-tight door for access from the cellar. Although this is no new idea, it is an arrangement not often found in dwellings using a furnace, and seems worthy of mention from the success the writer has met with in its use.

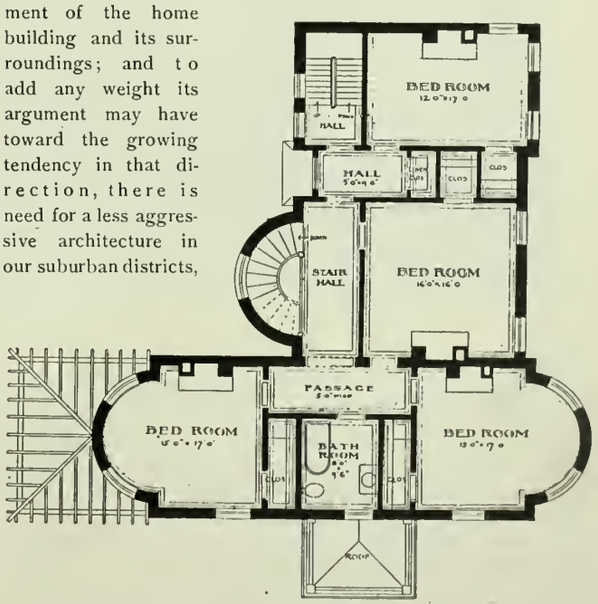
While not suggested as coming within the limits of the conditions of this article, a few words seem admissible here relating to the possibilities of solid floor construction even in houses of moderate outlay.

As the cost of rolled steel beams has been constantly decreasing, and will undoubtedly be quoted at still lower prices in the future, the comparatively small additional cost in masonry houses, of constructing the floors of the first and second stories of light steel beams and terra-cotta arches, renders the adoption of such a method perfectly feasible, and the gain in solidity, the absence of shrinking timber, and of resounding and springing floors, and the closing of air spaces to draughts and vermin, more than compensate for the additional expenditure, which would vary in different parts of the country, but at most should not exceed 5 per cent. of the cost of the house.

It will be seen on the accompanying plan that the substitution of brick for wood, in the single partition between the dining room and pantry, would give bearings for steel beams throughout.

There is little to be said about plumbing beyond the repetition of what has long been advocated and practised; the simplest possible arrangement of pipes open to inspection everywhere, the fewest possible fixtures, and the careful avoidance of all new and ingenious complications of traps and overflows for fixtures.

This article has been prepared in the interest of simplicity and refinement in the treatment of the home building and its surroundings; and to add any weight its argument may have toward the growing tendency in that direction, there is need for a less aggressive architecture in our suburban districts,



SECOND FLOOR PLAN.

that the house shall stand for that which is within, for the home which it covers, having no conscious air of wearing features whose only apparent purpose is that of attracting the notice of the passer-by.

Brick and Marble in the Middle Ages.

BY G. EDMUND STREET.

CHAPTER X.

"With all its sinful doings, I must say
That Italy's a pleasant place to me,
Who love to see the sun shine every day,
And vines (not nail'd to walls) from tree to tree
Festoon'd." —*Beppo.*

Venice to Verona — Verona to Mantua — Villa Franca — Mantua: its Churches and Palaces — The Theatre — Montenara — Campitello — Casalmaggiore — Longadore — Cremona: the Cathedral — Churches and Public Buildings — Lodi — Pavia: its Churches — Castle of the Visconti — The Certosa — Drive to Milan.

OUR gondolier, anxious not to be too late for us in the morning, slept in his gondola beneath our windows, and did his best, when the sun rose, to rouse the sleepy porter of our hotel, but in vain; and at last, when I awoke, I found we should have a very narrow escape, if indeed we did not absolutely lose our train. The thing was, however, to be done, and was done. We shot rapidly — only too rapidly for the last time — along the smooth waters on which we had been so pleasantly loitering before, and soon found ourselves at the railway station. Our journey was much like what such journeys usually are: as far as Verona we were only retracing our steps, but now the hot sun had quite cleared away the clouds which, when we passed before, hid the Tyrolese Alps from our sight, and these, whenever the high acacia hedges which line the railway allowed us a sight of them, made the journey so far beautiful.

The names of the engines on this railway are very unlike the kind of nomenclature indulged in at home; we were drawn to Verona, I believe, by the Titian, and saw, as we rushed along, engines named after Dante, Sansovino, and other artistic and literary celebrities.

We reached Verona at ten o'clock; the station, however, is so much out of the town, and the day was so intensely hot, that we gave up the idea of again going into it, and, contenting ourselves with the general view of its quaint and picturesque walls rising over the rugged hills which girt the city on its northern side, we sat down to a breakfast of iced lemonade and some of those deliciously light cakes which are never had in such perfection as in Italy, and amused ourselves by watching the way in which the guards and drivers of the train by which we had travelled proceeded to solace themselves with a game at billiards, upon a table provided, I suppose, by the very considerate directors of the railway company.

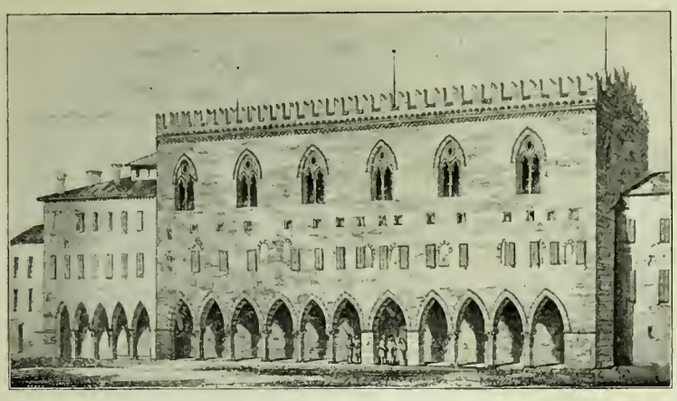
The railway from Verona to Mantua crosses a country which is thoroughly uninteresting in point of scenery; it carried us on well into the great plain of Lombardy, rich, teemingly rich, in its produce, but flat, arid, and sultry to a degree. This was altogether one of our hottest days, and took us fairly into a kind of district in which the heat is most oppressively felt.

On the road we passed Villa Franca, a small town which has a rather striking castle, with battlemented walls and a good many square towers, still very fairly perfect; the whole built in brick, and with battlements finished square at the top, and not forked like those at Verona.

ST. ZENO, VERONA.

We reached the station at Mantua by twelve o'clock, but, as this was very far from the city, it was nearly an hour later before we were fairly landed at one — I forget which — of the abominably dirty and bad inns to which sojourners within its walls have to submit with the best grace that they can.

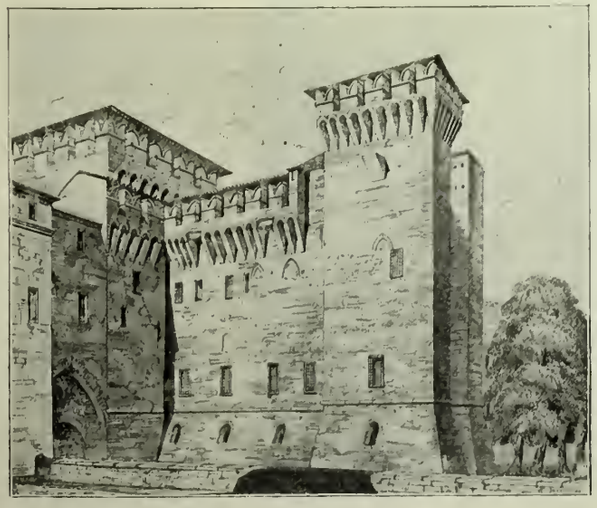
Mantua is nearly surrounded by water; two large shallow and unwholesome-looking lakes giving it this far from pleasant kind of isolation. Over a long mediæval bridge between these waters the way into the city from the terminus lies. One of the lakes is higher than the other, and accordingly twelve mills, each adorned with a statue of an apostle, are formed upon the bridge, and give it its name of Ponte Mulina.



DUCAL PALACE, MANTUA.

The general aspect of Mantua is very dreary and unpleasing, not less forlorn in its appearance than Padua, and possessing but little attraction for an architect. The chief architectural feature of the city is the Ducal Palace, which contains, in the midst of a mass of Renaissance work of the poorest and most unsatisfactory kind, some very good remains of pointed architecture.

The finest portion is a long building of vast height, and retaining more or less of Gothic work throughout, but especially remarkable for the range of windows in its upper stage. Its front faces on one side towards the Piazza di San Pietro, and on the other with a very nearly similar elevation towards the Piazza del Pallone, one of the courts in the vast palace of the Gonzagas, of which it forms a part. This building is said to have been commenced about A. D. 1302 by Guido Buonacolsi, surnamed Bottigella, third sovereign of Mantua, and this date quite agrees with the character of all the detail. The interior has been completely modernized, mainly by Giulio Romano, who carried out very extensive works in other parts of the palace. The windows in the upper stage of this portion of the palace deserve notice as being about the most exquisite examples of their class that I anywhere met with, though those in the campanile of Sant' Andrea, hard by, are only second to them. The main arch is of pure pointed form, and executed in brick with occasional voussoirs of stone — one of which forms a key-stone — and over it there is a label of brick effectively notched into a kind of nail-head. The same kind of label is carried round the arches of the window-openings, and down the jamb as a portion of the jamb-mould, and again round a pierced and cusped circle of brick in the tympanum.

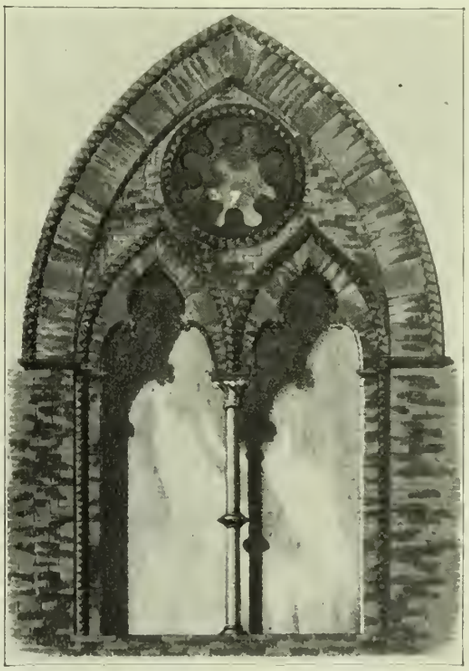


CASTELLO DI CORTE, MANTUA.

In the sub-arches the key-stones and cusps are formed of stone. The whole of the jambs are of brick, but instead of a monial there is a circular stone shaft, with square capital and band and base. The whole is so exceedingly simple as to be constructed with ease of ordinary materials, and it is quite equal in effect to any stone window of the same size that I have ever seen.

The accompanying drawings will, I trust, sufficiently explain the merit of this magnificent piece of brickwork. The arcading upon which it rests, and the perfectly unbroken face of the whole, are very characteristic of Italian work.

On the opposite side of the Piazza di San Pietro is the cathedral, the only ancient portion of which is a small part of the south aisle. It is of very elaborate character, entirely built in brick, and so far as it remains appears to have been part of an aisle finished with a succession of gables, one to each bay, a common arrangement in German and French churches, where additional aisles are so frequently met with, but uncommon in Italy, where, as in England, churches have seldom more than one aisle on either side of the nave.[1] The brickwork in

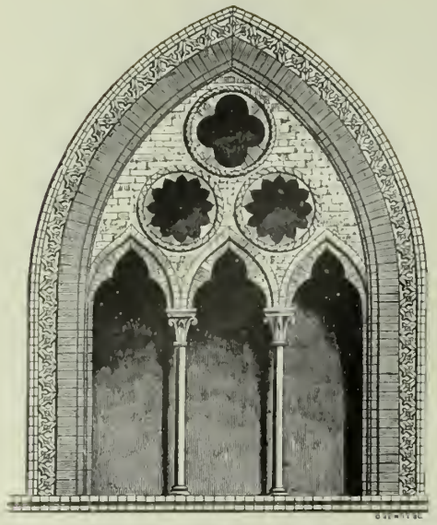


WINDOW IN DUCAL PALACE, MANTUA.

this small fragment of the cathedral, though elaborate, was not pleasing, being of rather late date.

On the same side of the Piazza as the cathedral is the Vescovato, a large pile of ancient building, but very much modernized. There still remain, however, some good three-light windows in the upper stage, inclosed within a circular arch, without tracery, and divided by marble shafts. Some old arches remain also in the lowest stage, which, though now built up, are still valuable as examples of the best mode of treating brickwork. They consist of three orders — the two inner formed of alternate voussoirs of brick and stone, carefully and regularly counterchanged, and the outer of a moulded terra-cotta ornament. Between each of these lines a brick of deep red colour is set edgeways, shewing a dark line of little more than an inch and a half in width, and valuable as very clearly defining the lines of the arch. All these courses are on the same plane; and probably another rim of the arch is concealed by the walling which has been filled in underneath.

[1] It is to be seen, however, in the church of San Petronio, Bologna.



BRICK WINDOW, SANT' ANDREA, MANTUA.

Going on from the Piazza San Pietro, and passing under an archway, we came upon the Castello di Corte, also a part of the ancient palace of the Gonzaga family, who were for a long time lords of Mantua. It is certainly a very remarkable piece of mediæval fortification, but its effect is much damaged by the erection of walls between the battlements, which in my view I have thought it much better to shew in their original state, which is evident enough upon careful inspection. The heavy machicolations which run round the main building have a peculiar and rather grand effect, particularly in the flanking towers. This portion of the palace is said to have been erected just at the close of the fourteenth century.

Close to the Castello di Corte is the Ponte di San Giorgio, one of the entrances to the city, and built between the Lago di Mezzo and the Lago Inferiore.

Retracing our steps, we soon found ourselves at the great Palazzo della Ragione, or town-hall. It has been very much altered, but one gateway remains in a very perfect state, and is quite worthy of illustration. The marble shafts in the upper stage of the building are coupled one behind the other with very beautiful effect. Brick and stone are used alternately in the main arch of this gateway, with thin dividing lines of brick, as in the Vescovato. In a wall close to the gate is a sitting figure, intended, it is said, to represent Virgil, of whom the Mantuans are still, as in duty bound, very proud. I cannot say much for the figure or its canopy, both of which are, however, mediæval.

We found nothing else worthy of notice in this building; but close to it stands the church of Sant' Andrea, a hideous Renaissance edifice tacked on to a most beautiful brick campanile.

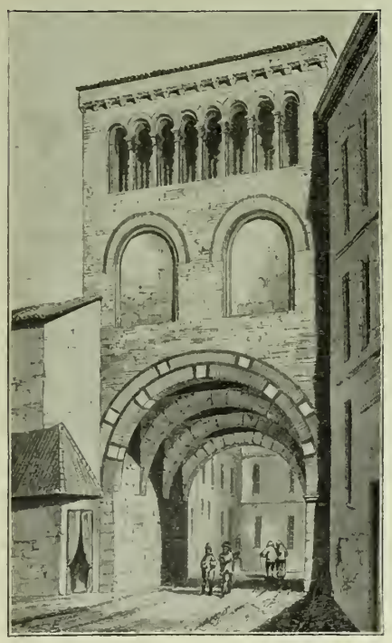
BRICK WINDOW, SANT' ANDREA, MANTUA.

The detail of this is throughout very fine. The tracery is all of a kind of plate-tracery, consisting, that is to say, of cusped circles pierced in a tympanum within an inclosing arch; the shafts between the lights are of polished marble, and coupled one behind the other. The relative proportion of the cusps in this and in most other Italian buildings is very good. In trefoils, for instance, the upper cusp is usually smaller than the lower; and in all good cusping it must be so. Modern men generally reverse the order, and, at the present day, so little is the subject really understood that at least ninety-nine out of every hundred cusped window-openings are designed without feeling, and quite unlike the best old examples; and this, though apparently a point of very small importance, is really of great consequence to the perfection of any pointed work.

The faulty portions of this campanile are the elaborate arcadings in brick beneath the string-courses, and the awkward and abrupt manner in which the octagonal stage and the round tile spire are set upon the square tower. The present appreciation of the building by the good people of Mantua is shewn by the opening pierced in its lower stage, in front of which the modestly withdrawn folds of a green curtain disclose the interior devoted to a barber's shop, and in which the patient, seated in the middle of the shop, and looking into the Piazza, submits to the painful operation of shaving — a common picture in almost every street of an Italian town, but not pleasant when the place is a portion of a church.

CHURCH OF SANT' ANDREA, MANTUA.

The guide-books speak of the church of Sant' Andrea as "among the finest existing specimens of an interior in the revived Roman style." If it really is so, I advise all architects interested in the failure of the said style to venture, notwithstanding the forbidding west front, into the nave, when they will perhaps find comfort in seeing how miserable a building "one of the finest" of



GATEWAY, PALAZZO DELLA RAGIONE, MANTUA.

its class may nevertheless be !

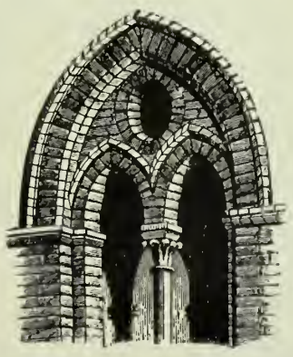
The people at Mantua seemed to be excessively disturbed by my attempts at sketching, and at Sant' Andrea they mobbed me so thoroughly that I was really beginning to think of giving up the attempt in despair, when a kindly-disposed hatmaker, seeing my distress, came down to the rescue, and gave me and my party seats in a balcony on the first floor of his house, in which, sitting at my ease above my persecutors and listening to the good man's wife and daughters, I finished my sketch with great comfort.

In Mantua there are two or three other churches with brick campanili, but they are very inferior in their character to that of Sant' Andrea, and hardly worth special notice. We owe it to the French that there are not more interesting churches, for, having succeeded in capturing the city after a very prolonged siege, they sacked it, and are said to have destroyed no less than about fifty of them.

Here, as elsewhere in this part of Italy, most of the streets are arcaded on either side, affording pleasant shelter from the hot sun, but every twenty yards we come upon one of an unpleasant class of shops, in which cheese, oil, and the like comestibles are sold, with most objectionable effects on all people blessed with noses.

In the evening we found an Italian performance going on at the theatre, and so thither we went, anxious to see how far Italian comedy might be amusing. I fear our inquiry was not much to our edification, for the favourite performers were mainly remarkable for the prodigious rapidity with which they uttered their facetious sayings, and so we lost more than half the dialogue. The theatre was almost entirely filled with Austrians, but still there was a sprinkling of Italians among them, which did away with the absurdly martial appearance of the only other theatre we had been into — that at Verona.

The next day was Sunday, but we were obliged to push on ; and so, resigning ourselves to the diligence which left Mantua at about nine, we booked ourselves for Cremona, under the promise that we should be delivered there punctually by five o'clock.



BRICK WINDOW, NEAR CASALMAGGIORE.

We lost sight of Mantua almost immediately, for, travelling along a dead flat and by roads whose sides are lined with high hedges of acacia or orchards thickly planted, you never see any place or building until you have absolutely arrived at it. There was not much to interest me on the road, and the weather, at first cloudy only and sultry, gradually became worse, and, before we had gone far, settled into a steady pouring rain ; so we read, wrote, and occupied the many hours in the rumbling diligence as best we might.

At Montenara, which we passed on our road, the church has a brick campanile, with pilasters at the angles, and in the belfry two-light windows, with marble central shafts and round arches. It has one of the usual brick conical spires, with small angle-pinnacles — a finish to these campanili which certainly does not improve upon acquaintance. They are constructed of bricks with semicircular ends laid side by side, the joints being broken in each course, and so making a very jagged kind of cone.

The only noticeable point about the church at Montenara is that it has been lately rebuilt in the very worst taste, and at an angle of forty-five degrees with the old steeple !

BRICK WINDOW, CAMPITELLO.

At Campitello there are several remains of interest. There is a small domestic building, with four pointed windows of two lights at the side ; the windows have central shafts of stone, but are otherwise entirely of rough brickwork. The church has a kind of double belfry-stage, arcaded similarly in each stage with round arches. There are also here the remains of a castle by the river, with a fine tower of the same type as the angle-towers of the Castello di Corte at Mantua, and covered with a very flat-pitched roof.

At Casalmaggiore, a town of some importance on the Po, we stopped for dinner ; but it was too wet to attempt to look at the river, and the only note I made was of a large new church now in course of erection, Renaissance in style, and with a large dome, and a choir and transepts, all terminated with circular ends. The redeeming feature about it was that it was entirely constructed in brick with considerable care, though probably ere long this will be covered with a coat of plaster, of which modern Italians are not one whit less enamoured than are modern Englishmen.

At a village, the name of which I did not learn, between Casalmaggiore and Cremona, the church had a remarkably good simple brick campanile. The belfry windows were pointed, of two lights, with a small pierced circle in the head, the shafts being of stone of course. Beneath the string-courses there was arcading, and the tower was finished with three forked battlements of the Veronese type on each face, and behind these rose a circular brick spire. This tower was to the south-east of the church.

At Longadore we saw another church with a good early campanile, of which I made a sketch. This was Romanesque, with angle pilasters, and a central pilaster carried up as high as the belfry-stage. The belfry windows were of three lights and shafted. The battlement was most peculiar — a quarter circle at each angle and a half circle in the centre of each side, with a narrow space between them ; the whole executed in brick and covered in with a flat modern roof. The angle pilasters finished under arcaded string-courses. Generally speaking, in these churches the only ancient features seem to be the campanili, and these are always of brick and nearly similar in their general design, with pilasters at the angles, a succession of string-courses — generally arcaded underneath — and windows in the belfry-stage only.

It was quite six by the time we reached Cremona, and, depositing our passports at the gate, we trotted on along the smooth granite (which in these towns is always laid in strips between the rough ordinary paving for the wheels to travel on), and after traversing a long tortuous street, and getting a glimpse only of the cathedral as we passed near its east end, we were soon deposited at the Albergo del Capello, a comfortable hostelry, which we enjoyed the more by contrast with the miserable quarters with which we had to put up at Mantua.

(*Continued.*)

Fire-proofing.

RECENT IMPROVEMENTS IN THE MANUFACTURE OF FIRE-PROOF BUILDING MATERIALS FROM CLAY.

IN THE BRICKBUILDER for June, 1897, while commenting on the effects of fire and water on the fire-proof Horne Office Building at Pittsburgh, on May 3 of that year, the following sentences appeared: "The fire-proofing material throughout is semi-porous red clay hollow tiles." "The fire test in the building showed that heating, wetting, and cooling did not destroy the structure of the material, as is sometimes the case with very light porous terra-cotta made of plastic fire clays." "The value of semi-porous tiles was completely demonstrated in this fire." And in August of the same year THE BRICKBUILDER said, in an article on "The Details of Fire-proof Construction": "The use of porous, and not semi-porous, terra-cotta is recommended for inert or protecting material, when used solid, while the semi-porous terra-cotta is recommended when used in the hollow form." Later, in the November issue, in an article on "The Present Condition of the Art of Fire-proofing," the value of a method for finishing the ceilings of fire-proof buildings with independent flat tiles, and the fact (which has been repeatedly demonstrated by experience) that if such tiles were made by splitting hollow tiles, after burning, they would not crack when exposed to fire and water, were set forth at considerable length.

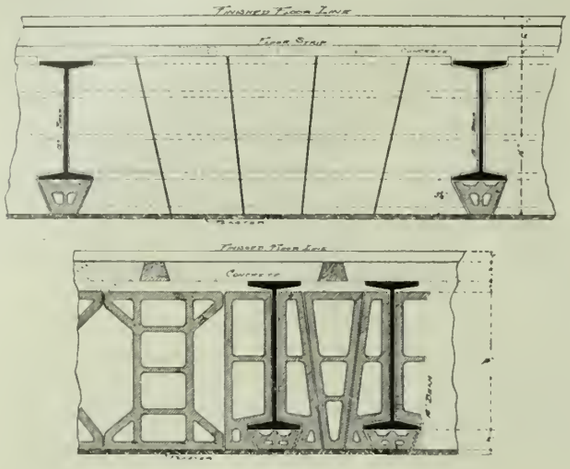


FIG. 1.

Since then, THE BRICKBUILDER has anxiously watched to see if any advantage would be taken of these suggestions, and the result in one instance is highly gratifying. Upon inquiry it was found that the Pioneer Fire-proof Construction Company, of Chicago, had since then not only experimented with, but put in practise, some of the recommendations of THE BRICKBUILDER. We therefore sought an interview with Charles F. Eiker, the general manager of the company, who has prepared the accompanying illustrations, which, to a certain extent, furnish replies to some of the questions addressed to architects in Chicago, as given in our August and September issues.

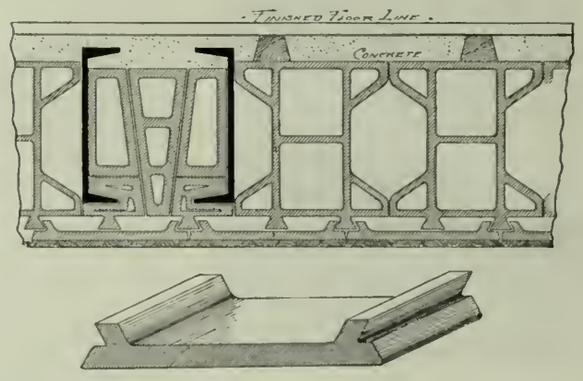


FIG. 2.

In answer to an inquiry as to what had been their practise in preparing and mixing clays, Mr. Eiker said: "Up to five years ago we used only the crude clay as it came from our mines, which was ground in dry pans tempered with water and put through our presses ready to dry and burn. If we used any grog, which, as you know, is rejected tile ground to a powder, it was without any system, and most of our rubbish pile was used for filling in low ground. I need not add that, according to this way of doing things, the quantity of imperfect material that could not be used commercially and went to the dump was very large. We have since then improved the hard product by a more systematic use of grog, have thereby decreased the waste, and have found this to be more economical in the long run.

"In 1893 we commenced experimenting with sawdust and ground coke for the purpose of making our material more porous and less brittle. We knew that our fire clay, which is very 'short,' would not make what is called porous terra-cotta. Since the great fire in Pittsburgh, in May, 1897, and after reading your comments upon it, we became convinced that the best material for all purposes was semi-porous terra-cotta, and renewing our experiments, we set about to make it as perfect as possible with the materials at our command. The result is that we are now making and using it in our contracts.

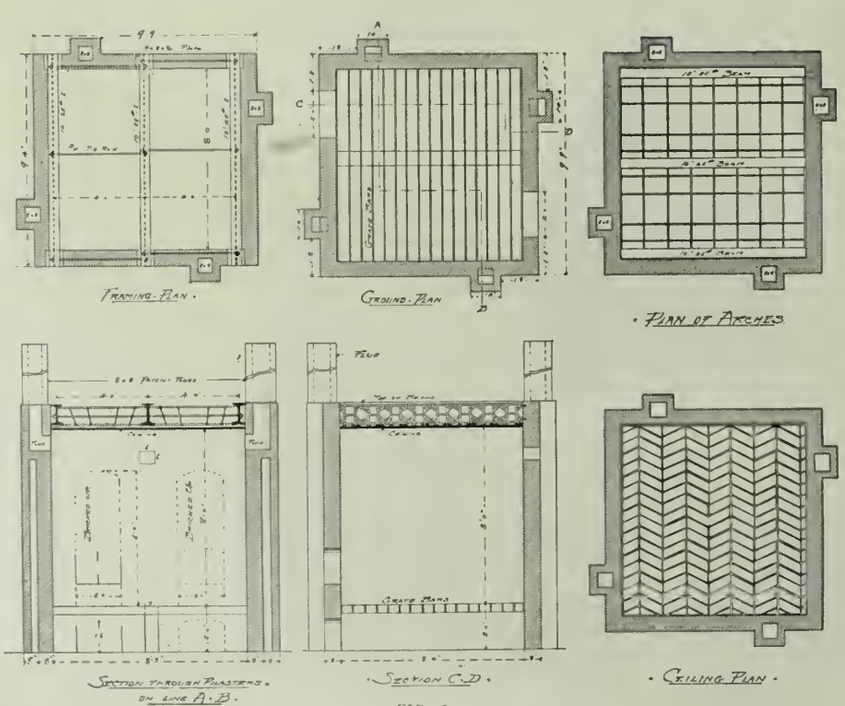


FIG. 3.

FIG. 4.

We use our fire clay finely ground in dry pans as a basis. With this we mix a small amount of ground shale to make it plastic, a proportion of grog to make it burn true and straight without cracks, and pulverized bituminous coal. We had to abandon both sawdust and coke. Of course the proportions in which we use these materials are our own property, and would not apply to any other clay. Our composition is the result of numerous experiments, for conducting which we constructed a small experiment kiln. We formerly made the hard tile as thin as it was possible to run it from the dies and burn and transport it successfully. It was necessary to do this to meet competition, reduce freights and handling, and to comply with the demand of the architects for a light material to be used in high buildings. Now that we are able to make the body of the material lighter, we have increased the thickness of the walls of the tiles about 25 per cent. to insure greater toughness and strength. We, as well as the architects, once thought that thin walls were best in hard tile, because the heat-resisting quality was found in the air cells. But the new material is also more nonconducting, and there is not only no objection but a great advantage in making the walls thicker, as you have already suggested. We still keep down the cost of transportation as well as the weight."

Q. "What is the relative expense of the new material compared with the old?"

A. "It is slightly greater. The cost of the materials used and the labor employed are considerably more; but there is a reduction in fuel, and the very slight loss from imperfect material offsets this to a considerable extent. Instead of having great piles of useless material, we have just enough now to grind up for 'grog.'"

Q. "How are you satisfied that this material is better than the old?"

A. "We have built a test house at our works at Ottawa, and have subjected it to repeated tests to demonstrate its value under the conditions which demonstrated the weak points in hard-tile constructions as developed in recent fires in fire-proof buildings."

Q. "Has this material been used in buildings during the past year, and if so, where, as we want to observe the results in case any of them should be subjected to an actual test?"

A. "It has been used in the State Street addition to the Fair Building, the addition to the New York Life Building, the Carter Building, and the Strong Building, all in Chicago. We use the same material for all purposes, and do not confine it to floor arches."

The illustration here given (Fig. 1) shows two vertical sections of the latest pattern of end-pressure floor arches made by the Pioneer Company. The upper one is a section through the beams, and the lower one a section through the girder. It is intended for a construction of double 15 in. I beam girders set far enough apart to pass outside of the continuous steel columns. The 12 in. I beams are framed to the sides of the girders, without necessitating any coping of their flanges. The arches are 16 ins. deep, and the under side, forming a flush ceiling, is 3½ ins. below the beams and 2 ins. below the girders. This provides for a soffit tile under all beams and girders that can be made with two air spaces. Only two buildings have been heretofore erected in Chicago with 3 in. hollow soffit tiles under the beams: the Western Union Telegraph Building and a wholesale store on Fifth Avenue. The girder, according to this construction, is treated similarly to those of the New York Life Building, as already described in THE BRICKBUILDER for July, the protection being independent of the floor construction, though both are flush at the bottom. The floor arches are built entirely of tiles of one section, including the skew-backs, and cut so as to occupy their respective positions, the joints radiating from a common center. Mr. Eiker says that this arch can be safely set, for office buildings or retail stores, to a safe span of 10 ft. No concrete is used except as ballast for the floor sleepers. Being made of semi-porous tile, the walls are made 1 in. thick. Attention is called to the fact that in these sections of tiles there are no sharp angles on the inside of the cells, which are the points at which arch tiles have been most liable to crack. The angles are rounded, with a radius of about ½ in., which Mr. Eiker claims as the result of tests showing that tiles of this section can be successfully dried and burned. This illustration (Fig. 1) is taken from the detail drawings of the floor construction of an important building now under consideration.

Fig. 2 is a section taken across the girder of a floor construction parallel with the beams, and adapted to the form of steel work used in the New York Life Building (see July BRICKBUILDER). It shows how the system of ceiling protection suggested in THE BRICKBUILDER for November, 1897, can be applied to flat end-pressure arches.

FIG. 5.

The Pioneer Company has constructed a section of floor and ceiling according to this detail in their test house at Ottawa, Ill., and subjected it to a very severe private test for their own satisfaction. The tiles forming the arches are run with two projecting dovetails on the bottom of each. The alternate dovetails are used for securing ceiling tiles which have been burned in couples and split apart. One of these is shown enlarged under the section drawing (Fig. 2). They are cut off diagonally so as to have a lozenge shape. This makes it possible to insert them between the dovetails with a small amount of mortar on each edge. These tiles when plastered are subjected to the full effect of fire and water, and have an air space behind them for the protection of the bottom of the arch. If they should fall in case of an actual test they can be easily and cheaply replaced, which would not be the case if the bottoms of the arch tiles should be cracked off. Thus the use of them avoids the necessity for resetting any of the arches. It has been demonstrated repeatedly, as described in these pages, that such flat tiles will resist fire and water better than hollow tiles. The Pioneer Company claims to have proved it, as will be seen hereafter.

To make this plain, we reproduce the drawings of their test house, with such a construction in position, which are shown in Fig. 3. This has many interesting features which seem to make it superior to that used by the New York Department of Buildings. The drawings are in the main self-explanatory. The "Plan of Arches" shows where the joints of the end-pressure arches are seen from the top, while the "Ceiling Plan" shows the ceiling tiles in position under the arches. A further description of this house and the test of tile-protected arches will be given in Mr. Eiker's own words: —

"The test house is very similar to that which was constructed two years ago by the New York Department of Buildings to determine the relative values of fire-resisting systems of floor construction used in that city. We think we have improved on that one by the introduction of two additional flues. Engineers of reputation have advised us that this is the only way to get a proper and uniform fire test. The building was completed Dec. 15, 1897, and the test of the protected flat-arch system was made in the latter part of December. The flat arches and furring tiles on the ceiling were set as shown on the drawings, and as I have described to you, all having been made from special dies made for the purpose, and the side walls were furred with 1½ in. split tile, all the material being our semi-porous terra-cotta. The upper surface of the arches was covered with wooden sleepers ballasted with concrete and covered with such a wooden floor as is generally used in office buildings. There were four 'peep holes.' Opposite one of them, on a shelf made of cast iron, were placed a piece of glass, a piece of brass, and another of copper. Each of these was melted in turn as the required temperature was reached. The fire was continued until the cast-iron shelf melted, when the 4 ins. of brickwork over the two fire doors was torn down. A 1 in. stream of cold water at a pressure of 50 lbs. to the square inch was thrown in until the whole was cooled sufficient for examination. I do not claim that this was such a test as scientific men might have made, but it suited us. The result showed that no wall furring had been broken or dislodged, and only three pieces of ceiling tile fell. They were immediately in range of the stream of water, and it appeared as if the joints had first been washed out and the tiles pushed away by the force of water. They were picked up unbroken. The photograph that I have shown you (Fig. 4) was taken after the test; the other one (Fig. 5) shows the outside of the test house. This building is still standing and will be used whenever we have occasion to make tests for ourselves or put to the service of any one who may desire to do so, to find if any new facts can be discovered."

In answer to a question, Mr. Eiker said that the fuel used was dry pine wood only. It was replenished through the two low iron doors, one of which is shown in Fig. 5. Over each of these was a sheet of iron with 4 ins. of brickwork built outside of it and so fixed that by pulling the sheet the whole would fall at once. The fire was maintained from 11 A. M. to 3 P. M. for this particular test.

Masons' Department.

SOME MISTAKES OF CONTRACTORS AS VIEWED BY AN ARCHITECT.

BY F. E. KIDDER.

IN the nature of things, there will always be a difference of opinion as to the wisest manner of conducting a given business and the methods to be pursued to gain the desired end. There are, also, and the writer deems it a misfortune, different ideas as to what constitutes success in business, although most people will agree that a certain amount of financial gain must be produced before one can call himself successful as a business man.

Assuming that a successful contractor is one who so conducts his business as to provide a comfortable living for himself and family, and to increase to a reasonable degree his original capital of goods and money, and to a large degree his reputation for good work and satisfactory execution of his contracts, the writer proposes to speak of a few of the things done, or neglected, by building contractors which appear to be in the nature of mistakes, that might to a large extent be avoided.

The first of these, both in point of order and in the consequences to the contractor, is that of *bidding too low*. It is certainly the opinion of most architects that contractors make a very serious mistake when they submit a bid that will not enable them to come out "whole" under any contingency, or with probable conditions allow a reasonable profit. The greater the risk, the greater also should be the margin allowed for profit.

Many contractors appear to think that they are doing the architect a favor when they put in a low bid, and although this may be so in special cases, it certainly is not so in the general run of work; and whether it be so or not, it is not the duty of the contractor to look out for the interests of the architect, in this particular, at least. As a rule, owners will finally either pay a reasonable price for what they want, or will take what they can get for their money, and that they should do so is beyond question.

To submit a low bid to help out the architect, and then expect him to "let up" on the work, is not only a great mistake, for which one deserves to lose, but verges on dishonesty.

That contractors, as a body, recognize the great evil of low bidding and have tried in various ways to prevent it is well known, but, as a rule, the schemes that have thus far been tried have not proved successful. The writer doubts if any scheme of prevention will ever be successful for any length of time, and believes that the only effective remedy is for each contractor to recognize that he is injuring himself when he puts in a low bid.

That contractors also make a mistake in bidding too high is also true, but this is a mistake that seldom occurs except in individual cases. A mistake frequently made by ignorant or careless contractors is that of making their bid according to the figures, either real or alleged, of some other contractor, and in connection with it is, perhaps, the greatest mistake of all: that of not recognizing one's own ability, and attempting a business for which one is not equipped, either mentally or with experience or capital.

The writer has known of many cases where a contractor has learned that another contractor has offered to do a piece of work for a certain sum, and has then put in a bid a little lower, without really knowing whether the work could be done for that amount or not. In not a few cases misleading bids have been quoted, and the contractor using them has been badly "stuck." A person that cannot estimate with reasonable accuracy the probable cost of work indicated by proper plans and specifications certainly cannot expect to become a successful contractor, although he may be a good workman.

Herein lies also a common mistake of foremen, or those who expect some day to enter the ranks of contractors, viz., that they neglect to observe carefully the cost of doing different kinds of work, the labor and materials required, and of making proper records of the same for future use.

When it comes to filling out and signing the contracts, the contractor not infrequently accepts conditions that he knows or ought to know will impose a hardship upon him, and in some instances, if strictly enforced, may cause him a considerable loss.

Until a contract is signed, it may be changed or modified, but after the signatures are affixed it can only be modified by the consent of both parties, and by that of the surety, if there is one.

The particular conditions of a building contract that may not be fair to the contractor are those relating to the payments and to the time allowed for completing the work.

A contractor cannot be expected to sign a contract unless the terms of payment are satisfactory, although it is fair to presume that he will be satisfied with the usual conditions of such agreements. Not infrequently, however, an owner will endeavor to hold back an unduly large percentage of the contract price until some time after the work is completed and accepted.

If the contractor has sufficient capital or credit to carry on the work under these conditions, it may pay him to accept them; but if he has not, and cannot pay his bills promptly with the amount of money coming to him, he should say so, and insist on better terms, and in most cases they would be granted.

The owner is usually as anxious to accept the lowest bid as the contractor is to do the work, and the latter should not be afraid to insist on terms as favorable to himself as to the owner. The same is also true in regard to the matter of time. Contractors undoubtedly know that it is hard to make a forfeiture clause "stick," but it is sometimes enforced, and the writer believes that it is a decided mistake to go on the principle that it will be "got around" some way.

It is much better to insist on the time necessary to do the work, with proper allowance for bad weather, delays, etc.

Again, many contractors expect the architect to see that their interests are looked after in drawing up the terms of the contract. Reliance on this is not always safe, nor is it quite fair to the architect. Until the contract is signed the architect bears much the same relation to the owner that a lawyer does to his client, and no one would expect a lawyer to advise the other side.

The contractor, therefore, should look out for his own interests, even at the expense, if necessary, of consulting an attorney, and he should be sure of what is in the contract before he signs it.

The writer has known of several instances in which contractors have bound themselves to do more than they intended, through carelessness in reading the contract or specifications, which are considered as a part of the contract. After the contract is signed and the work commenced, the relation of the architect changes somewhat, being more that of a judge between both parties, but he is also to a certain extent the agent of the owner; and as the faithful agent must ever have at heart the interest of his employer, he cannot be expected to look after that of the contractor. Most architects also desire to have the work done as well as possible, and the natural tendency is to impose on the contractor rather than to favor him, which makes it all the more necessary for the contractor to stand up for his rights.

(*Continued.*)

A CORRECTION.

EDITORS OF THE BRICKBUILDER.

Dear Sirs: — By some slip of the pen, I spoke of a working day of twelve hours, in my article on "Estimating Brickwork," September number, thirtieth line, second column. It should have been eight hours.

Yours truly,

F. E. KIDDER.

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK. — In April we predicted that by this time business would be in a healthy condition, provided that the war was settled, and in most lines of business this prediction has been fulfilled; but in regard to building operations it is now too late to begin any edifice of large size so that it will be well under way before winter. Consequently there is very little new work of any consequence to report, although we have heard of several important buildings now being planned, but not to be built until spring. A number of architects have been busy with small cottages, some of them brick, but the majority built in the regulation way, viz.: brick foundations to line of water table, first story clapboards, and shingles above.

The English half-timbered style is rapidly growing in popularity, and the prettiest examples of it that we have in and around New York are built with the first story and terraces of dark red brick, with the half-timbered work above. This makes a pleasing contrast of color, besides adding much to the stability of the structure.

The following items of new work have been reported: —

C. P. H. Gilbert, architect, is preparing plans for a five-story,

TERRA-COTTA PANEL, SCHOOL NO. 7, BAYONNE, N. J.
Executed by the New Jersey Terra-Cotta Company.
Hugh Roberts, Architect.

fire-proof brick and stone residence to be built on 79th Street, between Fifth and Madison Avenues, at a cost of $125,000.

James E. Ware & Sons, architects, have prepared plans for a six-story brick, stone, and terra-cotta apartment house, Central Park, West, near 94th Street; cost, $100,000.

Schneider & Herter, architects, have planned two five-story brick and terra-cotta stores and flats to be built on 100th Street, corner Second Avenue; cost, $40,000.

Clarence F. True, architect, has prepared plans for six five-story brick and stone dwellings to be built on Riverside Drive near 83d Street; cost, $150,000.

IMPOST CAP, MAIN ENTRANCE, CAXTON BUILDING, CLEVELAND, OHIO.
Executed by the Northwestern Terra-Cotta Company.
F. S. Barnum & Co., Architects.

C. P. H. Gilbert, architect, is at work upon plans for a seven-story brick and stone fire-proof office and studio building to be erected on Fifth Avenue; cost, $185,000.

Chas. E. Reid, architect, has prepared plans for a six-story store and tenement building to be erected on Oliver Street; cost, $50,000.

Farnsworth & Miller, architects, have planned a three-and-one-half story brick dormitory for the New York Catholic Protectory; cost, $40,000.

N. C. Mellen, architect, has planned a three-story brick store and studio building to be built for the Cameron Company, on Fourth Avenue, corner 19th Street; cost, $160,000.

Buchman & Diesler, architects, are preparing plans for a six-story brick store building to be erected on Houston Street, at a cost of $50,000.

Three warehouses, built of brick and iron, and costing about $150,000 total, are soon to be erected in the Government Navy Yard, Brooklyn.

Edward Wenz, architect, has planned five four-story brick and stone flats to be built on Franklin Avenue, corner 168th Street; cost, $105,000.

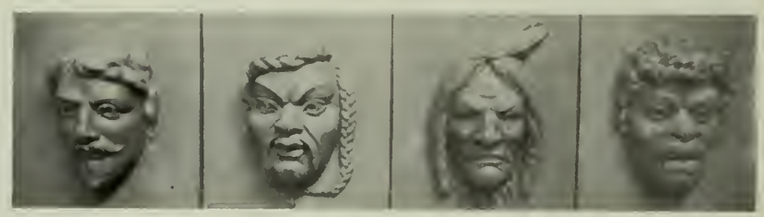
CHICAGO. — The building trades have been much interested in the recent controversy between Mr. Downey, of the Board of Education, a contractor of long experience, and Mr. N. S. Patton, architect of the same board, and a man of no less experience in his own line. Mr. Downey introduced a motion compelling the use of a certain make of bricks to the exclusion of all others, and this motion was vigorously opposed by Mr. Patton, both for architectural reasons and also because it seemed to grant a monopoly to one favored firm. The brick manufacturers have entered protest against the Downey resolution; but the school board have gone so far as to order Mr. Patton tried for "insubordination." Mr. Patton is President of the Illinois Institute of Architects and stands high in Chicago. Mr. Downey was formerly Commissioner of Public Works. Hence the controversy, and the "trial" is given prominence by the daily press.

Questions affecting schoolhouse construction are of deep interest in Chicago just now, when the constant increase of school population is calling for so many new and enlarged school buildings. One of the newest for which plans have been drawn is the Dewey School to be erected at 54th Street and Union Avenue. Its exterior is of pressed brick and cut stone, and its interior fittings are most full and complete, the whole cost being $90,000.

New buildings are being erected on the site of the disastrous fires of last March, and it is to be noted that special precautions are being taken as to fire protection and sufficient elevator service. The Ayers Building on Wabash Avenue will have a front of white glazed terra cotta and will be nine stories high. The Schoemmann Building, on which but little work has yet been done, is to be specially constructed for the carrying of heavy printing presses, and will have a front of stone and pressed brick.

Jenney & Mundie are the architects for a new twelve-story office building to be erected on the site of the National Life Building on La Salle Street. This is between the Association Building on the north of Arcade Court and the New York Life Building on the south of an intervening alley, and the fact that the interior walls of the latter building are of enameled brick and the former light-colored brick will afford much additional light to the interior of the new building.

The Western Methodist Book Concern will build a ten-story building on its lot at 57 Washington Street, from plans drawn by Architect H. B. Wheelock. Mr. Wheelock also has planned a new structure for the wholesale region of Chicago, a warehouse on Market Street, which is to have a front of pressed brick and terra-cotta. Also at Canal and Jackson Streets an eight-story fire-proof building is being constructed, its exterior being of red pressed brick with stone trimmings.



HEADS FOR A BUILDING, MARKET SQUARE, WASHINGTON, D. C.
Executed in gray terra-cotta by the Excelsior Terra-Cotta Company.
T. F. Schneider, Architect.

A new Union Station is being built at Englewood, one particularly adapted to the elevated roadways of the four railroads, and also the electric service in the subway.

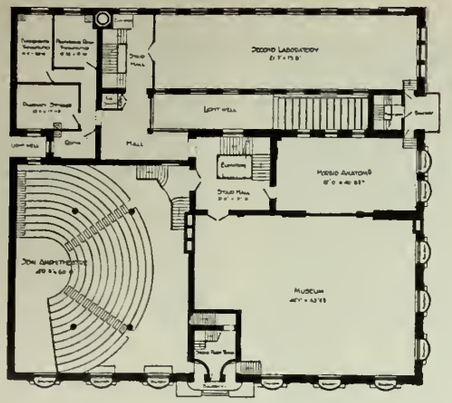
The Midlothian Country Club, Frost & Granger, architects, has just been completed. It is colonial in style with very ample accommodation in every line.

The Rock Island Road has also erected a new depot at the station about a mile from the club house, conforming in style of architecture to that of the club house.

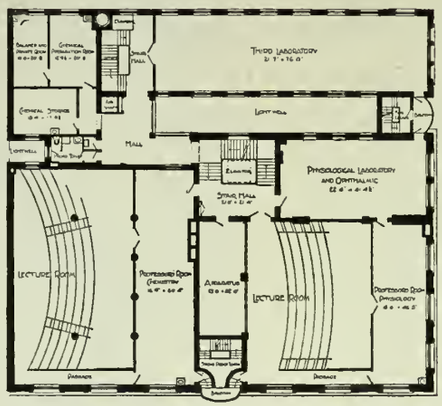
PANEL OVER THIRD STORY, BAYARD BUILDING, NEW YORK CITY.
Executed by the Perth Amboy Terra-Cotta Company.
Louis H. Sullivan, Lyndon P. Smith, Architects.

ST. LOUIS. — There is considerable complaint of dulness among architects and builders, although there is, beyond question, indications of improvement, which are quite likely to continue, and doubtless the beginning of the year will see the opening up of a good business.

Real estate has become more active, and capitalists are offering money for investment at lower rates of interest. This, together with the general expanding and shifting of commercial interests, gives considerable encouragement.



SECOND FLOOR.



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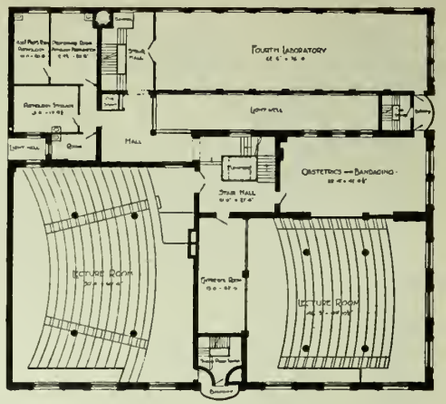
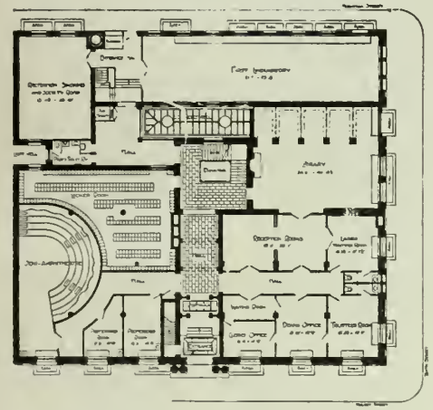
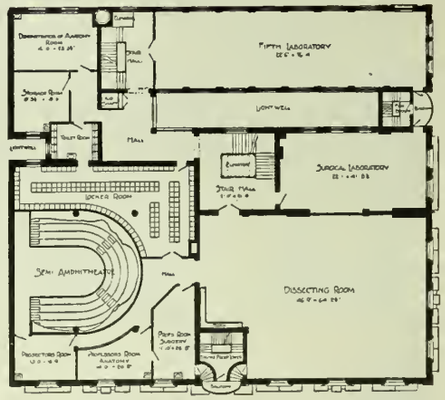


FOURTH FLOOR.



FIRST FLOOR.

JEFFERSON MEDICAL COLLEGE, PHILADELPHIA, PA.
James H. Windrim, Architect.



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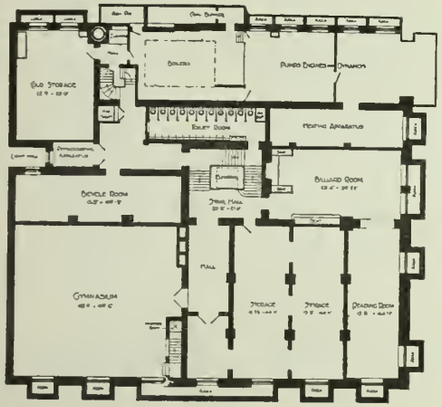
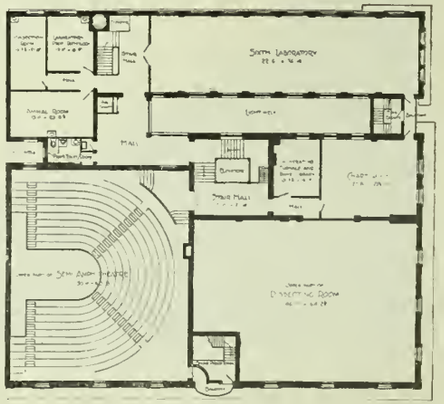
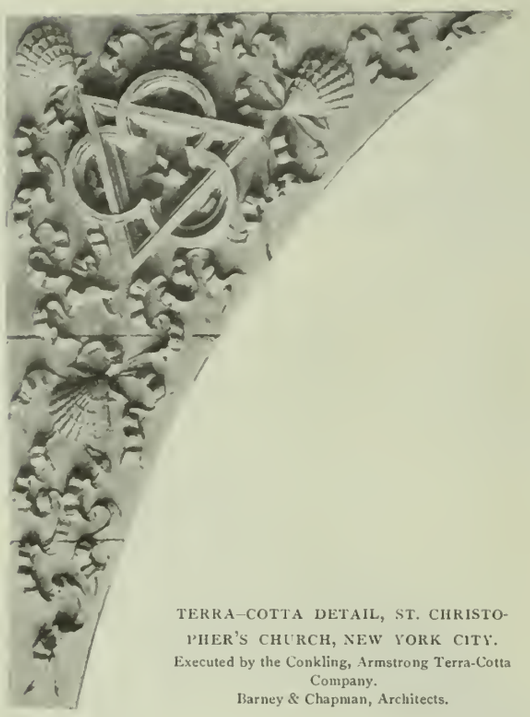


BASEMENT.



SIXTH FLOOR.



TERRA-COTTA DETAIL, ST. CHRISTOPHER'S CHURCH, NEW YORK CITY.
Executed by the Conkling, Armstrong Terra-Cotta Company.
Barney & Chapman, Architects.

The report of the Commissioner of Public Buildings for September shows a marked improvement in the class of work being done, as well as an increase in value over that for the same month last year of about 30 per cent.

The northeast corner of 6th and Olive Streets, around which memories cling of many visionary schemes in the past, ranging from six-story commercial buildings to twenty-two-story office buildings, is again attracting attention. This time it is proposed to erect a ten-story building at a cost of $200,000, and a permit has been issued to the Reliance Building Company for such a building. Architect Theodore C. Link has prepared the plans.

Another corner which has been the subject of several speculative schemes, and for which a permit was once issued for a twenty-two-story building, is the southwest corner of Olive and 7th Streets. It seems as though this may also be improved at once, and, although it may not be so pretentious as some of its near neighbors, nor approach the clouds so nearly as some of the previous schemes contemplated, it may become more famous from an architectural point of view. The building faces two alleys as well as two streets, and consequently will have light on every side. It will be only three stories high and of stone. Mr. Isaac Taylor, the architect, will make the most of the opportunity, and place there an architectural monument worthy of so prominent a corner. The building is for the St. Louis *Daily Republic*. It is gratifying to find occasionally an owner who is willing to sacrifice something to the finer feelings.

James Bright has the contract for a six-story warehouse near Cupples station, for the Simmons Hardware Company. The building is 63 by 120 ft. on 9th Street between Clark and Walnut Avenues. The plans were prepared by Shepley, Rutan & Coolidge.

T. B. Annan is the architect for a seven-story building facing on 4th Street 52 ft., for T. J. Lackland.

Adjoining this property occurred a very disastrous fire a few days ago, resulting in two deaths and a score or more of serious injuries. The building was occupied with sporting goods, and the fire and explosives completely wrecked it. It is rumored that it will be rebuilt at once.

The Commissioner of School Buildings, Mr. Wm. B. Ittner, recently awarded the contract for four more schools. The department is a year behind with its work and is striving to catch up.

CURRENT ITEMS OF INTEREST.

THE DAGUS CLAY MANUFACTURING COMPANY is furnishing 100,000 buff brick for a new power house at Williamsport, Pa.

THE GRUEBY FAIENCE COMPANY are lining a subway across Avon Street, Boston, for Jordan, Marsh & Co. It is to be done in a dull green and white.

THE BURLINGTON ARCHITECTURAL TERRA-COTTA COMPANY will furnish the terra-cotta for the new library at Hyde Park, Mass., and also for a new schoolhouse at Brookline, Mass.

THE SAYRE AND FISHER COMPANY, of Sayreville, N. J., have been very busy during the past season, and are placing orders for additional machinery with Chambers Brothers Company, of Philadelphia.

THE town of Somerville, Somerset County, N. J., has given the Berlin Iron Bridge Company, East Berlin, Conn., the contract for their new iron bridge. Span is about 60 ft., and the bridge has a clear roadway of 14 ft.

CHARLES BACON, Boston representative of the Excelsior Terra-Cotta Company, is supplying the architectural terra-cotta for the Whitman and Nonantum Blocks, Newton, Mass.; Fuller, Delano & Frost, architects; H. F. Ross & Co., contractors.

THE BERLIN IRON BRIDGE COMPANY, East Berlin, Conn., are

BURT'S THEATER, TOLEDO, OHIO.
The building is executed in three colors of brick and terra-cotta; the lower story in a gray brick, with a gray terra-cotta string-course separating it from the superstructure. The darker part of the superstructure, as shown in the photograph, is in a golden-yellow vitrified brick, and the lighter part of the diaper in a light cream buff, with the terra-cotta matching it.
Brick furnished by the Columbus Brick and Terra-Cotta Company; terra-cotta by the Winkle Terra-Cotta Company.
George S. Mills, Architect.

RESIDENCE AT BUFFALO, N. Y.
George Cary, Architect.

furnishing for the Laflin & Rand Powder Company, Pompton, N. J., the steel roof for one of their storehouses. The building is 45 ft. wide and 150 ft. long.

THE KITTANNING BRICK AND FIRE-CLAY COMPANY is furnishing buff bricks, shade No. 2, for the new Mead Building at Buffalo; L. P. T. Eckel, architect; and their Akron, impervious, dark pink Roman brick for the new Robinson Building, same city and architect.

THE BERLIN IRON BRIDGE COMPANY, East Berlin, Conn., have the contract for furnishing the steel work for the Memorial Hall being erected at Westerly, R. I. This building is to be fire-proof throughout, has steel floor beams and columns supporting the floor structure, and steel trusses and beams for the roof.

THE C. P. MERWIN BRICK COMPANY, Berlin, Conn., is furnishing the hollow brick for the Back Bay Station of N. Y., N. H. & H. Ry., at Boston; Shepley, Rutan & Coolidge, architects; Horton & Hemminway, builders. The company is making a specialty of side-cut headers in hollow brick, and is meeting with a large demand for same.

THE INDIANAPOLIS TERRA-COTTA COMPANY will supply the architectural terra-cotta which will be used in the new Law Building at Indianapolis: Louis H. Gibson, architect. The building is to be eleven stories high, and will have a frontage of 62 ft., which will be constructed entirely of terra-cotta.

THE C. P. MERWIN BRICK COMPANY, Berlin, Conn., is just completing its final shipments of ornamental red mud brick to the Pearl Street Church, Hartford, Conn.; C. A. Bartlett and Ernest Flagg, New York, associate architects. A great variety of shapes were required in this work, and the Merwin Company feel justly gratified at their success in filling the contract in such a creditable manner.

THE C. P. MERWIN BRICK COMPANY have added to their line of manufacture, hollow brick with closed ends. These are used for headers in connection with their other hollow brick. The following buildings are being furnished with hollow brick through their agent: the Connecticut Builders'

PARK THEATER, NIAGARA FALLS, N. Y.
(From *The Illustrated Buffalo Express*, Copyright, 1898, by Geo. E. Matthews & Co.)
The front brick are a dark flashed Roman, furnished by the Dagus Clay Manufacturing Company, Daguscahonda, Pa.
Orchard & Joralemon, Architects.

Supply Company, Pepion Block, Hartford, Isaac A. Allen, Hartford, architect, Washburn Brothers, contractors; Arsenal School, Curtis & Johnson, Hartford, architects, Chas. B. Andrus, contractor.

THE CELADON TERRA-COTTA COMPANY, LTD., is supplying the following new buildings with their roofing tiles: J. B. Hanna residence, Columbus, Ohio, Yost & Packard, architects; Winnetka School, Winnetka, Ill., W. A. Otis, architect, Chicago: Superintendent's residence, Ohio State Hospital for Insane, Massillon, Ohio, Yost & Packard, architects, Columbus, Ohio; Boys' Industrial School, Lancaster, Ohio. Richards & McCarthy, architects, Columbus, Ohio; A. Houghton, Jr., residence, Corning, N. Y., Pierce & Bickford, architects, Elmira, N. Y.; C. L. Poston, residence, Athens, Ohio, Yost & Packard, architects, Columbus, Ohio; Audubon Avenue School, New York City, C. B. J. Snyder, school architect, New York; Geo. T. Dickover, residence, Wilkesbarre, Pa., J. H. W. Hawkins, architect: C. B. Scoville, apartment building, Oak Park, Ill., Patton, Fisher & Miller, architects, Chicago.

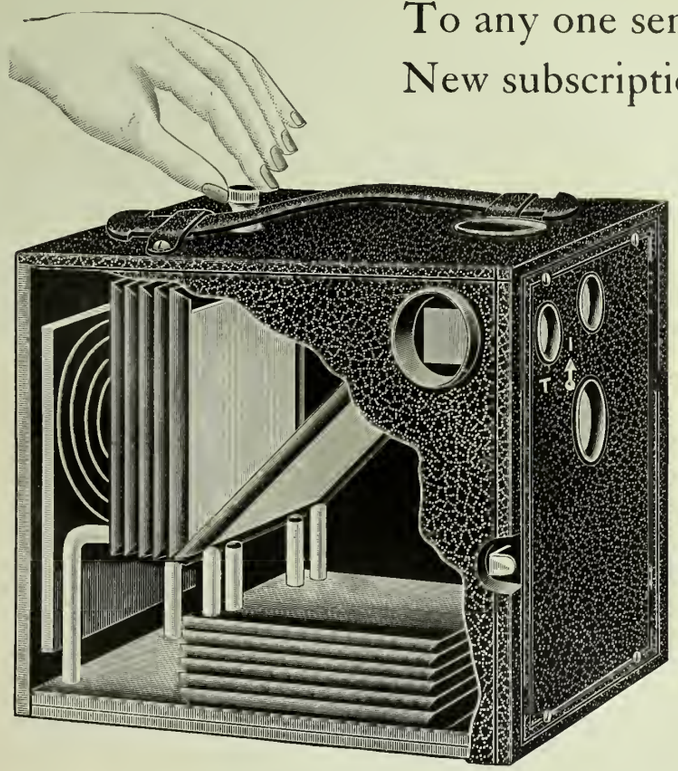
RESIDENCE OF FREDERICK W. WEITZ, DES MOINES, IA.
Frederick W. Weitz, Architect.

THE ILLINOIS SUPPLY AND CONSTRUCTION COMPANY is incorporated in both the States of Missouri and Illinois. The officers are Wm. M. Louderman, president, and W. P. Grath, secretary and treasurer. The capital stock of same is $75,000, being fully paid.

The business of this company is the manufacture of face brick in the following colors: solid white, buff, silver gray, pink, steel gray, mottled, red and brown: also dealers in builders' supplies, perfection mortar colors, terra-cotta, fire-proofing, and vitrified street paving brick. The company is operating the plant of the American Hydraulic-Press Brick Company, located at Collinsville, Ill., eleven miles from St. Louis. The brick manufactured by them have a national reputation, being used in all the large cities of the States, and are manufactured by the latest improved hydraulic press, making brick of a uniform texture and free from granulation, every brick being subjected to a pressure of fifty tons. The plant is equipped with the latest improved Grath Patent Down-Draft Kilns, which patents are owned by the company. The company always keeps a large stock of plain and ornamental brick on hand in the various colors. In the later part of May the works were visited by a disastrous fire, the entire brickmaking department being destroyed. In place of frame buildings a large two-story brick building has been erected.

Views of the plant are shown in the company's advertisement, page xii.

How to Win a Fine Camera.



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We think it may be truthfully said that THE BRICKBUILDER has improved with each year, and 1899 will surely be no exception.

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Draughtsmen,
Contractors, and
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Rogers & Manson,
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INDEX TO ADVERTISEMENTS.

Renwick, Aspinwall & Owen, Architects,
New York City.

SEAM-FACE GRANITE

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See May issue of this magazine.

Front Elevation.

HOUSE FOR AN ENGINE COMPANY, CITY OF NEW YORK.

EDWARD PEARCE CASEY, Architect.

Rear Elevation.

Conkling, Armstrong Terra-Cotta Company.

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LOUIS H. SULLIVAN, ARCHITECT.
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NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY,

PHILADELPHIA. 38 PARK ROW, NEW YORK CITY. BOSTON.

VOLVME VII NOV. 1898 No. 11

THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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CUSHING BUILDING, 85 WATER STREET, BOSTON.

P. O. BOX 3282.

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A QUESTION OF ETHICS.

COURTS of law do not exactly teach architecture, but we listened to an interesting exposition upon the ethics of the profession a short time since in a court where we had the misfortune to be called as a witness in a suit brought by an architect to recover commission. A brother architect was on the stand, having been called by the plaintiff to testify in regard to certain points regarding professional charges. On the cross-examination the opposing counsel sought to bring out the suggestion that the plaintiff had first approached the defendant, whom he had tried to interest in himself to the extent of accepting plans, and the question was asked, "Is it not very common for architects to offer to submit plans on a venture, hoping that they may be accepted?" The question was promptly objected to by the plaintiff's counsel. The objection, however, was not sustained by the judge, who made the remark that the architectural profession was not at all like that of the doctor or the lawyer, members of which never solicited work, and that of course it was manifest and perfectly well known that all architects were glad to compete. We confess we have been interested in trying to reason out how the judge arrived at such an opinion, and can only conclude that he must have been somewhat unfortunate in his architectural acquaintances, for all of our observation and our knowledge of the profession here and elsewhere point to a directly opposite conclusion, and we believe that it is the rule rather than the exception for reputable architects to decline to speculate on their chances. The incident shows how little the architect's point of view is appreciated even by the educated portion of the community. As a matter of fact, among the architects who would be taken as types of the profession, their position in relation to their clients is precisely that of the lawyer, and if the time ever comes when the practise of architecture is surrounded with the same safeguards against ignorance that the law extends to the legal profession, it is quite likely that the architect's standpoint will be better understood. It may not be necessary for the public which pays for and occupies the houses which architects build to thoroughly appreciate the peculiar relations which necessarily exist between the honest, educated practitioner and his work, but, on the other hand, it is not fairly supposable that the architect should be ready at all times to scramble for his work and compete, cut prices, or do most anything to get a job. Recognition of a higher ideal will come with the growth of good architecture. One has only to look back a comparatively few years to see that the necessity for groveling is rapidly diminishing, and that though a learned judge may be disposed to class architects, hod carriers, and others indiscriminately, the profession has won for itself a place which commands a very decided measure of respect. The temptation to get work at any price is a constant one, and while the profession is so open to any one, irrespective of his ability, it is not strange that the position of the architect should be frequently misconstrued, and the good and the bad lumped together in a single category. It is the saving remnant who have high ideals, who constitute the real measure of what the profession stands for, and the leaven of that remnant is a force which is constantly increasing.

THE old New England best parlor, which was closed against sunlight, moths, and the family, only to be opened on state occasions for the benefit of strangers, might almost be termed a prototype of the spirit which is so manifest in our public buildings and which prompts some one, we cannot say whether architect or owner, to turn his best front towards the street and to content himself with the commonest kind of work on the inner courts or back alleys. This might have been permissible at one time when all our buildings were carried to a nearly uniform height, but since the advent of modern commercial methods, there is hardly a street which does not show some tall structure elbowing itself above its neighbors, offering a very brave array of finery towards the street, but ghastly in its nakedness elsewhere. This is surely an instance of inherent, if unconscious, bad taste. There is no good reason why a building should not be presentable on all sides. The argument that it is often built on party lines does not amount to a great deal, for it is the exception to find an adjoining owner who would not be willing, for a reasonable compensation, to allow the eaves to project over his property, and we venture the statement that, in most cases of public buildings, the neighbors would be quite ready to welcome such partial infringement for the sake of the added looks of the building. We need not expend elaboration on the unimportant sides of the building. There is no violation of good taste in recognizing that a building has a decided front, that one portion of it is to mark the entrance, or that the most desirable portions of the interior are to give on a façade which bears the greatest amount of elaboration; but to assume that we can spread our lavishness along the whole expanse of a front and then suddenly saw it off at the turning of a corner is to admit that our buildings are not designed as a whole, but that a frontispiece is put up simply for show. Without following this idea to the extent which Mr. Ruskin has seen fit to insist upon, we certainly can expect that when a property owner is to shoulder himself above his neighbors, he ought, for his own sake and

for the sake of the public that permits him to do such things, to see to it that the building, which is pretty sure to be visible in its entirety from several directions, shall present at least a dignified, respectable appearance on its less important sides. The extra cost of doing this is far less than is often spent by property owners in advertising the fact that such a building is in existence, and yet the beautifying of the plain walls, or, perhaps, to put it better, the rationalization of the plain walls, as a mere advertisement, would be worth all it would cost.

AND this suggests the oft-repeated query of our brick manufacturers, why the architects seem to prefer old, rough, misshapen brick to the product upon which the manufacturers have expended so much more thought and care. From an architectural standpoint the answer is natural enough. We have seen repeated instances of side walls of buildings which, as far as the material went, was more interesting than the press brickwork of the front. This was not, however, because common brick was used in one case and pressed in another, but was simply one of those accidental happenings which sometimes set at naught the wisdom of the academy, just as a tumbledown, dilapidated, old mill may be much more beautiful than a smart, new affair. We have yet to see an interesting effect produced by the use of a poor quality of brick that could not be duplicated and bettered with the use of a good brick, and the cause for rejoicing over picturesque old brick walls is not in the quality of the material so much as in the way it is used. If good brick be used with a mixture of picturesque appreciation, such as might find expression in some of the old things we admire, the result would be undoubtedly better than when we are obliged to content ourselves with the ruder product. Other times, other manners. The rough brick which might have pleased the medievalists cannot lend itself rightly to modern work. We can get the picturesque effects, but we must use better material, and, fortunately, the picturesque qualities are not a concomitant solely of crudeness of manufacture.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

FREDERICK N. REED, architect, has removed his office to 52 Kilby Street, Boston.

WM. H. GORNPERT, architect, 2761 Atlantic Avenue, Brooklyn, N. Y., would be glad to receive samples and catalogues.

THE Columbia College scholarship for this year goes to William C. Ayres, a draughtsman in the office of Ernest Flagg.

R. MAURICE TRIMBLE, architect, has opened an office in the Ferguson Building, Pittsburgh, Pa. Samples and catalogues desired.

THEODOR G. AHRENS, architect, has opened an office at No. 8 East Lexington Street, Baltimore, Md. Samples and catalogues desired.

ERNEST FLAGG has been appointed by the Government (Navy Department), architect for the new building to be erected at Annapolis. It is estimated that the total cost of these buildings will be fully $10,000,000.

AT the thirty-second annual convention of the American Institute of Architects, held at Washington, November 1, 2, and 3, the following officers were elected: President, Henry Van Brunt: first vice-president, W. L. B. Jenney; second vice-president, J. W. McLaughlin; secretary and treasurer, Glenn Brown; auditors, S. A. Treat and W. G. Preston; directors, for one year, F. M. Day, J. C. Hornblower, T. D. Evans; for two years, R. W. Gibson, L. T. Scofield, W. M. Poindexter; for three years, A. G. Everett, W. C. Smith, G. B. Post.

THE limited competition for the Shattuck Prize, offered by the Mechanics' Charitable Association of Boston, for the best design for workingmen's houses, has been decided by the award of the prize to R. Clipston Sturgis, of Boston. The open competition was decided in favor of George E. Barton and George G. Will, draughtsmen in Mr. Sturgis's office.

The amount of the limited competition prize was $750, and that of the open competition, $450.

The judges were Prof. F. W. Chandler, John M. Carrere, and H. Langford Warren.

THE drawings submitted in competition for the Cornell University Traveling Fellowship in Architecture were exhibited and judged at Washington during the recent meeting of the A. I. A.

The competition program called for a Grand Stairway for a Metropolitan Library, the winner to receive $2,000, paid in instalments, in the manner common to all University Fellowships. W. Herbert Dole, a draughtsman in the office of Ernest Flagg, New York City, was placed first, while Floyd Y. Parsons and Ira C. Sheldon were given honorable mention.

The judges were John M. Carrere and William A. Boring, of New York City, and Edward B. Green, of Buffalo.

A REGULAR meeting of the T Square Club, Philadelphia, was held on Wednesday evening, November 2, at which the subject for competition was "The Porte-Cochère of a Theater." First mention was awarded to Alfred M. Githens; second mention to Wetherill P. Trout, and third mention to Oscar M. Hohanson.

The Club gave a "smoker" on the evening of November 16, at which the drawings entered in competition for St. Paul's Church at Overbrook were exhibited. Professor Laird explained how the designs were viewed by the church committee in making the awards.

At a meeting held on the evening of November 2, the Club gave $100 as a nucleus of a fund to be used for the purpose of erecting in Philadelphia a permanent memorial to commemorate the successful termination of the late war with Spain.

ILLUSTRATED ADVERTISEMENTS.

THE medallion of Thomas Jefferson shown herewith is modeled from a painting by Gilbert Stuart. It will be used in connection with other work in the vestibule of the Jefferson Medical College, Philadelphia; designed by Mr. James Windrim. The work

is being executed by the New York Architectural Terra-Cotta Company.

In the advertisement of Fiske, Homes & Co., page x, is illustrated one of their mantels, erected in a billiard room. A residence at Buffalo, of which Green & Wicks were the architects, is shown in the advertisement of The Harbison & Walker Company, page xv. The United States Post-Office at Madison, Ind., is shown in the advertisment of the Ludowici Roofing Tile Company, page xxvi.

The American Schoolhouse. XIII.

BY EDMUND M. WHEELWRIGHT.

SPECIFICATIONS FOR A SCHOOL BUILDING.

(Concluded.)

SECT. 11. MORTAR. — (*a*) Mortar for laying brick and stone masonry shall be prepared from sand and cement of the qualities before specified. The ingredients are to be evenly spread and thoroughly mixed dry, in the proportion of one part by measure of cement to two parts of sand, and a moderate quantity of water is to be afterwards added to produce a paste of the proper consistency; the whole to be quickly and thoroughly worked.

(*b*) Cement mortar shall be mixed in such quantities as will allow it to be used very soon after being mixed, and any cement mortar not used within three quarters of an hour after being first wet shall be rejected.

SECT. 12. ASPHALT. — (*a*) Give one thick coat of hot asphalt to rough brickwork of exterior door and window jambs and outside of foundation walls and brickwork below top of ground.

(*b*) Waterproof bottom and sides of trenches and conduits with two moppings of hot asphalt on two thicknesses of heavy tarred paper.

(*c*) Cover in best manner with best Neuchâtel or Syssel asphalt the floors of rooms so noted on plans.

SECT. 13. EXTERIOR STONEWORK. — (*a*) Provide and set exterior trimmings as shown on ¼ in. and ¾ in. scale drawings; all to be of best quality [Blank] sandstone, [Blank] limestone, [Blank] marble, and to the satisfaction of the architect.

(*b*) All moldings must be cut sharp and true, exposed surfaces to be fine crandalled [hand tooled] in a manner satisfactory to the architect.

SECT. 14. STONE SETTING. — Set all cut stone in best manner in cement mortar, as above specified, and clamp well to brickwork with galvanized-iron clamps.

SECT. 15. NORTH RIVER STONE. — (*a*) Furnish and set 4 in. North River bluestone slabs planed on top for pipe trenches and conduits.

(*b*) Furnish and set outside steps of best quality North River bluestone, fine axed in best manner.

SECT. 16. FLOORS, AND ROOF FRAMING. — (*a*) Provide all materials for and construct all floors and roof of wholly incombustible materials. This construction may be either: —

(1) Steel frames, girders and beams, with flat terra-cotta arch construction, with beams protected by end-construction soffit tile; all thoroughly filled about steelwork with cement mortar and filled to top of grounds with concrete.

(2) The concrete and steel construction of the [Blank] Company for floors.

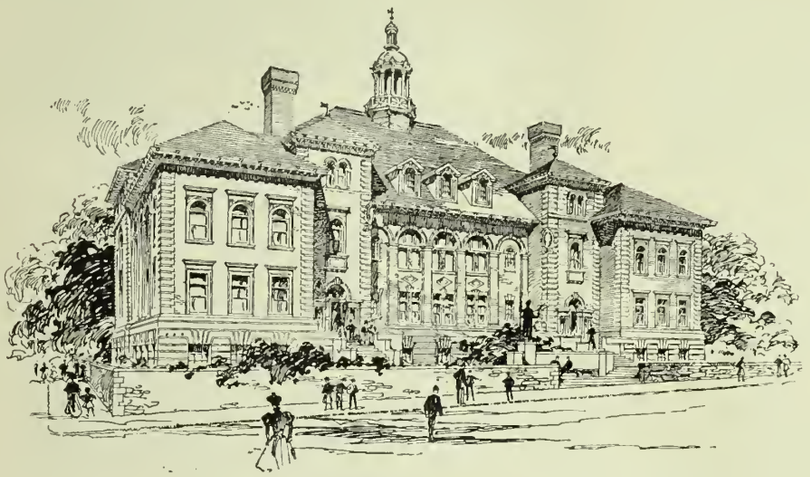
(3) The fire-proof and steel construction of the [Blank] Company.

(*b*) Whichever construction is used, it will be required to safely sustain the load required by the building laws of the city of [Blank], and the contractor shall present to the architect, before applying for permit, a complete set of framing plans, showing the method of construction proposed, and subject to the approval of the architect.

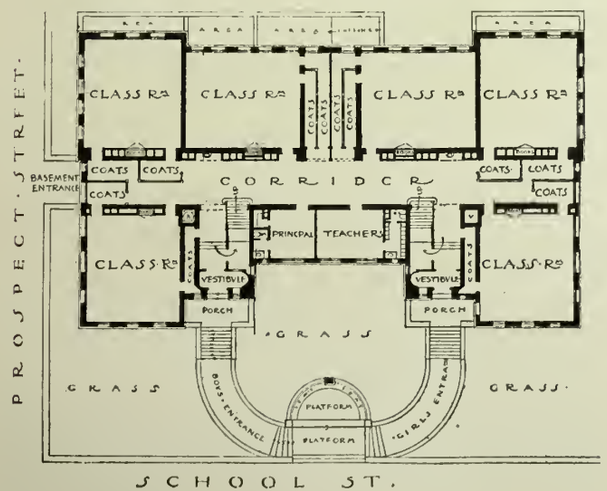
(*c*) The floors shall be finished level and true on under side, and be arranged for plastering of ceilings directly on floor construction, except where ceilings are furred down.

[(*d*) Supply and set the steel framing for walls, which shall be of ample strength to sustain the superstructure, and shall be subject to the approval of the architect. Sectional drawings of the construction shall be submitted to the architect for approval.]

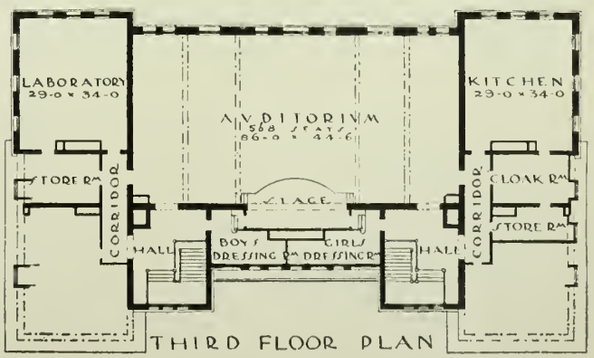
(*e*) Furnish and set all plates, connections, anchors, ties, T's, bolts, and washers requisite for the construction of said floors, steel framing for walls and roofs in the best and most workmanlike manner, and do all drilling and jobbing to fully complete the work. All



PIERCE GRAMMAR SCHOOL, BROOKLINE, MASS.
Julius A. Schweinfurth, Architect.



FIRST FLOOR.



THIRD FLOOR PLAN

PIERCE GRAMMAR SCHOOL, BROOKLINE, MASS.
Second story is a duplicate of first story, except that in place of teachers' rooms, there is a room to be used for teaching sewing.

iron and steel work is to have one heavy coat of good red lead and oil, when delivered, and one coat after being set in position.

SECT. 17. IRONWORK.—(*a*) In addition to the iron and steel work required under section 16, furnish all iron and steel shown on plans.

(*b*) All ironwork is to have one heavy coat of good red lead and oil when delivered, and one coat after being set in position.

(*c*) Furnish for all openings lintels of form and size shown on ¾ in. scale drawings. Furnish lintels required for vent and heat openings.

(*d*) Furnish all beams, ties, braces, lintels, railroad irons, masons' iron, etc., not specially called for, but required for the completion of the building.

(*e*) Furnish in accordance with design shown on ¾ scale drawing and in accordance with full-size drawing, the window and door grilles, to be set in best manner by the contractor.

(*f*) Furnish boiler flue of ¼ in. boiler iron, [Blank] in diameter, thoroughly riveted, and securely set same with wrought-iron supports.

SECT. 18. IRON STAIRCASE, ETC.—(*a*) The contractor shall take all measurements at the building, and erect the several flights of stairs in a neat and workmanlike manner, furnishing all bolts, nuts, screws, washers, etc. All beams and channels are to have, at bearings, plates 1 by 8 by 12 ins., and other sizes as marked on framing plans, and where members are framed they are to be coped and put together with angle plates, properly bolted; also do all drilling, boring, and jobbing to fully complete the work. All the flights are to have channel-iron stringers; the landings of channel-iron and T and angle-iron framing.

(*b*) All girders, beams, channels, angles, etc., are to be smooth, straight, and true, and all cast work is to be from soft gray iron, free from sand-holes or other blemishes, to be smoothly finished up, and all mouldings are to be clean and sharp.

(*c*) Stairs to be built strictly in accordance with the full-size drawings.

SOUTH BOSTON HIGH SCHOOL, SOUTH BOSTON, MASS.
Herbert D. Hale, Architect.

(*d*) [Rail to be of wrought-iron pipe set as shown on ¾ in. detail drawing.] Posts to be surmounted by large ball as shown.

(*e*) Treads and landings to be of cast iron, and to be completely covered with [Mason safety treads]. [⅛ in. rubber mat like sample in architect's office.]

(*f*) Paint the whole two good coats of good red lead and oil, one at foundry, and one when stock is delivered at site.

SECT. 19. ROOFING AND METAL WORK.—(*a*) Cover all roofs, except those shown to be of copper, with best 5-ply composition roofing, put on in the best manner on top of roof.

[Cover roofs with heaviest Neponset paper, and lay with the best even color, non-fading, Standard No. 1 Monson blue slate, or equivalent, subject to approval of the architect, and laid with 4-in. head cover, well bonded and nailed with four-penny tin nails. Bed slates in the best elastic oil cement for last two courses at ridge.] The copper roofs to be 16 oz.

(*b*) All flashing of chimneys, projecting stone-courses, ventilator curbs, valleys, battlements, walls, coping, etc., or other rising parts and covering of crickets, scuttle, ridges, and molded capping, to be of 16 oz. copper. Cover top of brick wall under coping stone with ⅛ in. sheet lead, as shown on ¾ in. scale drawings.

(*c*) Provide and set where shown, skylights of 16 oz. copper; the same to be constructed in the most workmanlike manner, and to be of construction approved by the architect, to be furnished with condensation gutters and ventilators, and to be glazed with best quality wire glass.

(*d*) Furnish and set ventilator of approved make, where shown, all as per detail, of 18 oz. copper on wrought-iron frame.

(*e*) Furnish and set cowls for vent ducts of 18 oz. copper on wrought-iron frames, all as per full-size detail.

(*f*) Make the whole roofing work perfectly tight, and keep it so for one year from date of acceptance of the building by the architect.

SECT. 20. CORNICES.—(*a*) Provide and set cornices of copper, all in accordance with detail drawings and directions. Furnish all structural iron and steel framework for the above work as may be later required by full-size details. Provide sleeves of 20 oz. copper where conductors pass through roof, strongly secured in place.

(*b*) Provide 16 oz. copper conductors where shown: the connection of same with sewer to be provided by the contractor for plumbing. Provide copper wire muzzles or strainers for each conductor outlet and fasten securely to the roof. Provide sleeves and cesspools in roof at conductor heads as indicated, all of 20 oz. copper, and connect with all conductors with lead goosenecks.

SECT. 21. METAL VENTS AND HEAT DUCTS AND REGISTERS.—Metal vents and heat ducts and registers will be provided and set by the contractor for heating and ventilation. (For ventilator on roof, see section 19.)

SECT. 22. CARPENTRY.—(*a*) The carpenter is to assist all other mechanics employed in building, including those employed upon plumbing, heating, ventilating, and electric work. He is to do all cutting, jobbing, furring, blocking, finishing, and setting of approved strips, etc., and provide all forms, centers, and lintels required by the architect.

(*b*) When required, provide cloth-covered screens, and fit properly to all window openings, including basement; also board up the entrances as directed, and provide suitable doors and hardware, locks, etc., and keep same in repair during the progress of the work.

(*c*) [Furnish all timbers, bolts, rods, hangers, joint bolts, anchor iron, dogs, etc., for floors and roofs as called for by drawings, as required by the building laws, and to make the work satisfactory to the architect. Frame, mortise, pin, raise, and fix in position the several floors and roofs, sizes to be as noted on drawings. Floor timbers to be anchored to walls and dogged together so as to form a continuous tie across the building everywhere.

(*d*) [Crown all floor timbers, ceiling joists, etc, ¾ in. where span exceeds 15 ft. and gage to an even width.

(*e*) [All the floor, ceiling, and roof timbers, girders, etc., are to be of the best quality straight-grained, seasoned Georgia pine, of full and square dimensions, and free from large or loose knots, shakes, wains, or sap.

(*f*) [The wall plates to be secured to brickwork by iron bolts every 6 ft., as shown on ¾ in. detail drawing.]

(*g*) [Cross-bridging where shown to be 2 by 3 in. stock thoroughly nailed together.]

SECT. 23. UNDER FLOORS.—(*a*) Lay on all fire-proof floors spruce boards ⅞ in. thick [or better, Georgia pine plank 2 ins. thick, dogged on to steel construction with wrought-iron dogs], thoroughly seasoned, mill-planed, well strained to joints, headings run by, double spiked on every bearing; floor boards to be free from large or loose knots, shakes, or sap, left perfect in every particular after other mechanics and ready to receive upper floor.

(*b*) Lay between upper and under floors heaviest Neponset building paper, breaking joint. [Lay between upper and under floors fire-proofing to be approved by architect.]

SECT. 24. ROOF PLANKING. — (*a*) Cover the roofs with 2 in. planed and matched, thoroughly seasoned Georgia pine plank, free from loose knots or shakes, well set up [and strongly spiked to rafters], and dogged with wrought-iron dogs on to steel construction.

(*b*) Fur for metal cornice, and prepare the roof for roofing, to the satisfaction of the architect.

SECT. 25. STUDDING AND FURRING. — (*a*) Partitions, where not shown as brick, are to be of steel channels, furnished and set by plasterer.

(*b*) Furnish and set 3 by 3 in. pine studding around all door or sash openings in channel-iron partitions.

(*c*) Furnish approved beveled screeds of chestnut, to be bedded into concrete floors, and also in pitch roofs.

(*d*) Furnish wood bricks for mason to build into walls to give nailings for furring, etc.

(*e*) Put on all grounds, angle, or corner beads for receiving the plastering throughout the building. Grounds to take plastering properly as directed.

SECT. 26. WINDOW FRAMES AND SASH. — (*a*) Make frames for windows, as shown by elevations and detail sheet, as per details, of pine. Inside to be veneered to compare with the finish of the several rooms. Pulley stiles, parting, and stop beads of hard pine. Stiles are to be fitted with bronze-face 2 in. steel axle pulleys. Sills of 2½ in. pine plank are to be thoroughly seasoned and free from knots, sap, or shakes.

(*b*) All exterior or interior single sash windows or transoms are to have rebated pine plank frames of well-seasoned, clear stock, the exterior frames 2½ ins. thick; interior frames 2 in. stock. All to be put together in the best manner. Window frames are to be painted one coat by contractor before being set (see section 34), and are not to be set until just before plastering is begun.

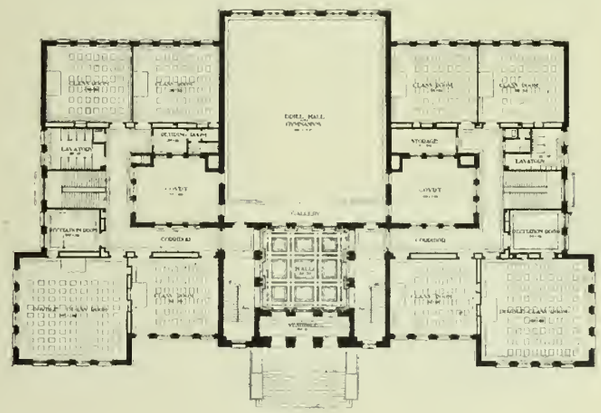
(*c*) Construct double run sash 1¾ ins. thick, with muntins 1⅛ ins. wide, arranged for the number of lights indicated on drawings, of best quality, thoroughly kiln-dried pine stock, molded, tenoned, glued, put together, and pinned in best manner, hung with best linen sash cord and round cast-iron weights to accurately balance sash when glazed; sash to be stained one coat. Exterior single sash and transoms to be the same as above. Interior transom and other sash to be of ash.

SECT. 27. DOOR FRAMES AND DOORS. — (*a*) All entrance door frames to be of first quality white pine plank, and securely fastened to masonry with iron dogs. All interior door frames to be of well-seasoned pine plank; all except those for closet doors to have transoms over them, which are to be veneered, where required, to conform with the finish of the several rooms; all as per detail drawings.

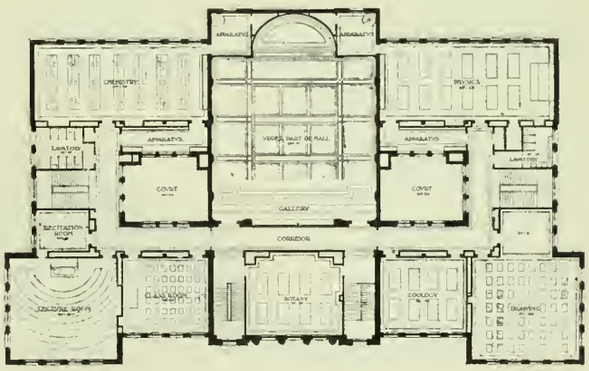
(*b*) All interior doors to be custom made, of thoroughly kiln-dried, first quality pine stock, veneered with properly selected brown ash, or oak, corresponding with the finish of the several rooms, flush-molded, mortised, tenoned, wedged, glued, and put together in the best manner; all as per scale and detail drawings, and all to have transoms, except closet and water-closet doors.

(*c*) Outside doors 2¼ ins. thick of white pine; interior doors 1¾ ins. thick, except those for water-closets, which will be 1¼ ins. thick.

(*d*) Inside doors are to have ⅞ in. thick best quality, rift



FIRST FLOOR.



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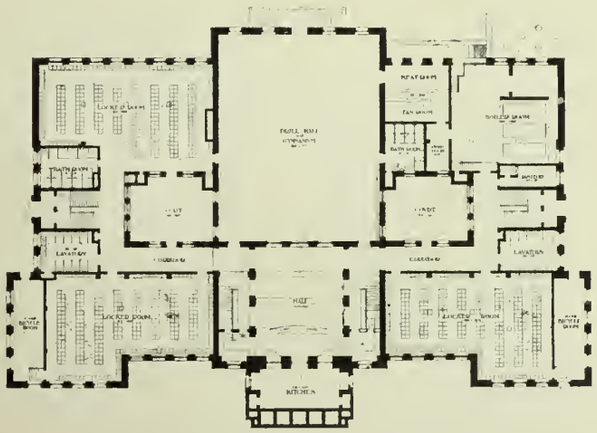
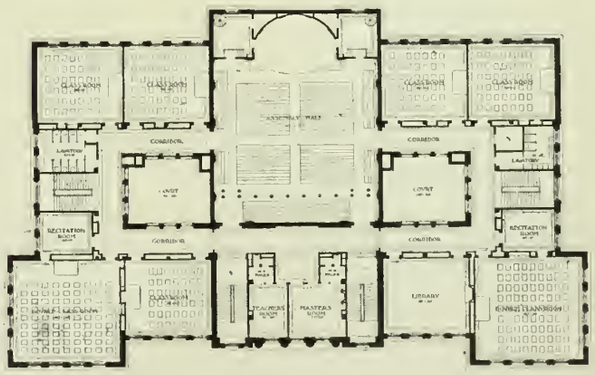


BASEMENT.



SECOND FLOOR.

SOUTH BOSTON HIGH SCHOOL, SOUTH BOSTON, MASS.

Pensacola hard pine thresholds, beveled on both edges, where not otherwise provided.

(*e*) All doors, except for toilet rooms and closets, to have one panel glazed with first quality double thick German glass.

SECT. 28. INSIDE FINISH.—(*a*) The inside finish, except as otherwise specified, is to be of first quality kiln-dried brown ash, of even color, all sandpapered off with the grain, and according to detail drawings.

(*b*) Provide a base around all rooms, corridors, closets, etc., of molded brown ash, as per ¾ in. detail drawing and full-size drawing, to be seen in estimating room, and also molded plinth blocks for all doors, using turned corners at all angles and jambs.

(*c*) Trim around all registers with molded ash.

(*d*) The office and library to be finished in first quality quartered oak, with cornice, boxed beams, and paneled ceilings, and with door and window trims of oak.

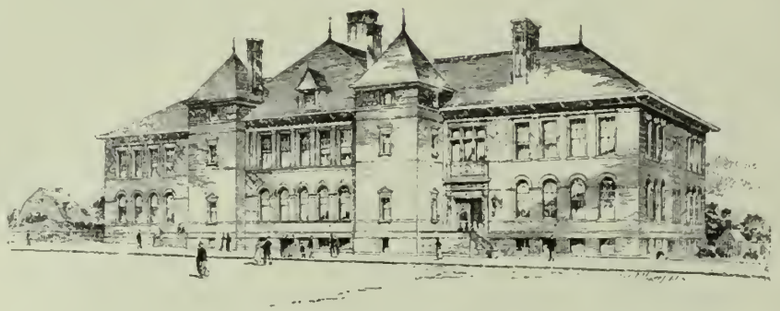
(*e*) Provide and set chair rail throughout all rooms with plastered walls.

(*f*) Provide and set 1¾ in. picture molding to run between the windows, of wood, to correspond with other finish, and in all school and recitation rooms.

SECT. 29. UPPER FLOORS.—(*a*) Upper floor boards throughout, except as otherwise specified, to be of the best quality rift Pensacola hard pine, not over 4 ins. wide, matched and blind nailed, planed to an even thickness, ⅞ in., all thoroughly kiln-dried, well strained, all heading joints run by and cut plumb and square (over a bearing in every case).

(*b*) Upper flooring in library and office to be quartered oak; to be ⅞ in. thick, not over 3 ins. wide, matched, and blind nailed.

(*c*) All the upper floors are to be planed and traversed and scraped to a uniform surface without ridges, etc., for first-class work. This work is to be done the last thing after painter has completed his work on the standing finish.



GIBSON DISTRICT GRAMMAR SCHOOL, BOSTON, MASS.
Edmund M. Wheelwright, City Architect.

SECT. 30. MISCELLANEOUS CARPENTRY.—(*a*) Provide movable teachers' platforms and fit up the toilet rooms, water-closets, bowls, etc., as shown on plans as directed.

(*b*) Put up two shelves of seasoned pine in all closets, over hooks, as the architect shall direct.

(*c*) Supply and set shelving, drawers, etc., in chemical storage room, dark room, and apparatus room; the glazed partition to run from baseboard to ceiling and to have simple cornice.

(For glazing, see section 34.)

The shelving in these rooms is to run to ceiling.

(*d*) Supply and set frames and 2¾ in. chalk receivers for all blackboards.

(*e*) The contractor is to allow and pay the sum of [Blank] dollars for electric clock dials.

(*f*) The contractor is to allow and pay the sum of [Blank] dollars for bookcases and wainscoting in library and office.

(*g*) Allow and pay the sum of [Blank] dollars for tables and furnishings of physical and chemical laboratories in addition to those otherwise specified.

(*h*) [Supply and set 2¼ in. ash hand rail for all staircases.]

(*i*) Supply and set 2¼ in. ash wall rail on bronze brackets (see section 31) for all runs of staircases, except on landings.

SECT. 31. HARDWARE.—(*a*) Furnish and supply all hardware trimmings and fixtures throughout the building, to be of solid bronze metal unless otherwise specified.

(*b*) Outside entrance doors are to have vestibule locks. Provide suitable door checks, of a make to be approved by said architect. Provide door catches, of a pattern to be approved by said architect, for outside doors and 5½ by 5½ in. bronze metal butts, bronze metal knobs, and large escutcheon plates.

(*c*) Doors of physical and chemical laboratories and of office — are to have [Blank] lock, master-keyed.

(*d*) All other doors are to have [Blank] three-tumbler lock, and with the same master-key, with 5½ by 5½ in. bronze metal butts.

(*e*) Knobs to be of size and shape to be approved by architect, and are to have key-plate escutcheon.

(*f*) Sash-fasts, lifts, and flush-pulls are to be of approved make and of finish to match door trims.

(*g*) Provide Climax stop adjuster for all inside beads of sash.

(*h*) Transom sash are to be hinged and to have "Solid Grip" transom rods of bronzed iron.

(*i*) Provide two rows of bronze hooks for all closets.

(*j*) Provide brass rubber-tipped door stops for all doors in building.

(*k*) Provide bronze rail brackets for wall rails of staircases.

(*l*) Provide all other hardware not specially mentioned, bolts, latches, scuttle fixtures, etc., as required or directed to complete the job.

SECT. 32. GAS-PIPING.—Pipe for gas outlets as shown on plans in the best manner; all to be done in accordance with the regulations of the gas company, connecting with street supply, making meter connections, paying all charges, making whole complete; all outlets to be capped.

SECT. 33. LATHING AND PLASTERING.—(*a*) The ceilings throughout addition are to be plastered directly on floor construction, and plastered ceilings where furred down [or where wooden floor construction is used] are to be lathed with No. 19 stiffened wire or "B" expanded metal lathing, securely fastened to metal furring strips [where wooden floor construction is used, the same is to be furred for ceilings with beveled Georgia pine strips], in best manner.

(*b*) Wire-lath across all iron beams, lintels, vent ducts, or other openings in brick walls that are plastered directly on the brick, as required to make a thorough first-class job.

(*c*) Wire-lath as above across all channel-irons in minor partitions.

(*d*) All furring is to be of iron. [This is only applicable to fireproof construction.]

(*e*) Minor partitions are to be constructed of studs of ¾ by ⅜ in. channel-iron, set 16 ins. on centers, fastened securely with staples or nails at top and bottom, and set true and straight.

(*f*) Attach "B" expanded metal or No. 20 galvanized Clinton wire-lath to front side of studs with No. 18 annealed wire; allow ¼ in. for grounds over face of lath on front of partition, and ¼ in. over studs on back of partition, unless otherwise directed by the architect.

(*g*) The channel-iron studs are to be securely fastened at top and bottom to cross pieces of 1 in. channel-iron. Channels at all openings to run to floor.

(*h*) Grounds for doors and windows are to be set in position by carpenter before iron studs are set.

(*i*) These partitions are to be rodded true and straight, and be plastered with King's Windsor cement, or Adamant, or Higginson's Prepared Mortar, flush with grounds on both sides of partitions, and when finished to be 2 ins. thick; the iron framework to be braced with temporary wood bracing from the back of the partition to the floor; this bracing to be set by plastering contractor, furnishing iron and lath, and is to be removed by plastering contractor after the face of partition has been plastered, and plaster has set sufficiently hard to hold partition straight and true.

(*j*) Wire on and securely fasten all necessary grounds and clamps for plumber's pipes, and for gas pipes and electric wire tubes, and for light fixtures.

(*k*) Furnish and set 1½ by 2 in. T iron frames for all doors in minor partitions.

(*l*) All plastering to be the best three-coat work.

(*m*) Plaster all walls throughout and ceilings, including basement ceiling, with same cement or mortar that is used on channel-iron partitions, lathed surfaces throughout, and all brick walls, where not otherwise specified or noted on plans. All to have grounds of proper thickness as directed by the architect.

(*n*) Brick walls to be plastered directly on the brick. Mortar to be well keyed and hand floated.

(*o*) Skim-coat plaster work, all to a true and even surface; angles and arrises to be quarter-circle throughout both walls and ceilings, except in library and office.

(*p*) Plasterer to provide and set all fire-stops required by the building laws, protect all weight-bearing metal with plaster and wire lath as directed.

(*q*) Run beads of English Keene's cement on Portland cement backing, for all doors and window trims and jambs in plastered rooms, except in library and office.

(*r*) Allow and pay the sum of [Blank] dollars for blackboard surface, this price to include the setting of same.

(*s*) Do any required patching at completion of the building and leave the entire plastering work clean and whole.

(*t*) Clear away all plasterer's rubbish.

SECT. 34. PAINTING AND GLAZING.—(*a*) Thoroughly putty-stop and sandpaper all woodwork.

(*b*) Paint all exterior woodwork four coats of best lead and oil, the priming coat to be put on immediately after the work is in place.

(*c*) Paint with three coats of lead and oil, heating and vent flues opposite all register openings.

(*d*) Paint ironwork and all metal work four coats of [Blank] metal paint, in addition to the paint previously specified for the same; colors and finish to be selected by the architect.

(*e*) Paint with four coats of best lead and oil, in colors to be selected, all exposed brickwork of basement.

(*f*) All oil used to be linseed oil from best Calcutta seed; lead to be ["Blank"] or ["Blank] Lead Works" best lead. Samples of the above are to be submitted for testing, and all paints are to be mixed at the building.

(*g*) Paint window frames and sills all over, except hard pine, before they are delivered at the building.

(*h*) Give parting and stop beads of windows one coat of oil and two coats of hard-oil finish. Grease pulley stiles with "beef's cod."

(*i*) All other finish, except where otherwise specified, is to be well filled and rubbed and is to have four coats of shellac, rubbed with pumice and oil to dead finish. All work about water-closets to have two coats of hard-oil finish with high gloss.

(*j*) Mahogany stain inside of all exterior sash, and finish with one coat of shellac and two coats of hard-oil finish.

(*k*) Finish all oak floors with coat of shellac and two coats of Butcher's Boston Polish in the best manner. Hard pine floors are not to have painter's finish.

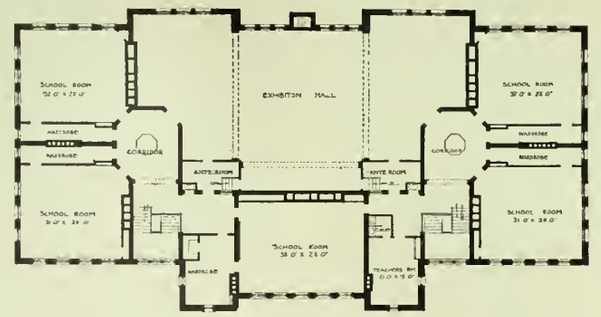
(*l*) Paint all plastering to height of 7 ft. 6 ins. above the floor and all Keene's cement work four coats of lead and oil. Tint the walls above this height and all ceilings above basement with water color.

(*m*) All colors to be given by the architect.

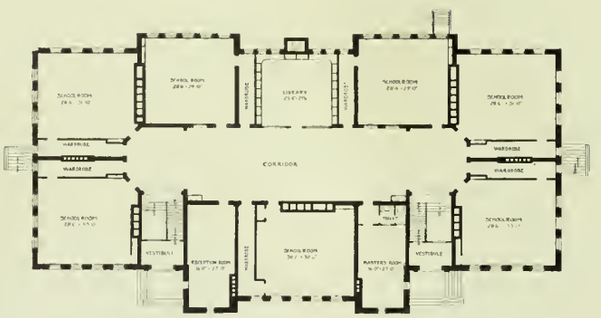
(*n*) Glaze throughout with first quality, double thick German or Berkshire glass, well bedded, tinned, and puttied. The sashes must not be put in before the putty has hardened thoroughly. The basement windows, ceiling lights, toilet-room doors, and wherever marked are to be glazed with fine ribbed glass.

(*o*) Glaze with German glass as above the interior doors.

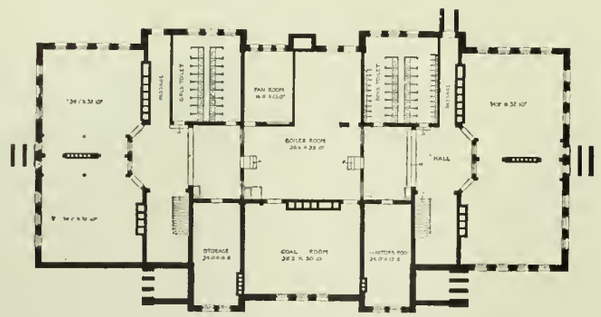
(*p*) The entire work is to be left whole, clean, and complete.



SECOND FLOOR.



FIRST FLOOR.



BASEMENT.

GIBSON DISTRICT GRAMMAR SCHOOL, BOSTON, MASS.

THE effect of frost, which tends to disintegrate bricks and stone, can be determined by a very simple test; namely, by direct freezing, says the *British Brickbuilder*. Let typical samples of the goods be chosen during frosty weather, and saturated with water, and then alternately frozen and thawed a dozen times or more. Now, if the samples to be tested are weighed dry, and the loss of weight by exfoliation determined also on the dry samples, the thing is accomplished. It would be possible to create a standard of permanency by counting a given percentage of loss as unity (this would have to be chosen arbitrarily) and then referring other percentages of loss to it. Thus might be created a scale of permanency, and when about to enter into a contract this might be referred to just in the same way as the resistance to crushing strain is now quoted.

Terra-Cotta Balustrading.

BY THOMAS CUSACK.

IN further elucidation of this subject, we give at Fig. 67 one section of parapet balustrading, which, whether by accident or good intention, proved well within the capabilities of the material in which it was made. This is due to the harmonious relationship of the members, also to the nice ratio of voids and solids obtained in fixing the size of these members. In this way a uniform shrinkage was secured, equalizing the strain during that critical process. The piece before us is 2 ft. 6 ins. by 3 ft., and but 4 ins. in thickness. There was no difficulty experienced in the execution of a score such pieces, and the size might have been increased considerably (had that been necessary) without incurring serious risk. With a thickness of 6 ins., single pieces such as this would be quite practicable up to, say, 3 by 4 ft.; even at that size, we doubt whether the limit would be reached.

At Fig. 68 we have a piece of balcony balustrade of the same general character. It is set up temporarily in connection with the dies and capping the better to illustrate both design and construction. In trueness of line, as in other points of mechanical excellence, this work will bear comparison with the best cut stone. As for price, where two or more such balconies are required, it ceases to be a question of comparison, and becomes one of contrast. We commend these facts to the consideration alike of those who seek adequate returns on a given investment, and to those entrusted with the beneficial expenditure of that which belongs to others.

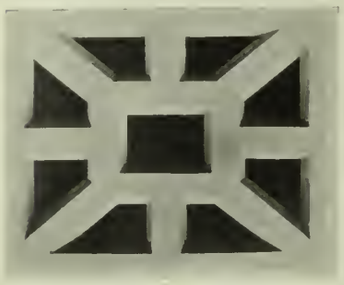


FIG. 67.

The balcony and parapet balustrading to which attention has been directed in THE BRICKBUILDER for September, as also in the foregoing illustrations, are all associated with classic, or with some phase of Renaissance architecture. For the remaining example in that class of work, a distinct type of Gothic has been selected; from which it will be seen that pierced curvilinear forms, however elaborate, are well within the capabilites of burned clay. Indeed, we may go farther and say that, in comparison with stone, the advantages in favor of the plastic material will be found in proportion to the intricacy of the design. This becomes obvious on taking the actual value of the stone in the rough, adding to it the cost of punching out the voids through a thickness varying from 4 to 8 ins. Thus far we get the subject in outline only. An expert stone-cutter has yet to mold all the members, to quirk out the intersections, and cut a variety of cinctures before it is complete. In figuring out the relative cost, it will be well to remember that, in stone, all this is done by the persistent, laborious use of mallet and chisel; finally, that the man who handles these tools is — as indeed he ought to be — one of the highest paid mechanics employed in connection with building. Gothic tracery in stone is therefore a luxury, reserved for the few who can afford it. Executed in burned clay, it comes within the reach of all builders wise enough to seek an embodiment of the artistic with the utilitarian elements of architecture, therein to be obtained at reasonable cost. Here we have the sound democratic doctrine of Mill — "the greatest good of the greatest number" — fittingly perpetuated.

In the production of pierced work in terra-cotta, whether bounded by straight or curvilinear lines, the operations just referred to are reversed from the outset. Even to cutting the profile of a molding in zinc, the part that a stone-cutter throws away as useless is indispensable to the terra-cotta maker. Mounted on a wood backing, it becomes his templet, from which the same molding is run with but little effort in a semi-fluid and very mobile material. Advantage being taken of the quick setting and adhesive properties of plaster, an equally rapid system of manipulation has been evolved. In this the expert plaster worker is guided by well-defined rules of procedure, all of which have been suggested to him from time to time by the peculiar action of the material in which he works. Chief among these is the principle of casting, wherever possible, as distinguished from carving in the solid. Hence the plaster model, no less than the mold to be taken from it, assumes the desired shape during the *process* of setting, and before the mobile mass has solidified. It may, therefore, be said that the resulting molds represent the least possible expenditure of raw material, of time, and of mechanical effort. So much for the preliminary steps of procedure; which, like the working drawings, are but well-devised instruments of service, — a means to an end, not to be confounded with the end itself.

In producing the actual pieces of terra-cotta from these easily prepared molds, the conditions are not less favorable. The raw material covers a goodly share of the earth's surface. Its abundance, variety, and wide distribution make it available for all time at a nominal cost. The facility with which it can be pressed into shape is proverbial; for here, too, the process is strictly plastic throughout. From thirty to fifty pieces may be produced from each mold, without the aid of any tool whatever, beyond the use of a man's hands. It is a fact, worthy of more than passing notice, that work such as shown in the accompanying illustrations was *not* hammered out of rock by oft-repeated blows and knocks, "but molded in soft clay, that unresisting yields itself to the touch." The last dozen words show that this easy facility of execution appealed to the poetic imagination of Longfellow no less strongly than it does to the most prosaic of practical men, to whom "time is money." To the fully equipped and qualified architect it should have a twofold significance; for in him we expect to find these qualities of temperament and training united to an extent unlooked for in the members of any other profession.

Considerations such as these, however, do not always occur to an architect engrossed, it may be, in the early stages of his project, or in time to enable his client to profit by their acceptance. When the question of cost comes up, as sooner or later it is likely to do, the man who is expected to foot the bills may have something to say. To him it then becomes a question as to whether he will pay for

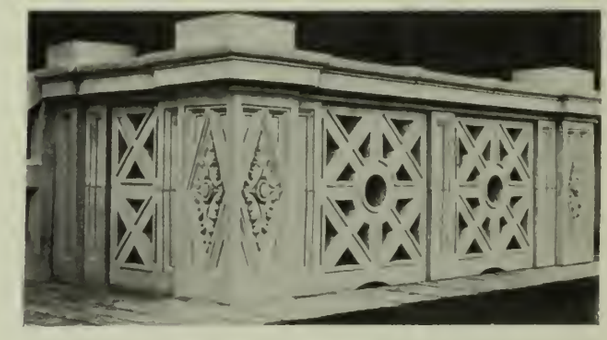


FIG. 68.

these embellishments in stone, or, perhaps, abandon them altogether. If, at this juncture, he be not guided aright through intervening doubts and difficulties by his professional adviser, a still worse fate is in store for him. He may, in a moment of weakness, rushing to the opposite extreme, perpetrate a sham in sheet metal for which he will afterwards hold his architect primarily responsible.

In the interest alike of architect and owner, we propose to show that features such as these can be executed in a material more enduring than stone, and at a comparatively low cost. These fundamental facts are becoming known to our leading architects, and, which is

more to the point, are being put to the test with results that must, in the nature of things, create an ever-increasing demand in quarters where it did not formerly exist. While enlarging upon the duties and responsibilities of architects, it must not be forgotten that those resting upon the manufacturers are not less urgent and exacting. They were outlined somewhat freely by the present writer in the first of these papers (BRICKBUILDER, May, 1895), in words that have not lost their original meaning because of anything that has happened since they were written. We shall take the liberty of reprinting them without transposition or abbreviation.[1]

FIG. 70.

In this connection, we would call special attention to Figs. 69 and 70; one showing the construction, the other a view of three pieces of Gothic balustrading, set together to illustrate the preceding diagram. It will be seen that the shaft by which these two alternating designs are, apparently, separated is made to lap in such way as to unite them, at the same time rendering the one and only joint practically invisible. In short sections the diagonal stays would not be needed; but as this was one of considerable length, they were added as a safeguard against lateral vibration. The spacing of these sections was, of course, fixed arbitrarily by the design, but the jointing and general construction were entrusted to the terra-cotta manufacturer. They might — by some makers would — have been subdivided into an aggregation of small pieces, on the erroneous supposition that this would mean less risk and less responsibility. That notion, originating in the unfortunate experience of some who are no longer engaged in the business, is far too prevalent, and though the originator may have passed from the scene of activity, the impressions so created survive with characteristic perversity. Misinformation of this kind has given rise to needless misconception on the part of architects, and is still highly prejudicial to the use of terra-cotta in general. It has been truly said that "time makes more converts than reason"; yet we have hastened to correct some of these false impressions, and shall continue to do so as opportunity permits, trusting to time for much that we must necessarily fail to accomplish. A learned writer has justly remarked that, "He only can rightly guide others in the paths of knowledge, he only can know whether his predecessors went right or wrong, who is capable of a judgment independent of theirs."

We know that "a long habit of not thinking a thing wrong gives it a superficial appearance of being right"; therefore, a few facts bearing upon the present example may help to remove the débris of some antiquated and exploded notions to which far too much credence has been given. In dealing with it, it will be seen that an opinion, altogether at variance with that indicated in the preceding paragraph, prevailed as to jointing from the outset. This work was made in *single pieces*, not because the architects had made any stipulation in that direction, nor yet as an empiric test of an abstract theory, but voluntarily, advisedly, and by preference. First: Because it is incomparably better to have it in that way, not only on the score of appearance, but also on the grounds of simplicity in setting and because of its greater stability once it has been set. Second: We are prepared to affirm that it will cost less, when made in the way indicated, than it would if jointed into smaller pieces. Third: Rational methods being adopted, the risks attending the manufacture of reasonably large pieces are reduced to a minimum — we might almost say a minus quantity. While these facts are sufficiently conclusive, it may be added that beyond the exact number of pieces called for, it was not considered necessary to make an "over"; nor was one required. As in larger blocks, previously described, these came from the kiln without a flaw. With hundreds of successful examples in reserve, we invite the attention of architects and owners to what has been said on behalf of advance practise, in which the bugbears of other days have become obsolete.

A pertinent observation left on record by Bacon occurs to us at this point, — one that is capable of a wider application than its author intended: "The amount of ill-written literature is not diminished by ceasing to write, but by writing others, which, like Aaron's serpent, shall swallow up the spurious." So, too, the amount of ill-constructed and poorly made terra-cotta is not improved by allowing men who are notoriously blind to constitute themselves leaders of the blind, but by producing work the superior excellence of which will force them to seek a less hurtful way of obtaining a livelihood.

From pierced double-faced balustrading to geometrical tracery is but a step, and the transition in such a case naturally suggests itself. What is practicable in the one is equally so in the other, for the prevailing conditions are identical. Nearly all that has been said in reference to the former will hold good in the latter case, and, so far as it goes, may now be emphasized without being repeated. There may be an opportunity during the coming year in which to say something on church architecture in materials of clay. In that case, a more extensive use of terra-cotta tracery will be urged in the light of accompanying illustrations; none of them formulated in support of new-fangled theories, but all taken from recently executed work, or from that which is entitled to yet greater respect, because of its survival in the face of time and the elements.

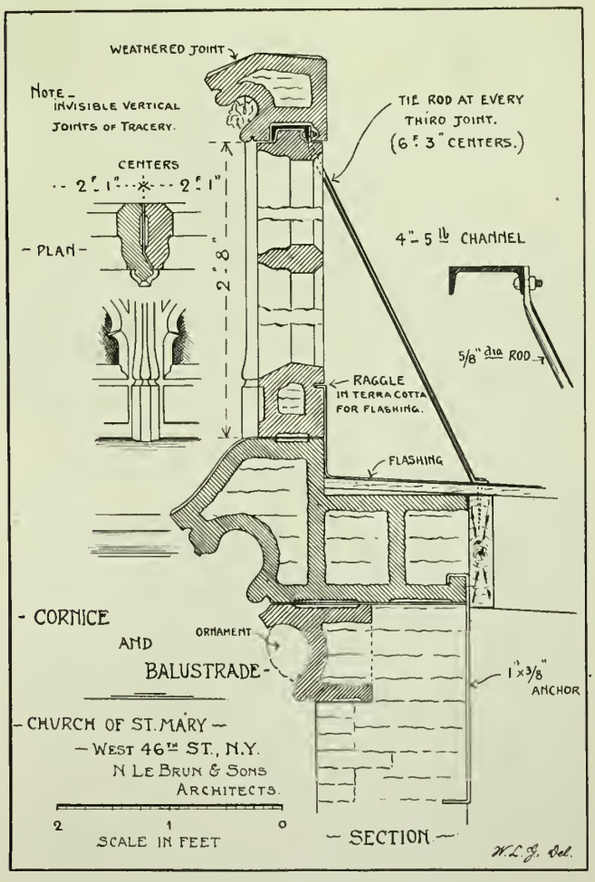


FIG. 69.

[1] Badly made terra-cotta is bad for everybody, irrespective of who bears the odium of being its godfather. By the same rule, a well-done job is a universal benefit, no matter who may be entitled to the credit of having stood sponsor for it. The better the work, the more will it be used and the wider will be the advantages that accrue. Thus does the question become one of public concern. Its enemies are of its own household. It lies with the manufacturers of terra-cotta themselves, more than with any other part of the community, to hasten or retard its manifest destiny as the popular building material of the future.

An Example of Fire-proof Church Architecture.

To the Publishers of The Brickbuilder: — I have experienced much gratification in having found in my own city a building in course of erection in which fire-proof material is being used in the main structure of a work of art, without in any way violating the traditional usages of the greatest period of historical

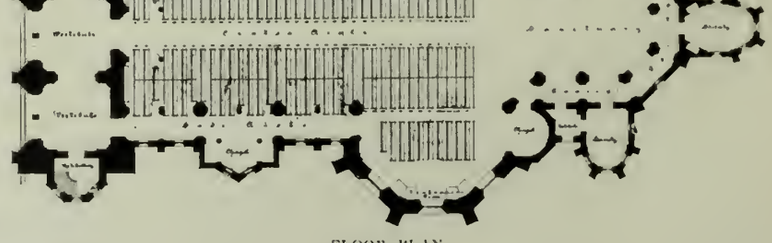
ST. PAUL'S CHURCH, CHICAGO.
From Plaster Model.

architecture. It must be confessed that in many respects the discussion of the problem, how to make buildings fire-proof, has little in it to satisfy esthetic aspirations, and unless it can point the way to a realization of that which will satisfy the eye as well as utilitarian needs, it soon becomes a dull subject as well to the average reader as to the writer. But when a fire-proof material becomes the essential part of a beautiful building, fire-proofing may well be recognized as a fine art as well as a science. It was with these thoughts that I first beheld the new St. Paul's (R. C.) Church, now about half completed, and concluded that it was destined to be the beginning of a fire-proof architecture in every sense of the term, and consequently an object of interest to the readers of The Brickbuilder.

This church is located on the southwest corner of Hoyne Avenue and 22d Place, in a quarter west of the lumber district mainly inhabited by a poor but industrious class of mechanics of German birth from the Rhine and Moselle provinces. The pastor of this flock is Rev. G. D. Heldmann, a native of Chicago. He was the founder of the parish. The architect and master of all the work is Henry J. Schlacks, also a native of Chicago, and now in his thirty-first year.

This church has reached the full height of the main walls, and the steel framework of the roof is in course of erection. It is designed and built according to the distinctive characteristics of thirteenth-century church architecture, and the material, wherever possible to use clay products, is *brick*, both outside and inside; whether for walls, groined ceilings, roofing material, interior finish, terra-cotta ornamentation and tracery, or flooring: all is some product of clay. The only exceptions are a granite water table surrounding the whole building (for it is a finished work on all sides), I-beams and concrete arches for the floor, small granite shafts with capitals and bases between the main vaulting piers, and a steel structure to support the tiled roof. There will be no wood, and consequently nothing to burn in the structure or finish, and all the seats and furniture will be movable. The doors will probably be of bronze, while the windows, the designs for which are yet to be decided upon, will be the best product of American artists in stained glass, set into the grooves of the terra-cotta tracery. It is only to be added that the pressed brick of the exterior and interior, most of which is molded (the same forming all the ribs and groins of the vaulted ceiling), is all fire brick, at which point my description of the fire-proof qualities of this edifice ends, and as such it is as nearly perfect as possible.

Other interesting facts will be given in the words of the architect, which I have solicited, as follows: "In December, 1896, Father Heldmann came to me and said he wanted to build a new church during the year 1897. We discussed the needs of the parish, and he asked me to make preliminary studies, which I did along conventional lines, occupying about three weeks, but not to my own satisfaction. We then discussed the possibility of building a church which would appeal to the affections of the people of the congregation by presenting something similar to those churches they had seen in the old country. They had mostly come from the valley of the Moselle, where the churches, which I had fortunately seen, had rough interiors, never intended to be plastered. At first we decided to build a church similar to the Cathedral of Treves, but on account of the great cost of finishing the interior with stone, the idea of building the whole, inside and outside, of brick was suggested by me. A brick interior was a novelty to Father Heldmann, though I knew they were doing it in Germany, and remembered particularly the success of this kind of building by Prof. Johannes Otzen, of Berlin. I therefore decided at that early stage of the program to follow in his footsteps. I also decided if possible to have the building vaulted with brick, which I believe has not been heretofore done with church edifices in this country. Of course, the scheme was to avoid all necessity for plastering, and this made it still more difficult. The plan was then settled upon, that is: that the church should be cruciform in shape, with very narrow



FLOOR PLAN.

aisles, to be used only for passage and processionals, leaving the nave unobstructed, and an ambulatory around the sanctuary. It was to have a large vestibule (narthex) vaulted, with organ loft, but no other galleries, two side chapels on the aisles, and two sacristies,

VIEW FROM THE NORTHEAST (OCTOBER, 1898), ST. PAUL'S CHURCH, CHICAGO.

the second one being behind the sanctuary, to connect with the cloister and pastor's house, to be hereafter erected, and a baptistry connected with the vestibule. When the scheme of brick construction for the interior was practically and satisfactorily settled, the exterior presented a very difficult problem, that of combining the two towers and the auxiliary chapels that Father Heldmann wanted, with the style of architecture we had chosen for the interior. But I found my motive for the towers in the Cathedral of St. Cortin, at Quimper, France, which I had always greatly admired. I hold that an architect should always go to examples of a perfected style and work upward, if possible, from them, and not trust too much to his own invention, and I think that in this opinion I am upheld by the best men in the profession. By so doing we are following in the footsteps of the best precedents we have. All the best architecture of the Middle Ages was evolutionary; everything was a slight improvement on something that had preceded it.

"We then determined to erect the building without the intervention of contractors."

"Why did you conclude to adopt that method?" I asked.

"Because we could find no builder in Chicago acquainted with the proposed method of construction, or who could give even an approximate estimate of the cost from my plans. At a meeting of the building committee, when these obstacles to a successful carrying out of the plans were discussed, the committee voiced the sentiments of Father Heldmann, expressive of his confidence in the architect, by deciding to let him carry out the work in his own way. There are many members of the congregation skilled in the different building trades, and this, together with the fact that at that time there was a general dulness in the building market, induced me to decide that, as far as possible, the parish should supply all the labor at current rates of wages, so that in many cases what a man contributed might come back to him. This has been done, and with great success. It has aroused an interest and enthusiasm in the parish that would not otherwise have existed. As for the materials, we contract for them or buy them in the open market.

"I was given all the necessary time to prepare the plans, being not otherwise engaged at that time, and before the foundations were designed I had borings made on the site. These resulted in the surprising fact that there was rock under the church at a depth of only twenty feet below the street grade. I then decided to carry all the main piers and buttresses down to the rock, the intermediate walls being carried on arches. I also became confident that I could successfully build the whole church with a vaulted ceiling, as I would have no fear of settlement. As a result, we have had no anxiety whenever we wanted to change the loads. The pier foundation, however deeper it may be than if it had been on clay, was much less expensive.

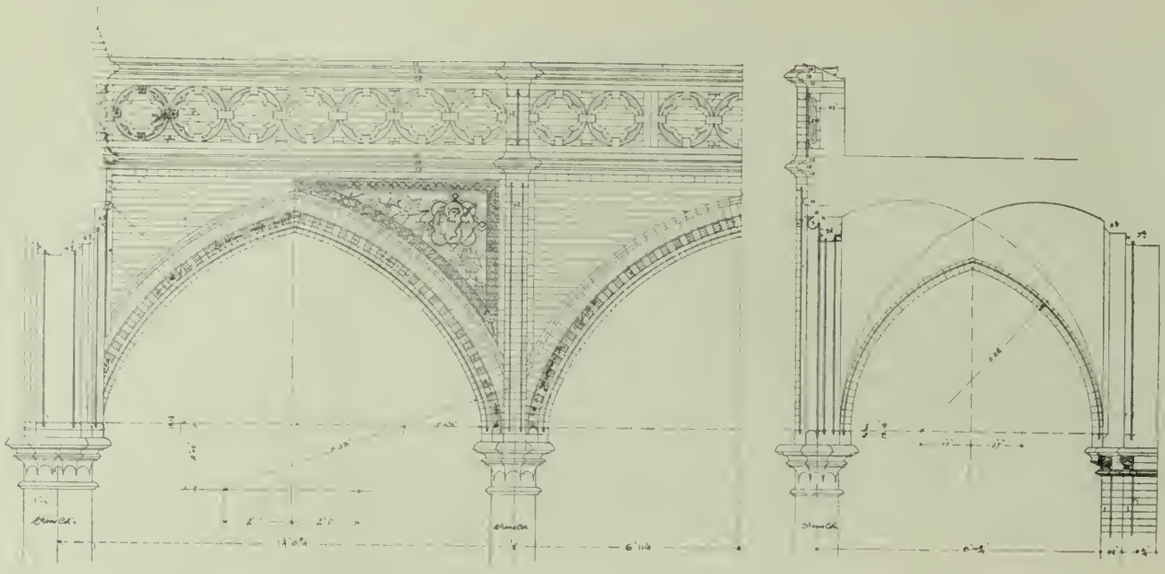
"My principal drawings were completed during the winter of 1896 and 1897, and we were able to commence the work in May, 1897. At that time I was fortunate in being able to procure the services of Mr. Paul F. P. Mueller, as superintendent of construction, his connection with a building company having been broken off very suddenly. He has since had entire charge of the work on the building as my assistant, purchasing material and employing men, for which his previous education in the best building school in Europe, no less than his large experience in this country, has fitted him."

Mr. Schlacks gave many more interesting particulars of his experience, too extensive to be here repeated.

I have also had a very interesting conversation with Father Heldmann, which I wish you had space enough to print in full, for it would be an admirable lecture, not only to architects, but to clergymen of his church. So I will give only its general tenor. He said he had always been dissatisfied with the meretricious ways in which Catholic churches had been built, and had made up his mind that if he ever built a church, it would be worthy to be called "the house of God," and should be an honest creation. His observation of what others had done had led him to learn what to avoid, but he had never had an opportunity to go to Europe and study either the perfected cathedrals of the Middle Ages or some of the modern churches he had heard of. He had, however, been reminded by Mr. Schlacks of the successful work of Professor Otzen, in Berlin, which made

INTERIOR, LOOKING TOWARD ORGAN LOFT (OCTOBER, 1898), ST. PAUL'S CHURCH, CHICAGO.

him think that he might be able to do as well. When he had accumulated sufficient funds to make a beginning, he and Mr. Schlacks had made a journey through most of the large cities of the



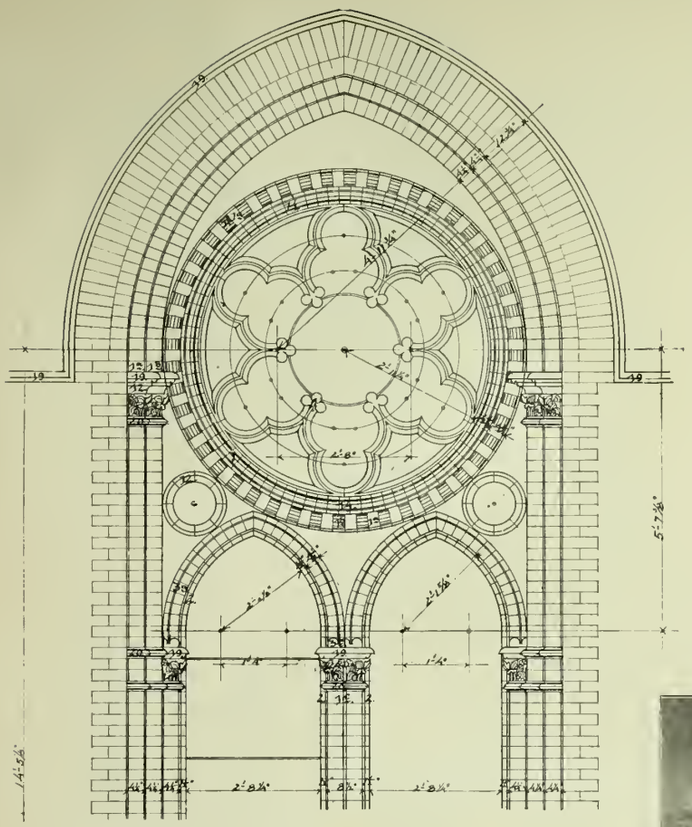
DETAIL OF ARCADE BELOW ORGAN GALLERY, ST. PAUL'S CHURCH, CHICAGO.

United States, East and West, to see what others had done. They visited hundreds of churches, not confining themselves to those of the Catholic denomination, and he was struck with the contrast between some of the churches of the Episcopal denomination and those of the Catholic. He said there was a sincerity of purpose in the Episcopal churches, and a truly religious character in their architecture, materials, and construction, that he had failed to see in the American churches of his own faith. This is not different from the opinions held by many thoughtful architects. He was struck, not only by the unsubstantiality of modern churches, but their liability to be destroyed by fire. He had always had a dread of fire since the great event of 1871 in Chicago, which made a strong impression upon him in youth, and thought that the way churches were generally built betrayed a great negligence in dealing with sacred things. To combat this, and at the same time secure economy of cost, a course which has since been justified by results, it was decided that the new church should be of brick, outside and inside, so far as possible.

INTERIOR OF ST. PAUL'S CHURCH, CHICAGO, LOOKING TOWARD ORGAN LOFT.
From Water Color.

The rest he left to Mr. Schlacks, in whom he had found an echo of all his longings and desires. It was in seeking the best color of brick to satisfy the eye that they had chosen a rich buff fire brick, which proved to be the cheapest that could be found to fulfil all the requirements, such as color, fire-resisting qualities, and the necessity of being made in a great variety of shapes, so that it could form continuous moldings. He hoped that his new church would not only be an educator for his own people, but would become an object lesson to all who might come after him. He could not speak too highly of Mr. Schlacks, who has devoted nearly his whole invaluable time to the work, and who was in entire sympathy with him in his aspirations.

A few statistics will be necessary to make this description complete. The outside dimensions are as follows: width over towers, 76 ft. 4 ins.; width over transept, 103



DETAIL, WINDOW OF NAVE, ST. PAUL'S CHURCH, CHICAGO.

ft.; length, 183 ft.; length, including sacristy, 203 ft. The heights are: from floor to under side of nave vaulting, 65 ft.; from floor to under side of transept vaulting at center, 73 ft.; sanctuary vaulting, 58 ft. The interior dimensions are: width of nave to axis of piers, 42 ft.; width, including aisles, 59 ft. 6 ins.; width at axis of transept, 93 ft. The height to ridge of roof outside is 100 ft.; the two towers are each to be 245 ft. high. A terrace 1 ft. 6 ins. high above the sidewalk surrounds the whole.

The pressed brick and molded brick are made by the Webster Brick Company, of Webster, Ohio. The plain faces of exterior walls are of common brick. When completed, the entire interior walls and piers will show Webster brick, of which also all transverse wall arches and groins of the ceilings will be made. The wide splay of the chancel arch, and a similar splay to the arch over the organ gallery, as well as all spandrels of arches and panels now shown on the walls as common, will be filled with glass pictorial mosaic on gold grounds. The vaulting cells forming the filling in of the groined vaulting are of three thicknesses of flat tiles set edge to edge. The first course forming the ceiling is of 6 by 6 by ¾ ins. nearly white porcelain tiles, with borders next to the vaulting ribs 6 ins. wide of encaustic tiles of the same size, in colors, so that the whole ceiling will be decorated. The two outer courses are of ¾ in. fire-clay tiles. The sculptured "eyes" in the vaulting and capitals of all colonnettes in the interior are of terra-cotta, made similar in color to the brick. All the vaulting is quadripartite and domical, thus avoiding all such *tours de force* of the medieval builders as have mystified some modern critics. All exterior terra-cotta, consisting of the window tracery, crockets, finials, copings, and crosses, are of similar terra-cotta, used, however, only where it has been impossible to use brick. Many of the pieces, especially for interior work, where subjected to great pressure, are cast and burned solid. All of this work is furnished by the Northwestern Terra-Cotta Company. The floor will be finished with encaustic tiles laid on the concrete arches. All exterior walls are hollow. There is a deep basement under the whole, which will be utilized by the heating and ventilating apparatus. This will, by regularly changing the air within the church, prevent all danger of sweating during the warm days of spring. The roof will be covered with Ludowici red tiles, made in Chicago, similar to those on the German Government Building at Jackson Park.

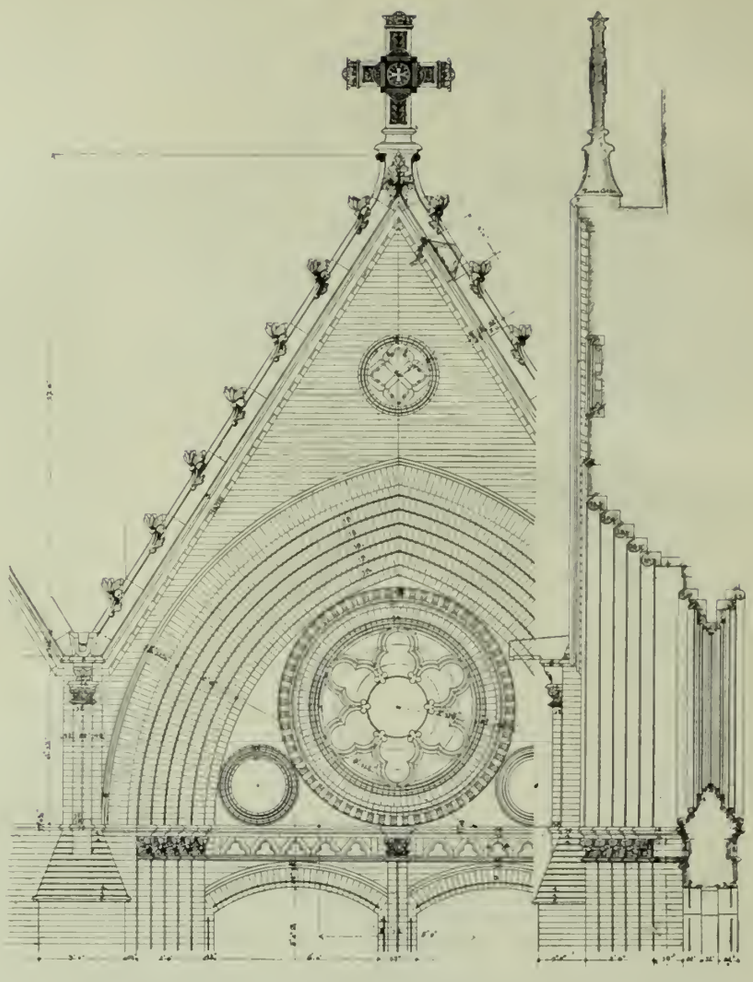
No metal or wood will enter into the construction of the twin spires. They will be built of brick, the walls being 12 and 8 ins. thick, and the crockets and crosses of terra-cotta.

In conclusion, let me say that the chief interest that attaches to this remarkable building is, not so much that it is an example of good architecture, truthful construction, and moreover thoroughly fire-proof, or not even because it is a wonderful example of construction with brick; it might not be either of these were it not for the fact that it is an architect's building and not a contractor's building. Or it might be said that it is a builder's building, and the builder was also the architect. It demonstrates that what was done in the twelfth, thirteenth, and fourteenth centuries can be done in the nineteenth, in the same way, and with the same results. The whole work is a labor of love from beginning to end. The modern commercial idea is entirely obliterated. What is more, it has proceeded far enough to demonstrate that this method is the most economical in

INTERIOR OF ST. PAUL'S CHURCH, CHICAGO, LOOKING TOWARD SANCTUARY.
From Water Color.

practise, and gives the largest results for the least cost. The wildest estimates have been made by outsiders of what it will cost. Those who are building it know now what this will be, but I will not attempt to repeat their figures. It does not concern the public.

The illustrations that I have procured consist mainly of one exterior and one interior photograph of the work in its present condition. The latter shows the method of interior construction and the groined vaulting over the organ gallery completed. It also shows the wall arch above it of 40 ft. clear span standing free. Mr. Schlacks had this built to satisfy some of the congregation that he could do it with safety; and it has stood without any other support for a month past. Another view is from the plaster model showing the completed church from the northwest, but much of the detail has been changed since it was made. The method of building admits of improvements in the design being made as the work progresses without extra expense. There are two interior views from drawings showing the completed building; also photographs of one of the crosses for the front entrance and one finial. Besides these I send you a ground plan and some of the detail drawings of the brickwork that are well worthy of study on the part of those who are interested, especially in the construction of window tracery with terra-cotta. PETER B. WIGHT.

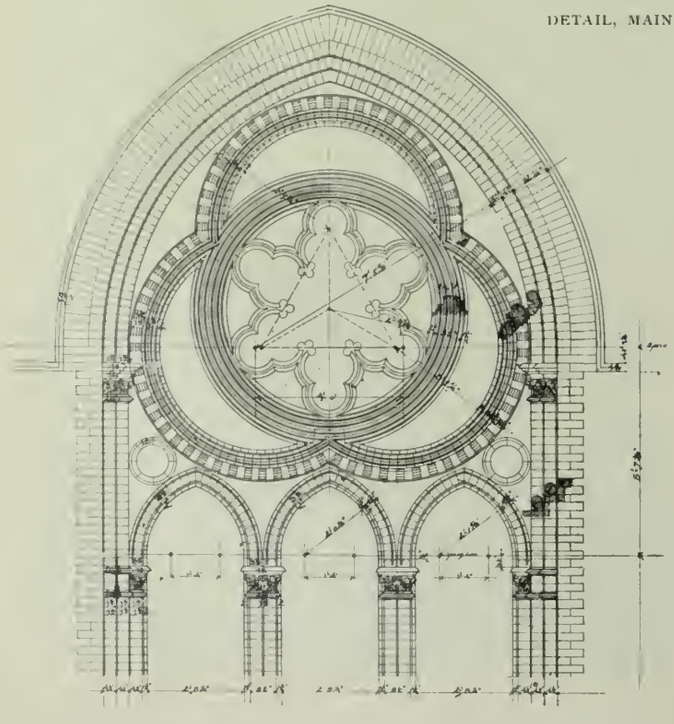


DETAIL, MAIN ENTRANCE, CENTER OPENING, ST. PAUL'S CHURCH, CHICAGO.

PRESERVING RECORDS OF FOUNDATIONS.

THERE are foundations and foundations, and though the average builder's foreman will be very ready to declare that earth that looks solid will hold, in an expressive phrase, all that you can put on it, every one who has studied foundations knows that the contrary is very often the case. We have seen bottom which had every appearance of being the hardest, firmest kind of dry, gravelly clay, but which upon investigation proved to be simply a thin layer of such clay over a relatively soft and yielding earth.

The practise ought to be rigidly adhered to of always sinking test pits before laying the foundations of a heavy building. It is a simple thing to have borings made to a depth of 20 or 30 ft. below the sidewalk, and there ought to be below the bottom foundation a layer of suitable bearing stratum at least 5 ft. thick, and of course the thicker the better. Furthermore, it is a wise precaution to not only have the borings made, but to reserve samples of the soil, and when the trenches are dug it is a good idea to have careful photographs taken from one or two points so as to show the character of the soil. This may prove very useful in case of subsequent additions or changes in the building, especially if such changes involve added loads. Also in large city buildings, when one structure is to be carried down below the adjoining cellars, it is well to take very careful photographs and measurements of the existing adjoining foundations, which are very often found not to be as secure as the neighbors imagined. These photographs, together with samples of the actual earth taken from several points about the building, would form valuable data to which the constructor could refer with perfect confidence.



DETAIL, WINDOW OF TRANSEPT, ST. PAUL'S CHURCH, CHICAGO.

PHYSICAL TESTS OF PORTLAND CEMENT.

BY CLIFFORD RICHARDSON.

As with the natural cements, we are accustomed to judge of the character of various kinds of Portland cement by certain physical tests as well as by their chemical composition.

In the following table are given the results of the physical examination of certain specimens which illustrate the various types of high-grade Portland cement now found in our market and recently tested in the author's laboratory.

PHYSICAL TESTS OF THE BEST BRANDS OF PORTLAND CEMENT OF VARIOUS ORIGIN.

Country. Brand.	German. Germania.	Danish. Alsen.	English. Brooks & Shoobridge	Belgian. High Grade.	American. High Grade	American. Ordinary.	American. Ordinary.
Residue on 200 mesh	25.9	21.0	23.0	23.0	14 0	23.6	6.8
,, ,, 100 ,,	6.0	4 0	7.0	10.0	1.5	6.8	.8
,, ,, 50 ,,	trace	trace	1.0	1.0	trace	.8	.2
Set, initial	3 hrs. 25′	3 hrs	1 hr. 45′	3 hrs.	4 hrs. 25′	2 hrs.	25′
,, hard	7 hrs. 40′	7 hrs.	3 hrs. 15′	6 hrs.	6 hrs. 20′	4 hrs. 45′	1 hr.
Water for neat mortar	20%	20%	19%	20%	19%	19%	20%
,, ,, sand ,,	10%	10%	9%	10%	9%	9%	9%
Tensile Strength:							
Neat, 1 day					376	260	350
7 days	656	560	596	626	840	496	790
28 ,,	687	666	464	638	974	678	
3 months					946	740	
Quartz, 3 parts:							
7 days	160	282	120	226	280	162	364
28 ,,	230	262	192	306	314	218	
3 months					494	244	
Crushing Strength:							
Neat, 7 days	5,458	6,056	4,725	5,091	10,280	5,500	4,950
28 ,,	6,695	6,761		7,256	11,822	7,412	4,400
3 months					13,250	5,787	
Quartz, 3 parts:							
7 days	1,659	1,321	634	1,601	1,762	1,042	2,137
28 ,,	1,700	2,157		2,142	2,990	1,712	2,500
3 months					2,923	2,100	

The results of the preceding tests show that the Portland cements are distinguished from the natural cements, in addition to differences in characteristics which have already been mentioned, by their slower set, except among some of the inferior brands, and their more rapid acquisition of strength, which is largely completed in from seven to twenty-eight days, although continuing to increase for a year or more. Mortars made with Portland cement are much denser and less porous than those of natural cement, due to the greater specific gravity of the cement itself and to the smaller volume of water required.

Amongst themselves the various brands of Portland cement differ very considerably, especially if the inferior Belgian, English, and American cements are included, and more so than would be expected where the limits of composition are so small. The best German Portland cement can, without doubt, be taken as the standard of what is most desirable. When such a cement is mixed with three parts of standard sand it yields a mortar which, according to the requirements of the Association of German Cement Manufacturers, should have a tensile strength of over 227 lbs. per square inch and a crushing strength of 2,275 lbs. per square inch in twenty-eight days, when preserved one day in air and twenty-seven in water of normal temperature. Generally much higher results are obtained in Germany, as may be seen from the results of a test of a sample of German Portland given by Professor Tetmajer, which are as follows: —

SAND MORTAR. 1 TO 3.

	Tensile.	Crushing.
7 days	318	2,824
28 ,,	398	4,082
3 months	434	4,228
7 ,,	443	5,004
1 year	605	5,429

Most of the German cements found in our markets fail to reach the high standard, especially of crushing strength, seen in this sample, but the best ones reach the limits which have been mentioned, while the highest grade American cements frequently exceed them, except in crushing strength. The lower results obtained here are very largely due to the differences in the methods of testing employed in the two countries, and not entirely to the nature of the cements themselves.

American cements in some cases have an excessively high tensile strength at early stages of the hardening process without increasing in strength after a few months, or even deteriorating after that time. This seems to be a peculiarity of the rotary furnace cements, while those burned in kilns are more like the similarly prepared German and Danish products, which gain their tensile strength more slowly, but continue to do so for a long time without reverting. It is plain, therefore, that a cement giving the highest results in tensile strength, especially in the neat form, at an early age, may not be the strongest in this respect after longer periods of time. It will be noticed, however, that the results obtained in tests of the same cement for crushing strength in the form of sand mortar may continue to increase when there is a decrease in the tensile strength and crushing strength in neat mortar after some time. The importance of long-time tests and of determinations of crushing as well as tensile strength are, therefore, apparent in judging of the character of any particular brand.

Our Portland cements are quite as well ground as those which we import, and often are much finer, in the best brands over 80 per cent. passing a sieve of two hundred meshes to the inch and from ninety-five to ninety-eight passing a one hundred mesh sieve. Considering the increased value of finely ground cement, this is an important consideration.

VOLUME CONSTANCY OR SOUNDNESS.

An important determination and consideration in judging a Portland cement is whether it is sound and will not change its volume on age and exposure, losing, at the same time, its strength and coherence. This is usually considered in making tests of cements. It appears from the results of our experiments that many second and third grade cements are not satisfactory in this respect, as some of them check and deteriorate under the conditions of the test. A good Portland cement should show no signs of deterioration in sand mortar even after considerable periods of time, and although it is impossible to always wait for long intervals to settle this point, there are forms of tests which can be so accelerated as to give a result from which more immediate conclusions may be drawn, and it is important that these tests be applied. The best brands, both of foreign and domestic cement, generally prove satisfactory in volume constancy, and when preserved in the form of pats with thin edges for a long time in water, or when the test is accelerated by heat, seldom show any signs of cracking or checking. As the supply of cement of such a quality is plentiful it seems undesirable to use any that will not pass the test, although it may prove unjust in a few instances if applied severely. The methods of making the tests we shall describe later.

EFFLORESCENCE on brickwork may, according to Professor Günther, of the University of Rostock, England, "come either from the bricks or from the mortar. While incrustations of calcium carbonate do no harm beyond spoiling the appearance of the work, soluble alkali salts repeatedly dissolve and recrystallize in the cracks, ultimately producing disintegration. To prevent these incrustations, pyrites and sulphates can either be removed by the slow process of seasoning the clay by prolonged exposure to the weather before making up into bricks, or by adding barium salts to the clay before burning, so as to produce the insoluble barium sulphate. Another remedy is the prevention, in continuous kilns, of the oxidation of the sulphur present in the clay or coal beyond the stage of sulphurous acid; which may be effected by limiting the air supply. Finally, the bricks should be very thoroughly burnt, since in this state they are less disposed to absorb the moisture necessary for the extraction of the soluble salts." — *Eng. Record.*

Masons' Department.

SOME MISTAKES OF CONTRACTORS AS VIEWED BY AN ARCHITECT.

BY F. E. KIDDER.

(*Continued.*)

THE writer is now supervising the completion of a building, the architect of which lost his health soon after work was commenced, and died when the building was about half completed. When the first bids were received they brought the price beyond the amount available, and the architect endeavored to reduce the cost by omitting some portions and changing the materials.

As the work has progressed much annoyance has arisen from the contractors claiming that they had certain verbal agreements with the architect which were not incorporated in the plans and specifications nor mentioned to the building committee. One subcontractor claims that to do the work according to the plans, specifications, and details will cost him three hundred dollars more than what he figured on doing. The writer, as superintendent, has only the plans and specifications to govern him, and, of course, the owners expect him to see that the work is executed in accordance with them.

Nothing having been said to the building committee about any of these changes, they naturally believe that none not shown on the plans were contemplated. Consequently, the contractor must comply with the drawings and specifications or forfeit his bond.

This is mentioned for the purpose of illustrating the importance of having everything in "black and white." It is true, a great deal of business is done on verbal contracts, and often without trouble, but it cannot be said to be a safe way of doing business, and, as a rule, is wholly unnecessary; even if the parties concerned are perfectly trustworthy, life is very uncertain, and death may bring about unexpected situations.

If the tracings, when handed to the contractor, are not in accord with the drawings on which the contract is based, or with the specifications, then is the time to require that they be corrected, and not after the work is commenced.

When once the work is under way it is poor policy to complain that more is required than was figured on, or that he, the contractor, has taken the work too cheap. Such complaints seldom do any good, and often injure the reputation or standing of the contractor.

Building contractors are also often very careless in making contracts with one another; the usual contract being merely the verbal acceptance of a bid, and even the latter is not always put in writing, or if in writing, not in a proper form. It has always seemed to the writer, that of all business men, building contractors and subcontractors are the most careless about their business affairs. This is probably due, largely, to the fact that they are generally pretty well acquainted with each other, and have, perhaps, done business together several times in this loose fashion with satisfactory results. Then, too, writing materials are not always at hand for making a contract, and the amount is simply jotted down in a note-book, and the rest left to a verbal understanding or to custom.

Again, many people, and they are not all contractors, appear to have the idea that to request a written contract or a written order implies distrust. This certainly does not follow, as even where both parties to a business transaction have the highest sense of honor, there is often a chance for a misunderstanding, or one party may have in his mind something different from that in the mind of the other, which, when the contract is put in writing, would be brought out. Again, in making a verbal contract one is liable to forget some important provisions or conditions which would not be so readily overlooked in making a written contract. No honest person can object to put in writing that which he has promised verbally, and in case of the failure or death of either party, a written contract will save many complications. Even written contracts are sometimes interpreted differently by the different parties thereto, as the writer has found in his own experience, but they are far more satisfactory than verbal ones.

The contracts between contractor and subcontractor need not be as elaborate as that between owner and contractor, the principal points to be defined being the money consideration, terms of payment, what is to be done and when it is to be done, and that it is to be done according to the plans and specifications. A contract embodying these points with sufficient clearness can be printed and put up in pads, of a size that can be carried in the pocket, and an indelible pencil or fountain pen can be used for filling them out. The written acceptance of a bid, if the bid embodies the points above mentioned, usually makes a sufficient contract, especially if the bid allows a fair profit on the work. It is in those cases where the work is taken at too low a figure that a contract is most necessary, at least to the general contractor.

Another serious mistake often made by contractors is in causing the architect unnecessary trouble, annoyance, and loss of time. We believe that nearly all contractors will admit that the good-will of the architects is of some financial value to them, and yet many contractors act as though it made no difference to the architect whether the work drags or not, or whether he has to send for the contractor several times to finish up his work or to get it ready so that other workmen may proceed, or has to settle disputes between the different contractors over some trivial matter.

The architect receives, practically, a fixed price for his supervision of the work, and if he has to visit the building for six months, when the work might as well be done in five, his expense of time and labor is increased 20 per cent. He cannot, therefore, be expected to desire a contractor to do his work that will make his own services expensive and laborious.

Some contractors, and more foremen also, often have the very annoying habit of urging some different way of doing the work from that shown or specified, and of haggling over little things, and some are even fond of advising the architect as to what will look best and how he might improve his design by making certain changes.

Both of these habits are not relished by architects, and the writer believes result in a financial loss to the contractor, through loss of work and favors that might otherwise, perhaps, be extended. Contractors also often lose the favor of both architect and owner by their utter unconcern as to how the subcontractors under them do their work, and as to the materials which they supply. It is true that, in a great measure, the general contractor makes no profit on his subcontracts, and many apparently think that for this reason it is no concern of theirs how the subcontractor does his work, provided it does not interfere with their own branch of the work, and manages to pass with the architect. This certainly is a mistaken idea, especially as it costs the general contractor little, or nothing, to keep a supervision over the different branches of the work and have them done right, thus securing a better building and saving the architect or his representative much trouble and annoyance. Contractors that do look after their subcontractors in this way stand much better with architects and owners, and are very likely to get a preference on account of it: they certainly are more likely to be invited to bid on work, while if they are notably negligent in this respect, they may not be given an opportunity to figure on another job, in the same office, at least.

The writer does not mean to imply that all contractors make the mistakes herein noted, nor that these mistakes are confined to any particular line of contractors; but that one or more of them are made by a great many contractors, he knows from his own experience, while he also believes that they can in a great measure be avoided, with benefit to the contractor, the architect, and the owner.

(*Continued.*)

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK. — Many report that they have more business in hand now, and in a hopeful state of negotiation, than has been the case since hostilities began with Spain. However, there will be no material revival until spring, when we hope all negotiations will be ended and all difficulties settled, in which case we can confidently predict that 1899 will be a great year for architects and builders.

No one, not even the man who leans by preference to the security market for his investments and for speculative diversion, questions the superiority of New York real estate over all other forms of investment and speculation when the prices are right. This means always and invariably when the property, at the price at which it can be bought, produces reliably, year in and year out, a rental equal to the normal rate of interest on bonds. In this connection it will be interesting to watch the outcome of the four great blocks which are now on the market, located near St. Patrick's Cathedral, in the most exclusive section of the city.

This is a phenomenal circumstance, and at the same time its cause is far from being detrimental to the real-estate interests of

CAPITAL, PRESS BUILDING, PHILADELPHIA, PA.
Executed in terra-cotta by the Standard Terra-Cotta Company.
T. P. Chandler, Architect.

that region. That these four blocks in the very heart of the up-town district are in the market is mainly the result of the up-town business movement, and the consequent upward movement of public institutions.

Two of the four blocks referred to belong to the Roman Catholic Orphan Asylum, one to the Women's Hospital, and the fourth to Columbia College. The taxpayers of the city will gain by the sale of these four blocks, as they are all now exempt from taxation, and as their sale will bring at least $6,000,000 worth of property under taxation.

The last regular dinner and meeting of the Architectural League was unusually interesting. The subject was, "The Improvement of the Water Front of New York." Addresses were made by Major Wells, 71st Regiment; Captain Taylor, of the battleship *Indiana*, who received an ovation; Messrs. Greene, Burr, and Morrison, prominent engineers; Messrs. Price, Harder, Thorpe, and Tilton, architects; and Messrs. Bush-Brown and Ruckstuhl, sculptors.

Among projected new buildings are: —

Montrose W. Morris, architect, has prepared plans for two three-

CAPITAL.
Executed in terra-cotta by the Conkling, Armstrong Terra-Cotta Company.
W. H. Allen, Architect.

story brick dwellings, to be built on Carrol Street, corner of West Prospect Park, Brooklyn; cost, $45,000.

Edward Wenz, architect, is preparing plans for four five-story brick flats, to be built on 117th Street, near Fifth Avenue; cost, $80,000.

James E. Ware & Son, architects, have prepared plans for a seven-story brick and stone apartment, to be built on West Central Park, near 94th Street; cost, $125,000.

Frank W. Herter, architect, has plans for four five-story brick flats, to be built on 54th Street, near Lexington Avenue; cost, $175,000.

Geo. F. Pelham, architect, has prepared plans for a five-story brick flat building, to be built on 138th Street, near Alexander Avenue; cost, $25,000. The same architect has prepared plans for a six-story brick and stone apartment, to be built on 91st Street; cost, $90,000.

J. B. McElfatrick & Son, architects, have planned a brick theater and music hall, to be built on Seventh Avenue corner of 42d Street; cost, $50,000.

CHICAGO. — It is conceded that architects are feeling more encouraged, probably because of the increase of sketches for prospective work, although it is a fact that as for actual work begun, as indicated by the taking out of permits, statistics show 8 per cent. decrease for the month as compared with even the poor business of the corresponding month last year.

In October occurred the death of Chicago's pioneer architect. Mr. W. W. Boyington came to this city in 1853. The Grand Pacific Hotel was one of the older buildings which he designed. Among the best known of the recent buildings for which he stood sponsor was the Illinois Building at the World's Fair, and the Columbus Memorial Office Building.

TRADE-MARK PANEL, BUILDING FOR W. B. CONKEY CO., HAMMOND, IND.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.
George C. Nimmons, Architect.

In the list of architects who appear to be busy is the name of F.

BUSINESS BLOCK, WALNUT STREET, PHILADELPHIA, PA.
Cope & Stewardson, Architects.

Foltz, who includes in his "now in hand" a school building, some residences, and factories.

Frost & Granger have let contracts for a $250,000 union depot, at Omaha. The exterior will be mottled brick and the roof will be tile.

Wilson & Marshall have some fine residences on their list.

Robert Rae, Jr., is the designer of an important apartment building.

A. G. Lund is designing a large apartment building, and John R. Stone is making working drawings for a row of houses.

Dwight H. Perkins and Frank L. Wright are associated architects for a new church of especial interest.

Recent happenings at the Chicago Architectural Club are as follows: Evening, October 24, "smoker," at which Messrs. Fritz Wagner and William D. Gates spoke on the subject of "Terra-Cotta as a Building Material"; evening of October 31, "Hallowe'en" night was observed; evening of November 7, W. M. R. French, director of the Art Institute, gave a lecture on "The Value of a Line." This evening was also observed as "ladies' night"; evening of November 14, "smoker," at which Paul T. Potter spoke on "Plumbing in Buildings," and Henry Lord Gay on "Sewerage Disposal in Country Residences."

PITTSBURGH. — As a rule, most of the building operations in progress at this time of the year are those which have not been finished during the preceding summer, but with our dull spring and summer there has been little to last over and work is dull, both with architects and contractors; quite a number of smaller dwellings, mostly brick, are, however, being built, but a decided improvement is looked for after the first of the year, and the general improvement in all lines seems to warrant this feeling.

Possibly the most interesting item which has been noted lately was the announcement by Mr. Andrew Carnegie, at the exercises of Founder's Day at the Carnegie Institute, that as soon as arrangements could be perfected, he would place at the disposal of the trustees a sum, probably about $500,000, to be used in making an addition to the present building. The quarters occupied by the art galleries and the museum are badly crowded, and this addition has been greatly needed; but while there have been rumors that Mr. Carnegie would build it, this was the first official announcement of his purpose.

The third annual art exhibit of the Carnegie Institute was opened to the public November 3. This has become an important event not only here but in Europe. Committees are chosen in a number of art centers, and all pictures, before they can be forwarded here, must meet with their approval. The jury of awards, elected by competing artists, consisted this year of eight American, one English, and one French artist.

The following items of new work have been noted: —

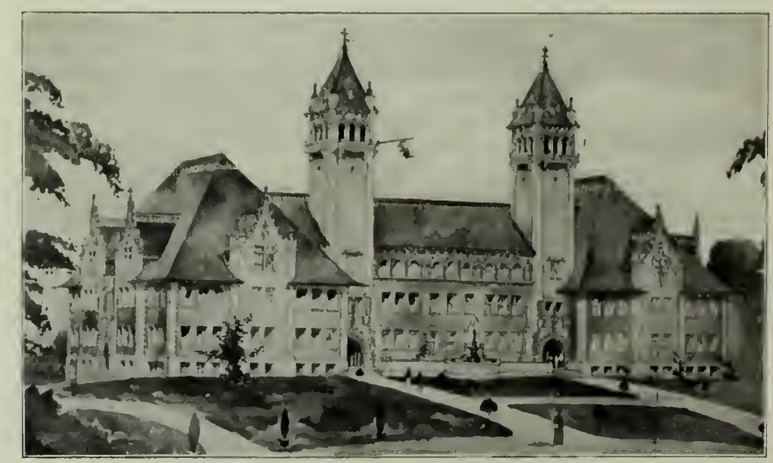
Architect C. M. Bartberger has recently let the contract for a new school building for the twentieth ward, Pittsburgh. It is to be built of brick and terra-cotta, and cost $115,000. He is also preparing plans for a large addition to the nineteenth ward school, Pittsburg; for a new school for the thirteenth ward, Allegheny; and for a new brick school at Wilmerding.

Work has been begun on the thirty-eight-room schoolhouse for the third ward, Allegheny; it is to be of stone, brick, and terra-cotta, and cost $200,000. F. C. Sauer is the architect.

Alden & Harlow have let the contracts for two branch office buildings for the Central District and Printing Telegraph Company. They have also prepared plans for a third of these buildings, to be built at McKeesport, Pa. The same architects have made plans for a new stone residence for Mr. J. G. Pontefract, Sewickley, Pa.

PANEL, SCHOOL NO. 7, BAYONNE, N. J.
Executed in terra-cotta by the New Jersey Terra-Cotta Company.
Hugh Roberts, Architect.

F. J. Osterling is preparing plans for a row of eighteen houses



SCHOOL BUILDING FOR THE OHIO INSTITUTION FOR THE EDUCATION OF THE DEAF AND DUMB, COLUMBUS, OHIO.
Richards & McCarty, Architects.

PUBLIC LIBRARY, ERIE, PA.
Alden & Harlow, Architects.

for Mr. C. L. Magee. They are to be built on Fifth Avenue, Pittsburgh.

W. J. Cast has let the contract for a new First Presbyterian Church, at Altoona, Pa.; cost, $50,000.

The exodus of the wealthier inhabitants of the down-town districts of Pittsburgh and from Allegheny seems to have stopped somewhat, and those especially who own the finer class of homes in these districts are turning toward Sewickley and the neighboring country, where many have recently bought considerable tracts of ground, and intend in the near future to build summer homes, in some cases of considerable size.

COLUMBUS.—There is being erected in this city a building of more than usual interest. It is a school building for the Ohio Institution for the Education of the Deaf, Richards & McCarty, architects.

The building is 240 ft. long by 110 ft. wide, and is practically three stories in height above a finished basement. The first and second stories and the central part of the third story will contain thirty-six schoolrooms, with a superintendent's office, cloak rooms, etc. The third story of one wing will be fitted up for a library, with reading rooms, etc., and the third story of the other wing will be fitted up for an art gallery, with studios, photographers' rooms, etc., while the large corridor connecting these wings will be used for an exhibition room to display the work of the institution. The gymnasium is in a semi-detached building in the rear connecting with the main basement. In one wing are locker rooms, showers, and a plunge for the boys, and in the other wing are like accommodations for the girls. The front part of the basement is used for chemical laboratories, bicycle rooms, and general lavatories.

The exterior walls will be faced with press brick furnished by the Columbus Brick and Terra-Cotta Company. The facing for the basement walls will be gray brick, Norman shape, and for the walls above the brick will be standard size, using gray brick for the corners and a rich buff brick for the body of the work. The ornamental trimmings will be a gray sandstone to match the color of the brick.

CERAMIC MOSAIC *v.* MARBLE PAVEMENT.

BY H. C. MUELLER.

THERE is a popular idea that nature never does things by halves, that when she produces a good material it is very nearly perfect for its purpose. As a matter of fact, however, few of the natural products used in building operations are perfect or uniform in their quality, and this applies with special force to the marbles which are used very frequently and with most gratifying success in an artistic sense for pavements and floorings. There are a few marbles which are excellent, and mosaics of marble as well as marble tiling have been used for a long period, replacing in many instances the encaustic floor tiles. If we may judge, however, by the continual search after something which shall be better than the marble, it is fair to assume that marble is not perfectly satisfactory, and all the indications point to decided superiority in some respects on the part of mosaic and tile work manufactured from burnt clay.

Within the past few years a tendency has been developed to substitute very largely the artificial for the natural product. This has shown itself principally in the East and in large cities where marble mosaic is extensively used. It has been found that the substantial appearance of the marble mosaic is deceptive, and that the work is not as strong as it seems. The patching of costly marble mosaic work is not an uncommon occurrence, and it is especially found that the wear, even under the best circumstances, is apt to be uneven, and that this is not obviated entirely by using a single apparently even quality of marble, as in a lot of marble blocks the quality will vary. Furthermore, under many circumstances, it is almost impossible to keep the marble mosaic perfectly clean, and though marble answered the purpose amply for the houses and temples of the Greeks and Romans and

DETAIL OF FRONT, PUBLIC LIBRARY, ERIE, PA.
Alden & Harlow, Architects.

did not show wear when traversed by sandaled feet, it is not wholly adequate for a vestibule or lobby in a New York or Chicago hotel or office building.

The tile manufacturers have long appreciated the possibilities of burnt clay for flooring. The advent of the vitreous floor tile,

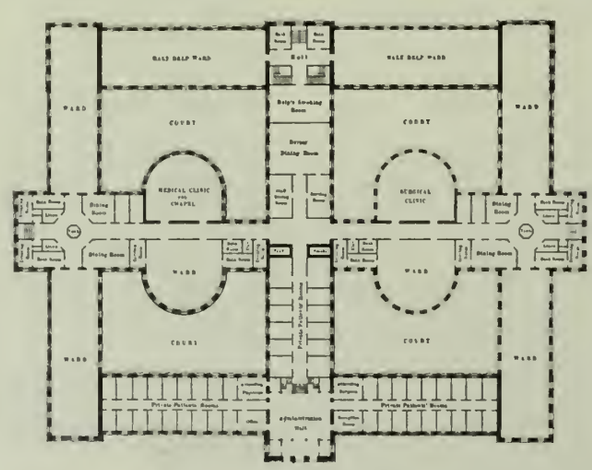
which is quite recent in its appearance, was a long step in advance, as it is a material which surpasses in hardness any known natural stone. As the public demand requires, from artistic reasons as well as convenience of setting, a mosaic composed of small pieces, the tile manufacturers have brought forth the ceramic cube mosaic, which is now in the market as a strong competitor for favor with the ordinary Roman block mosaic. Marble, though looked upon by the casual observer as something extremely hard, is in fact not hard at all, rather suggesting hardness on account of its polished surface, which is unyielding to the touch. Burnt clay, with its sometimes velvety surface, does not look as hard as marble, yet the expert knows very well that marble may be scratched with soft iron, while reasonably hard burnt clay cannot be touched with a hard steel point. Again, while any floor covering which is composed of marble blocks laid upon a necessarily more or less yielding foundation is liable to develop cracks in the surface, it has been found by experience that a mosaic composed of minute fragments of burnt clay is much more rigid and less liable to develop unsightly cracks than is the marble mosaic. This is for reasons which can be readily appreciated. When the ordinary marble mosaic is set, it has to be ground and polished off on account of irregularity of the cubes, and this grinding process sometimes has a tendency to break the set of the cement, so that it is a very easy matter to dislodge individual cubes, and in case of repairs it is found that the cement does not adhere very closely to the marble. On the other hand, vitreous tiling forms a complete union with Portland cement mortar. The silica contained in the cement attacks the silica developed to a glass-like set in the vitreous tile and adheres to it in such a degree that it will be impossible to part cement mortar and tile without splitting either parts of the mortar or parts of the tile.

The color of marble mosaic floors is very easily obscured by wear. It can be brought back by scouring and polishing, but the surface of the vitreous tiling is so hard that the scratching due to walking over it does not deface the surface, and it is impossible to scratch or stain it. As the surface becomes polished through wear, the colors remain the same.

In an artistic sense, when marble work is just right, it is extremely satisfactory, but any one who has experimented with color attempts in marble mosaic knows how limited is the available palette. The best colored marbles are the expensive ones, and for ordinary conditions the cost is so great that they are not used at all. The choice is limited, in this market, at least, to a rather dirty green, two shades of yellow, a dull red, black and white, and the varying shades of Tennessee. On the other hand, with vitreous tile there is almost no limit to the range of the possible colors, and they are all of practically the same cost, so that the artist in using the latter material has a perfectly free hand and can work out his color scheme in the humblest building without the restrictions of prohibited colors.

(From *The Illustrated Buffalo Express.* Copyright, 1895, by Geo. E. Matthews & Co.)

BUFFALO GENERAL HOSPITAL, BUFFALO, N. Y.
George Cary, Architect.



GROUND PLAN, BUFFALO GENERAL HOSPITAL, BUFFALO, N. Y.
George Cary, Architect.

CURRENT ITEMS OF INTEREST.

THE new Mercantile Building, New York City, Robert Maynicke, architect, Thos. J. Reilly, builder, will have a front of semi-glazed brick, which are being furnished by the American Enameled Brick and Tile Company.

DECKER & ST. CLAIR, the general contractors for the new

GARDEN VASE.
Executed in terra-cotta by the Winkle Terra-Cotta Company.
Barnett, Haynes & Barnett, Architects.

church in Winsted, Conn., have let the contract for furnishing the structural ironwork in the building to the Berlin Iron Bridge Company, of East Berlin, Conn.

CHAMBERS BROTHERS COMPANY, of Philadelphia, report a decided improvement in their business during the past month. They are giving especial attention to the trade South, and are making new customers in that section.

THE BERLIN IRON BRIDGE COMPANY, East Berlin, Conn., are erecting for the Seamless Metal Company, Sing Sing, N. Y., across the railroad tracks connecting the different parts of their plant, a steel foot bridge.

THE DAGUS CLAY MANUFACTURING COMPANY are furnishing the face and molded brick for the First National Bank, at Fairmont, W. Va. These are an old gold mottled brick. They are also furnishing a light pink brick for the residence of Mr. L. B. Cushman, North East, Pa.

THE BERLIN IRON BRIDGE COMPANY, of East Berlin, Conn., are erecting for the United Gas Improvement Company, Waterbury, Conn., the steel work for a generator room and an engine room. These roofs are to have steel trusses, supporting the roof covering.

JOHN H. BLACK, Buffalo representative of the Kittanning Brick and Fire Clay Company, is furnishing the vitrified buff brick that is being used in the interior of the new addition to the Buffalo Cooperative Brewery, Esenwein & Johnson, architects; also the gray bricks being used in the Albermarle and Aberdeen apartment houses, John S. Rowe, architect.

THE CELADON TERRA-COTTA COMPANY are supplying their roofing tile for the following new buildings: Residence for J. W. Mitchell, Columbus, Ohio, Yost & Packard, architects; residence for L. Hicklem, Columbus, Ohio, E. W. Hart, architect; office for Dr. C. M. Taylor, Columbus, Ohio, W. T. Mills, architect; bathing establishment, Revere Beach, Mass., Stickney & Austin, architects.

THE ST. LOUIS TERRA-COTTA COMPANY wish announced the fact that the company has been recently reorganized, and under the present management is in a position to guarantee satisfactory work and prompt deliveries on all contracts which may be placed with them.

The entire plant has been overhauled and fully equipped with the best terra-cotta machinery, the kiln capacity increased, and an enameling department added for the manufacture of enameled and glazed terra-cotta and enameled brick. The modeling department is in charge of experienced men, thoroughly competent to execute difficult work.

The company would be glad to render estimates on any work in their line.

THE following new buildings are being or are about to be equipped with the Bolles Revolving Sash or the Queen Overhead Pulleys, or both: Bourne Office Building, ten stories, Liberty Street, New York City, Ernest Flagg, architect (Bolles Revolving Sash and Queen Overhead Pulleys); Vicent Office Building, sixteen stories,

RESIDENCE, BEACON STREET, BOSTON.
McKim, Mead & White, Architects.

Duane Street and Broadway, New York City, George B. Post, architect (Bolles Revolving Sash and Queen Overhead Pulleys); Mott Avenue Public School, New York City, C. B. J. Snyder, architect (Bolles Revolving Sash); Auduborn Avenue Public School, New York City, C. B. J. Snyder, architect (Bolles Revolving Sash); apartment house, Fifth Avenue and 45th Street, New York City, J. O'Rourke & Sons, architects (Bolles Revolving Sash and Queen Overhead Pulleys); German Liederkranz Club House, Brooklyn, N. Y. (Bolles Revolving Sash); Seelye Hall, Smith College, Northampton. Mass., York & Sawyer, architects (Bolles Revolving Sash and Queen Overhead Pulleys); New York Hospital, New York City, Cady, Berg & See, architects (Queen Overhead Pulleys); Caledonia Club, New York City, Alfred H. Taylor, architect (Bolles Revolving Sash).

ONE of the most annoying things in any house is a sliding door hanger that will not run smoothly; that will leave the track, stick, or otherwise behave in an unpleasant manner just when such things cause most inconvenience. Lately, what bears every evidence of being quite the ideal parlor door hanger has been placed on the market by The McCabe Hanger Manufacturing Company, manufacturers of hangers for parlor, barn, fire, elevator, and accordion doors. The hanger in question is a perfect device and a gem in the mechanical way. The track is steel, and the wheels of the carriage are turned wood fiber, thus assuring the least possible noise. The carriage has ball bearings and case-hardened cones, and is constructed along the line of a bicycle bearing. The hangers have been used in Biltmore, the Vanderbilt estate in North Carolina, the Carnegie estate in Florida, also the New York City house. They will also be used in the Vanderbilt house on Fifth Avenue, now undergoing extensive repairs and decorations. They were used throughout the new Sherry Building and the Columbia Library Building. In the elevator hangers this firm have been unusually successful, theirs having been specified on most of the large buildings that have been built all over the country in the last few years.

Renwick, Aspinwall & Owen, Architects,
New York City.

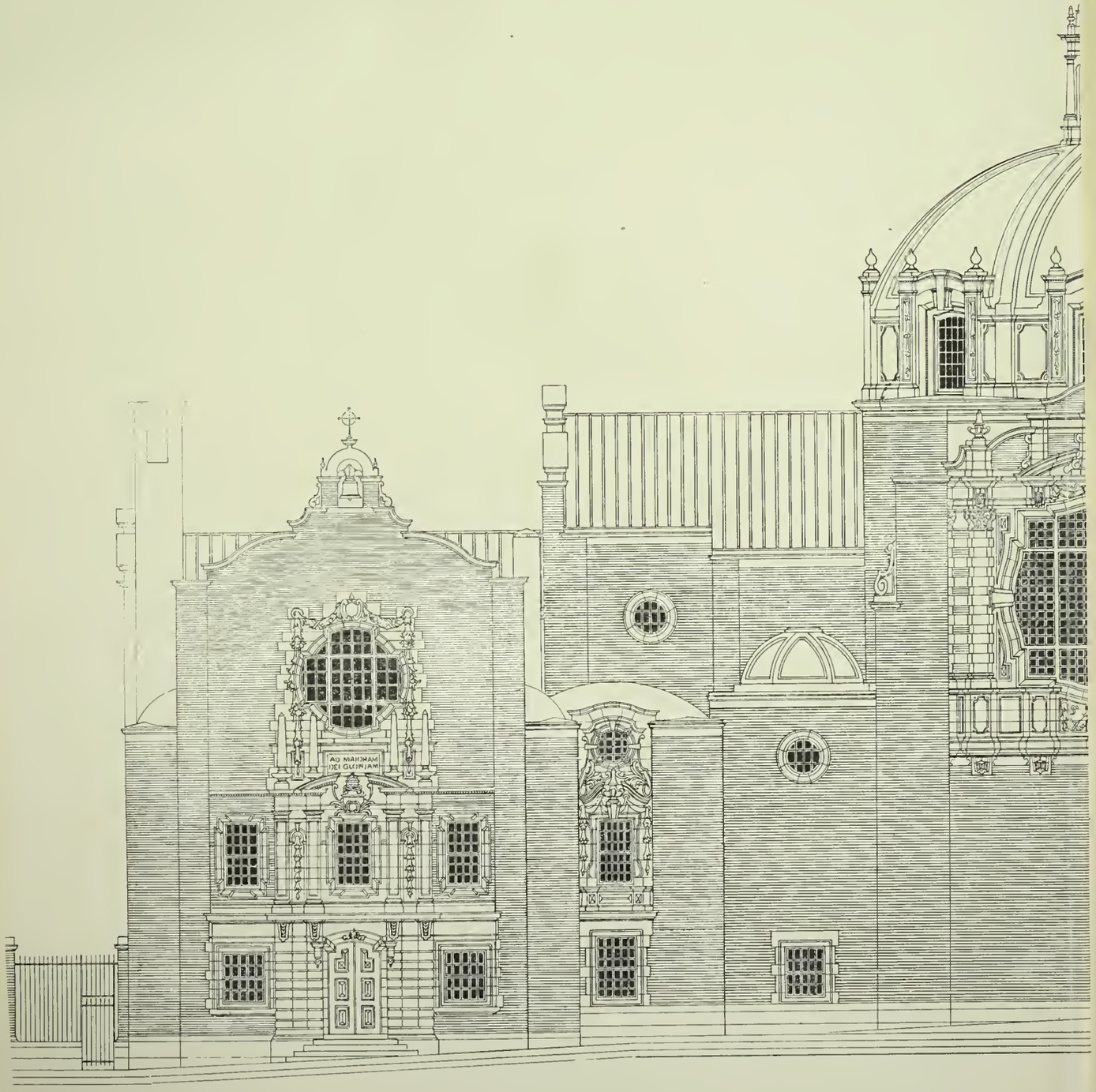
SEAM-FACE GRANITE

Furnished by

Gilbreth Seam-Face Granite Co.

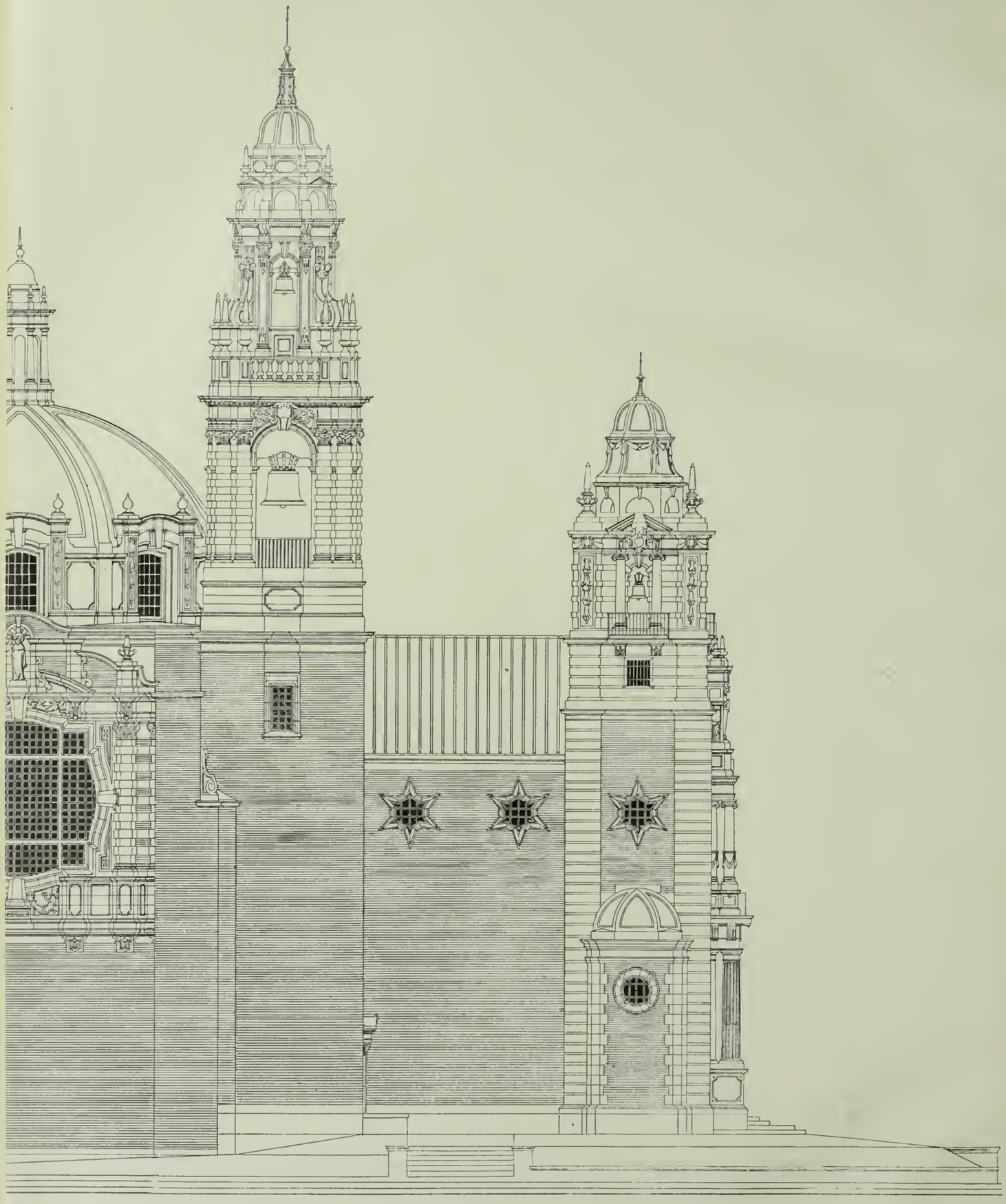
See May issue of this magazine.

HOUSE FOR HARVEY CHILDS, JR., ESQ., PITTSBURGH, PA.
PEABODY & STEARNS, ARCHITECTS.



CHURCH S. PETER AND PAUL (F
CRAM, GOODHUE & FERG

PLATES 89 and 90.



R. C.), FALL RIVER, MASS.

GUSON, ARCHITECTS.

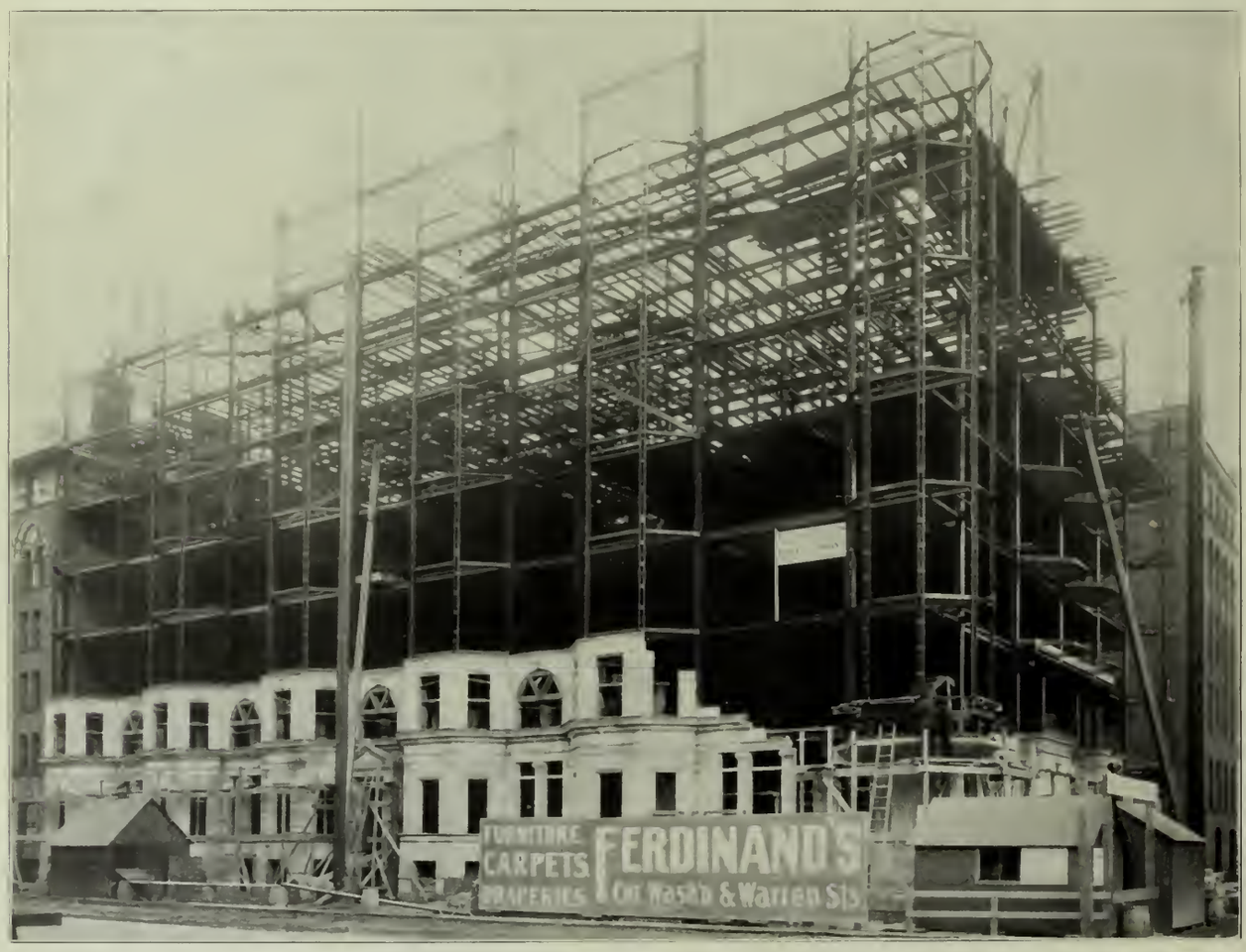
GARDEN VASE.
EXECUTED IN TERRA-COTTA BY THE WINKLE TERRA-COTTA CO.
BARNETT, HAYNES & BARNETT, ARCHITECTS.

The Fawcett Ventilated Fireproof Building Company, L't'd.

Patents in England, Belgium, France, United States.

Contractors for Structural Steel, Fireproof Floors, Partitions, etc.

ESTIMATES AND DESIGNS SUBMITTED ON APPLICATION.



WESTMINSTER CHAMBERS, COPLEY SQUARE, BOSTON.

HENRY E. CREGIER, ARCHITECT. WOODBURY & LEIGHTON, CONTRACTORS.

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TERRA-COTTA AND BRICK BY THE

NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY,

PHILADELPHIA. 38 PARK ROW, NEW YORK CITY. BOSTON.

The Brickbuilder
for 1899 ... Prospectus

PLATE FORM OF SCALE DRAWINGS.

IN this department there will be reproduced each month, carefully selected scale drawings of the very best work being done in this country, wherein brick or terra cotta is employed. These illustrations will comprise elevations, plans, and details secured by personal solicitation from the best offices.

DRAWINGS AND PHOTOGRAPHS OF ENGLISH WORK.

We are assured by our representative now at London that we shall be privileged to publish during the year, drawings of some of the best current work of English architects. Arrangements having been perfected whereby our illustrating plates will be made at London, thus avoiding the necessity of sending drawings to this country, we feel reasonably certain of adding this desirable feature to our Plate Form. In addition to these drawings we shall illustrate from photographs recently secured, a number of English brick cottages, manor houses, college buildings, etc.

MEASURED DRAWINGS OF OLD FOREIGN WORK.

There will be published during the year, measured drawings of old foreign work, made especially for us by men holding travelling scholarships. These drawings consist chiefly of details of entrances, windows, cornices, string courses, etc.

CONTRIBUTORS TO LETTER PRESS.

Among those who will contribute to our columns during the year on architectural subjects are:—

CLARENCE H. BLACKALL,
JAMES BRITE,
ARTHUR G. EVERETT,
ERNEST COXHEAD,
RALPH ADAMS CRAM,
THOMAS CUSACK,
FRANK MILES DAY,
JOHN LYMAN FAXON,
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T. HENRY RANDALL,
JULIUS A. SCHWEINFURTH,
RUSSELL STURGIS,
R. CLIPSTON STURGIS,
EDMUND M. WHEELWRIGHT,
PETER B. WIGHT.

Engineering subjects relating to architecture will be discussed by

CHARLES J. EVERETT, JR.,
FRANK S. HARRISON,
HENRY W. HODGE,
CORYDON T. PURDY,
AND OTHERS.

Leading Articles for the Year.

COUNTRY CHURCH TO COST $50,000.

Following the plan inaugurated last year, of inviting a number of well known architects to contribute—each an article which shall be a treatment of some one building of the popular class, according to a program giving certain requirements, we have chosen for this year, two types; first,

A COUNTRY CHURCH TO BE BUILT OF BRICK AND TERRA COTTA.
Cost, $50,000.

The contributors will be

ERNEST COXHEAD	(Coxhead & Coxhead)	San Francisco.
RALPH ADAMS CRAM	(Cram, Goodhue and Ferguson)	Boston.
ALLEN B. POND	(Pond & Pond)	Chicago.
T. HENRY RANDALL		New York.
R. CLIPSTON STURGIS		Boston.

PUBLIC LIBRARY TO COST $100,000.

Second,

A PUBLIC LIBRARY TO BE BUILT OF BRICK AND TERRA COTTA.
Cost, $100,000.

The contributors will be

JAMES BRITE	(Brite & Bacon)	New York.
ARTHUR G. EVERETT	(Cabot, Everett & Mead)	Boston.
JULIUS F. HARDER	(Israels & Harder)	New York.
THOMAS M. KELLOGG	(Rankin & Kellogg)	Philadelphia.
JULIUS A. SCHWEINFURTH		Boston.

These articles will be illustrated from drawings and sketches of elevations, plans and details.

THE USE OF BURNT CLAY PRODUCTS FOR INTERIORS.

By Russell Sturgis. In two illustrated articles, Mr. Sturgis will show the possibilities of burnt clay as a medium for artistic interior work.

MONTEVENTOSO.

By Bertram Grosvenor Goodhue. Mr. Goodhue has been fortunate enough to unearth an hitherto unknown town on the northern slope of the Appenines, where he found some of the most notable brick and terra cotta architecture of North Italy. A description of this town, with sketches of its architecture, will be given in two numbers of next year.

Other Leading Articles for the Year.

PICTURESQUE BUILDING SITES.

By Henry P. Kirby. There will be two articles upon the subject, which will be illustrated from charming pen and ink sketches which Mr. Kirby has specially prepared for this series.

THE MINOR BRICK BUILDINGS OF FRANCE.

By William T. Partridge. There will be three articles in this series, which will be illustrated from Mr. Partridge's own collection of photographs and sketches of interesting small brick buildings, which are located in the smaller cities and towns of France.

THE ARTISTIC TREATMENT AND USE OF ROOFING TILE.

By W. A. Otis. In two articles upon this subject, Mr. Otis will illustrate some of the many artistic effects that may be obtained with roofing tile, and describe the best methods to be employed in laying them.

AMERICAN TILE WORK.

By Clarence H. Blackall. A summary of what has been accomplished in this line, and a description of the most notable work produced by our American manufacturers. This will be considered carefully from the artistic point of view as showing the possibilities of this art industry.

THE FORMAL GARDEN.

By Elmer E. Garnsey. In connection with this series, consisting of two articles, Mr. Garnsey will describe and illustrate some of the more interesting examples of foreign gardens, suggesting the possibilities in architectual effects that may be obtained at a reasonable cost by the use of terra cotta.

ARCHITECTURAL TERRA COTTA.

By Thomas Cusack. The valuable series of papers which have been contributed by Mr. Cusack under this general heading will be continued during the coming year. He will advocate a more general use of terra cotta and brick in the church architecture of the future and discuss the somewhat neglected subject of color combinations in plain and enamelled surface treatment; not only on exteriors, but in the vestibules, corridors, etc., of public buildings. Historical data will be cited, and in each case selected examples will be fully illustrated by drawings and photographs taken from successful work of recent execution.

ENGINEERING PROBLEMS RELATING TO ARCHITECTURE.

A series of papers which will deal with the every day problems of construction. Names of contributors announced elsewhere in this prospectus.

FIRE-PROOFING.

In this department, which is set apart especially for the discussion of up-to-date matters pertaining to fire-proof construction with burnt clay, there will be published a most valuable series of papers, descriptive of improvements that have been recently made in the construction of arches, partitions, etc. In addition to these, other papers will be contributed by leading authorities on fire-proof construction.

MORTARS AND CONCRETES.

This department is maintained for the purpose of furnishing that class of material which shall be an aid to architects and builders who recognize the necessity of care in successfully employing cements, and to that end a series of carefully prepared papers will be published during the year.

MASON CONTRACTOR.

In this department there will be published a series of papers which shall be alike of interest to architects and contractors.

Suggestions from our subscribers as to important questions needing practical discussion are solicited, and all such will be given due consideration.

BRICK AND TERRA-COTTA WORK IN AMERICAN AND FOREIGN CITIES.

The scope of this department will be somewhat enlarged upon during the coming year, and in addition to regular letters from the larger American cities with accompanying illustrations of current work, we shall publish two letters specially prepared for our columns by F. W. Fitzpatrick, on the Interesting Brickwork of Washington, D. C. These letters will be fully illustrated from photographs and sketches. An additional feature will be a contribution by William T. Partridge, on the Modern Brick Architecture of Paris. This, too, will be illustrated from photographs and sketches, which are to be prepared by Mr. Partridge during his forthcoming trip to France. Other interesting foreign brickwork, both old and new, will be shown in this department.

EDITORIAL AND CURRENT TOPICS.

Our editorials are contributed by a staff of able writers, and by them current topics of interest will be discussed.

CONTINUED FROM 1898.

Of the articles promised for, and serials begun during 1898, there remain to be published at least three more papers of Mr. Wheelwright's series on The American Schoolhouse, and Mr. Day's paper on Italian Brickwork. These will certainly appear in the early numbers of the year.

The reprint of Street's Brick and Marble in the Middle Ages will be continued as opportunity permits.

The Brickbuilder is published monthly at Boston, Mass.

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THE BRICKBVILDER

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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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COLORED BRICK.

THERE was a time, not very long since, when to designate anything as being brick color was equivalent to saying it was a deep, dull red, and no other tone but red was thought of in connection with burnt clay for building material. But when the newer shades of brick began to be considered, all this was changed, and our constructors very speedily found themselves in possession of a great variety of tones, ranging from almost jet black through chocolate colors, browns, reds, buffs, and grays, to the pale yellows and whites. The whole subject of colored bricks was an innovation, for a while at least, and in the natural efforts to provide the designer with all the required shades, to place any suitable color at his disposal, the multiplying of colored bricks increased perhaps beyond measure. Certainly for a while we had a surfeit of some of the lighter shades of brick, to an extent which was bound to bring about a reaction, especially as in a great many cases very little care had been exercised in selecting the particular color. We have known repeated instances where a strong-colored mottled brick looked about perfect in one locality or in one design, when the identical shade used on a different side of the street, with different surroundings, seemed harsh and totally out of place. Consequently the manufacturers of our colored bricks have sometimes had to beware of their friends, and have suffered because of injudicious selection to an extent which has been prejudicial to the use of some of the best shades. Again, the colored brick have not always been made with the most care. Some of the companies have put out products which have hurt the trade a great deal, and the cheap manufacturers of poor brick have imitated all the shades produced by better companies, so that it is not unnatural to expect a reaction in favor of red brick. We notice in one of our contemporaries statements to the effect that red brick is returning to favor and that the use of the lighter tones of brick are a passing fashion, which is likely to be superseded by the use very largely of the old-fashioned red brick, and it quotes a number of buildings in New York, which have been constructed entirely of the darker shades, arguing from this that the colored bricks are doomed. We do not at all share this belief. We have always admired red brick, and in its place it is an excellent tone, blending admirably with its surroundings and adapting itself to many different styles of design, but he would be a poor designer indeed who felt constrained to limit himself to any one tone or quality, either light or dark. The dreary monotony of continuous rows of sad, overdone bricks is to be deplored, no matter what the particular tone may be. There are a good many incipient shades now in the market which could well be spared, but there are certain shades of buff, pale red, and mottled browns which we believe will always remain in favor, and will always be used by thinking designers in producing certain effects. Again, some of the shades of gray have come to stay, and have been a factor in some of our best buildings, without suggesting in the slightest degree a forced use of either color or material; while as for white brick in its various modifications, there is every indication to believe that its use is only just beginning to be appreciated, and that in the near future it will command a much larger measure of appreciation than has heretofore been awarded it. To build a structure in strict conformity to any one type is not a course most calculated to develop good architecture. The individuality of ideas which is so prominent in our modern work has received no inconsiderable measure of its strength from the opportunities for real color which have been afforded by our brick manufacturers, and we have every reason to believe that the reaction against the excessive use of the lighter bricks is a perfectly healthy one, that the pendulum is not to swing entirely the other way, that we will be spared the affliction of a town made brick red, and that the wide palette, from which with care and forethought so much can be accomplished, will be superior to any mere whims of fashion.

A PROPOSITION has recently been suggested in this city which certainly deserves earnest thought. The Museum of Fine Arts is situated on a tract of land facing Copley Square, and open on each side. At the time it was built, some twenty years ago, the district had not received its present character, and in fact Copley Square in those days was almost in the suburbs. At present the Museum is faced on one side by buildings of an altogether non-fire-proof character; on the other it has for a near neighbor a recently constructed family hotel, of fire-proof construction, and the buildings of the Institute of Technology, constructed with the so-called slow-burning construction, which, however, did not hinder a fire in them this last summer. Immediately adjoining it towards the southwest is a large district of middle-class dwellings, which would offer slight resistance to a large fire. In the changes incidental to the railroad systems entering the city, it has been necessary to relocate the nearest fire-engine house, and the Museum now finds itself at least partially surrounded by buildings of a questionable fire-proof character and with less readily available help in case of conflagration. It

has been seriously considered whether the Museum should not be removed from its present quarters and rebuilt somewhere in the Park System, where it could be entirely isolated from adjoining structures. The New York fire emphasizes the danger from one's neighbors. A fire in the Museum would result in damages that no insurance policy could begin to make good. The neighbors of the Museum are apt to become more numerous rather than less, and though the building itself is fire-proof in construction, its large skylights and necessarily large openings would make it an easy prey to a conflagration. In view of all these conditions, we feel that the trustees of the Museum are not only justified in considering the removal to a more open location, but that such removal is a duty which they owe to the community and to the invaluable treasures placed under their care. Copley Square is now enriched by the presence of Trinity and the Public Library, the New Old South and the Museum, but it would be far better for the square to lose a portion of its distinctive character than to take any chances of damage, however slight, to the treasures which the Museum contains.

THE LEAGUE COMPETITIONS.

THE activity and continued progress manifested by our architectural societies is one of the encouraging signs of the times. The Architectural League, of New York, worthily keeps up its traditions by the manner in which it is constantly creating opportunities for study and for improvement, and placing such opportunities within the reach of the younger members of the profession. The announcement has been received of the competitions which the League is to hold this year for the awards of the gold and silver medals, the Avery prize of fifty dollars, and the President's prize of the bronze medal and twenty-five dollars. The award of the gold and silver medals and the Avery prize are open to all residents of the United States. The President's prize is open to the members of the Architectural League only. For the gold and silver medals the program contemplates a design for reviewing stands and public grand stands, arches, etc., in the nature of temporary structures required for the purpose of reviewing an army returning from foreign service. The site is assumed to be Riverside Park in the vicinity of Grant's Tomb, which in its present condition is certainly sadly in need of accessories. A reviewing stand of the description provided for in this program would be a most inspiring addition to Riverside Park, and the mere fun of studying out such a problem ought to be enough to call out a great many designs from our younger architects. For the Avery prize a design is required for a war medal for decoration of soldiers in commemoration of Santiago, while the President's prize is to be awarded for the best design for a poster for the League Exhibition of 1899. Full particulars of these competitions can be obtained by addressing Mr. Robert W. Gibson, Chairman of the Committee on Competitions, 215 West 57th Street, New York City.

OWING to Mr. Wheelwright's absence in Europe, paper No. XIV. of the American Schoolhouse Series will not be published until the January issue. There will be at least two more papers in this series, which will be published in consecutive issues following January.

WINDOW JAMB AND CONSOL.
Executed in Terra-Cotta by the New York Architectural Terra-Cotta Company.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

MESSRS. INGLE AND ALMIRALL, architects, announce the removal of their offices, after December 11, from 874 Broadway to 10 and 12 E. 23d Street, New York.

THE MEXICAN CONSTRUCTION AND ENGINEERING COMPANY, City of Mexico, would be glad to receive catalogues and samples of American building materials.

HERBERT E. GATES, architect, 58 Bedford Row, Halifax, Nova Scotia, would be glad to receive catalogues and samples of American building materials.

THE BUILDERS AND TRADERS EXCHANGE, of Columbus, Ohio, request manufacturers' and dealers' catalogues.

ON Monday evening, November 21, Normand S. Patton addressed the members of the Chicago Architectural Club on the subject of "A Typical Public School," especial reference being given to the needs of Chicago schools.

THE annual meeting and dinner of the Beaux Arts Society was held at the Café Flouret, on November 18.

The retiring president, Mr. Walter Cook, addressed the society, speaking of the work of the past year, and in particular of the success of members of the society in the New York Library and California University competitions.

The reports of the secretary, treasurer, and committee on education were accepted, that of the treasurer especially being received with great enthusiasm.

The following officers were elected for the coming year: President, John Galen Howard; Vice-President, Edward L. Tilton; Treasurer, Joseph H. McGuire; Secretary, Charles Butler; Corresponding Secretary, Theo. Evernghim Blake; Members of the Committee on Education, Ernest Flagg, John M. Carrere, and Charles Morris. Cary S. Rodman, Atelier Blondel, Scellier de Gisors, was elected a member of the society.

An invitation was received from the Architectural League to take part in their dinner and meeting of January 3, and it was decided to inform all the members of the society in order that as many as possible might be present.

The meeting concluded with the enthusiastic reception of the six *derniers nouveaux*.

ILLUSTRATED ADVERTISEMENTS.

THE following new illustrations may be found in the advertising pages of this number: detail of window, Plymouth Building, Minneapolis, Frederick Kees, architect; advertisement of Fiske, Homes & Co., page x; residence at Buffalo, N. Y., C. D. Swan, architect; advertisement of The Harbison & Walker Company, page xv; the Crozer Building, Philadelphia, Frank Miles Day & Bro., architects; advertisement of Conkling, Armstrong Terra-Cotta Company, page v; Somerset Apartment Hotel, Boston, Arthur H. Bowditch, architect; advertisement of The Celadon Terra-Cotta Company, Limited, page xxvii.

Suburban Residence Built of Brick.

COST, TEN THOUSAND DOLLARS.

BY WALTER COPE.

HOUSES are built to live in and not to look on; therefore, let use be preferred to uniformity, except where both may be had," is a dictum oftener quoted than followed. Whose fault is this? Are we architects responsible? Is it our fault or our misfortune that much of the domestic architecture of the present day fails to express anything very clearly and continually wanders from one caprice of style to another, until we become well-nigh desperate at this eternal torment of style and detail, this babel of tongues?

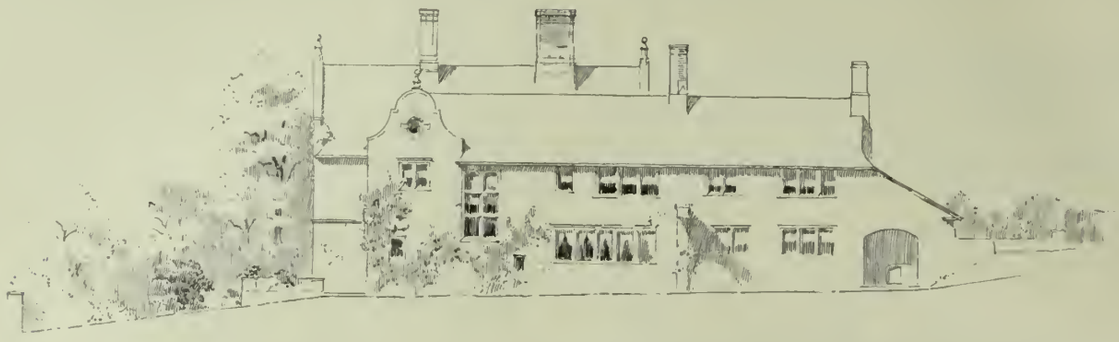
The owner usually selects a site for his house before he consults with us, and so begins to crystallize his ideas too soon, seizing often upon what he considers his own particular province, the "practical" part of the problem, and limiting us to what he believes to be the architect's only sphere, the mere embellishing of his scheme. True, he magnanimously credits us with the magical power to make impossible proportions beautiful, and in a general way to bring order out of chaos. So, where he sticks fast, he says: "You as an architect can, of course, work that out. I don't so much care how that part goes, but I must have," etc. Our faces glow with well-feigned admiration, while our hearts sink. He leaves us, having secured the promise of a sketch in the course of a few days. We put on our hats, go out to lunch, come back and throw ourselves defiantly at the problem as we have accepted it, with a conviction that the scheme is hopelessly defective, but must somehow or other be beautified into shape. Is it any wonder, under such conditions, that we allow our whole energy and enthusiasm to be taken up with that part in which "the stranger intermeddleth not"?

But if the result of our efforts is a senseless and wasteful plan whose defects are but partly masked behind a studied arrangement of architectural detail, whose is the fault? It is ours, because we do not try to capture the citadel of the Philistine but content ourselves instead with sallying now and again from our own stronghold, first in one direction and then in another, slashing madly to right and left, to prove to the world that we are the rightful masters. Yes! We are to blame. We are cowards. The Philistines are not so strong as we imagine and can be won by strategy if not by direct attack, and when they are captured and put under tribute they will make very good subjects, and the architectural millennium will then begin.

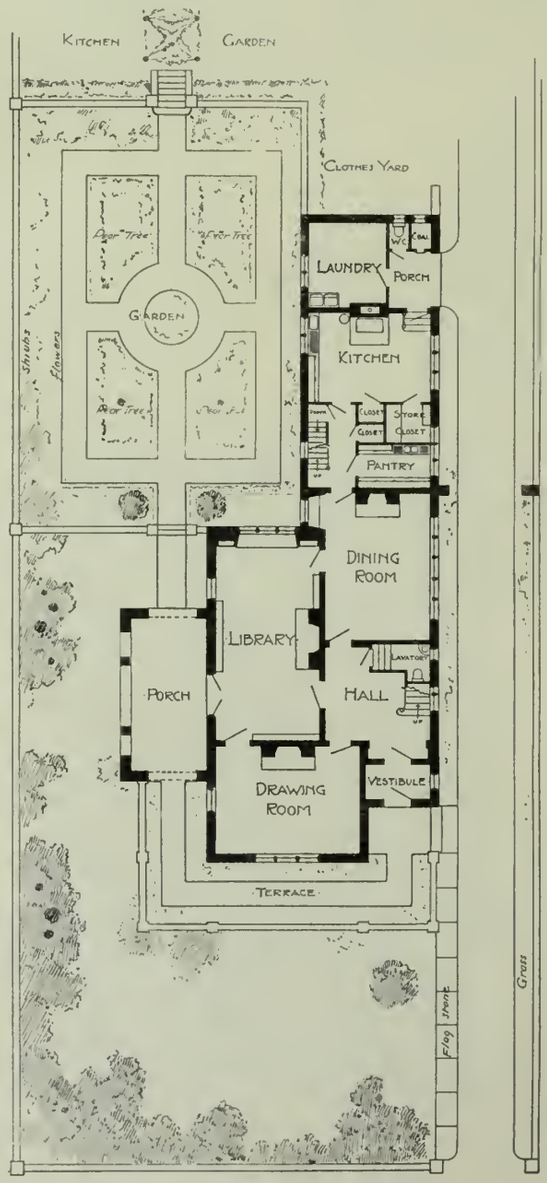
In the case before us, THE BRICKBUILDER furnishes the lot and the owner keeps entirely in the background. The lot is uncomfortably narrow and slopes quite too violently to make the planning of a house for it a restful or soothing exercise. Besides, it slopes south and west instead of south and east, and this forces me to put my porch on the west side, in the glare of the afternoon sun, since it must not be on the front, and we shall have to wait until the oak trees grow big before it will be right. Sadder still, our garden will not get the early morning sun. Failing to exchange the lot for one I liked better, I would have set the house close to the western side instead of the eastern, with its drawing room, library and dining room all looking out on the porch and garden to the east, but I could not bring my mind to thus give up the distant view over the valley and out into the western sky. Walled gardens are lovely — outdoor rooms, with the sky for a ceiling, and the rest of the world hidden. But I must have this and the distant view, too — both of them — for my library windows.

So the house is made as narrow as possible and placed close to the eastern line with a narrow driveway between it and our neighbor up the hill, whom we cut off with a brick wall of goodly height. Ivy will grow well on this wall, for it is mostly against the bank and therefore damp and cool in hot weather. I don't own a horse or carriage, but hope to some day, and in the meanwhile the driveway shall be for the tradesmen and for ourselves when we hire a cab to take us out or to bring us from the station in the rain. When I can afford it I may build a little stable, up at the back of the lot. In plan the house is, in a sense, tumbled together, with "use preferred to uniformity." The entrance is at the southeast corner with the doorway facing the front, though the hall lies on the eastern side of the house. The dining room, of course, is on the east side, too, for every one should start the day with some sunshine at breakfast. And we will have a little peep, too, at the sunset and a breath of sweet air from the garden through the little window in the west corner. The lot is too narrow to waste in a passage from the kitchen to the front door. This never seemed to me a matter of importance because the waitress answers the door bell. A drawing room, I suppose, has to be; first because THE BRICKBUILDER says so, and secondly because in the course of the year many people call to see us who must be received decently, though we have no idea of sharing our library with them. Besides, we may need a drawing room for our daughter's wedding twenty years hence; so we are to have one, and we shall try not to make it altogether a Potter's Field. But I feel it in my bones that we are going to live in the library and that the door between the two will

be surely kept locked, except when we have a party. As for the library, I like a long room if the ceiling is not too high. A number of people can be sociable in such a room in a reasonable and a happy way, because they will not sit in a circle like an Indian council. As to a porch, I cannot abide it on the front, for we want it to ourselves, whether our visitors be peddlers or our dearest friends. Our friends are sure of a welcome, and if they hear our voices on the porch can find us by walking around the terrace without stopping to ring the front-door bell.



The house will have its kitchen wing, for in this climate any arrangement which does not insure air on both sides of the kitchen and pantries, however small they may be, is a mistake. The pantry will not open direct into the dining room, for it is trying for the hostess to keep up the conversation with her guests while she hears her glass and china being smashed at the sink. There is a closet for the brooms and coal-scuttles, and a way for me to get to the cellar without intruding on the cook and her friends; and though the back stairs are bound to carry the smells of the cooking to the second story, we hope to successfully head them off there from the front of the house. The kitchen will have a large ventilator in the ceiling — not in the wall near the ceiling — opening into the flue which encloses the iron smoke pipe of the range, and the tops of the kitchen windows on both sides will be on a level with the ceiling, so that we hope to ventilate the kitchen well and to keep the room over it reasonably cool in summer. There is a closet for the cook, a weak concession to the modern false sense of order; cooks should not be allowed to have closets where they can associate old bonnets and ill-washed pots. The little storeroom is just big enough for a refrigerator and a few shelves but it has its own window to keep it cool. This room we want to line completely with glazed tiles. The cook will not have to drag her coal up from the cellar, for there is a bin on the kitchen porch which will hold a supply of coal for three or four months.



The laundry is entered only from the outside and is ventilated like the kitchen into the large flue. The clothes yard will be back beside the kitchen garden.

Upstairs we have tried for quiet rooms, cut off as much as possible from the sounds in the hall below: and the second floor will be built with two sets of joists, quite independent of each other: one to carry the first story ceiling and the other for the second floor, with loose deadening felt between them. This method of deadening floors I have found very effective. Several of the closets between the rooms have doors on each side, so that they may be used for either room, as may prove most convenient, or as communicating passages when desired.

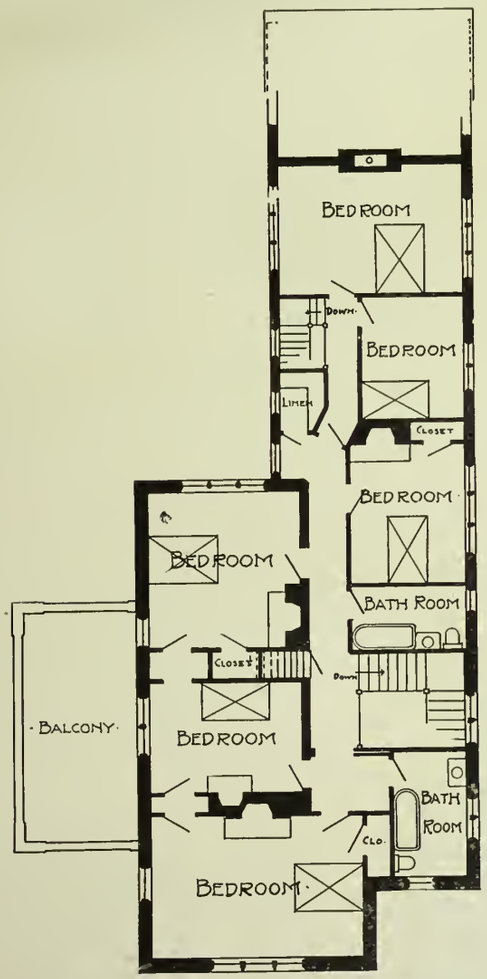
The loft will be reached by a little steep stair and will have nothing but a floor, and while it is not intended for anything but trunks and lumber, I know that it will make the most fascinating of play-rooms for the children on a rainy day, — a fairy world which the "grown-ups" never invade, — full of delightful mysteries, the scene of dark conspiracies, of feasts and tournaments and hair-breadth escapes, of solemn funerals and happy weddings.

But the house is only half of our scheme. It will be as simple and cheap as we can build it substantially. The bricks will be dark red hard brick, selected merely for color and laid Flemish bond with over-burnt headers, the joints about $\frac{5}{16}$ in. wide and raked out deep. What little there is of moulding or coping will be of hand-made bricks like the others, except at the entrance door where we shall waste a little money on a bit of detail in dark red stone. On the street front and on both sides of the lot, running back at least as far as the kitchen garden, we shall have a brick wall coped with bricks on edge.

And on this we shall plant vines — Irish ivy, where it will grow well — and in places jessamine, and climbing roses, and honeysuckle, and virgin's bower. Then there will be some beeches and dogwood, and a lot of

rhododendrons down near the street, and two or three oak trees, and close up near the terrace, a yew. Back near the garden will be more oak trees and a honey locust and a lot of sassafras, and at the garden entrance, two box trees. At the back of the garden, on each side of the steps, there will be lilacs, and along the west side, hawthorn and flowering plums and what-not. The garden will have four pear trees, one in each main bed, as in all good old-fashioned gardens. Our summer sun is too hot, and the feathery shade of the pear trees is welcome to the flowers. Besides, what is more beautiful than a pear tree in bloom?

This is not half of what we shall plant; but why mention each tree or shrub more than the books we intend to have in our library or the pictures on our walls? We have got an old Scotch gardener, and though he does not think much of my garden lay-out and shakes his head ominously at it, I know it is only because he intends



to surprise us next summer with the wonderful results that skill can accomplish under adverse conditions. He declares that the side next the house is hopeless, but I notice that he is devoting much attention to it, and that the florists' and nurserymen's bills are like to ruin me. He has not been in Spain and does not know that ivy-leaf geraniums should be set in pots on a parapet, to tumble over the wall in masses of bloom. But we shall see: he loves flowers, and I cannot help thinking that he takes a pitying interest in me as one who really cares for them too, though full of strange notions about twigs and masses of foliage, and hopelessly ignorant of botany. The kitchen garden shall be his, and if I will not allow coleus in a bed in the front grass, or the garden given over entirely to prize specimens for the flower show, he can do what he likes in his own undisputed domain.

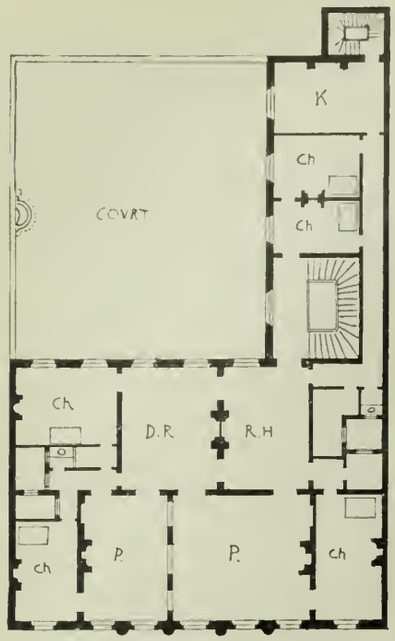
The Architecture of Apartment Buildings. III.

BY IRVING K. POND.

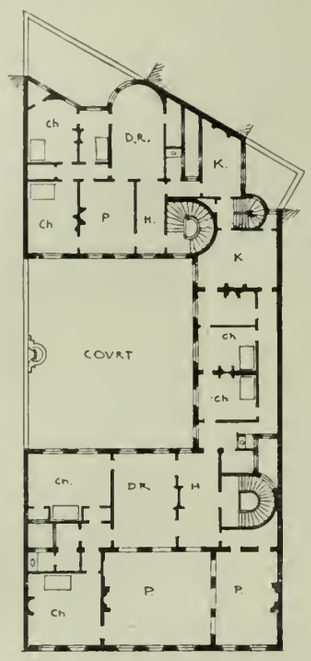
IN the matter of height, to the extreme of which modern buildings of all classes seem to aspire, much of interest is brought to the problem of the apartment building. To what number shall stories be added one upon another? Beyond what height do stairs begin to be a burden to owner and occupant? and what is the lowest limit at which the elevator appears as an income-producing factor? These and kindred questions arise when the matter of height presents itself. An absolutely satisfactory answer to these questions implies a knowledge of all the conditions surrounding the special problem; but a few general lines may be laid down. There are various classes of apartment buildings, and even the term "first class" is relative and varies with the country, the province, or indeed the city. But taking it to mean the highest type yet produced in Paris, for instance, a city of apartments, or in the two or three principal American cities, it is safe to say of the "apartment of the first class," that in these latter cities the elevator can be omitted from no building of above two stories in height, and this brings the investor up against the generally accepted statement, that in no building under five stories in height, and with two apartments served to each story, is the elevator a profitable institution. But profitable or not to the owner, in many localities the elevator is considered an absolute necessity by tenants, and must be operated. Of course, in apartments of the highest type it is desirable so to plan the building that but one apartment is served to each story, yet this makes the matter of the elevator of great moment to the investor, from the points both of original outlay and of the expense of continued operation, and three or four-storied apartment buildings must be extremely well planned and very desirably located to produce above what is expected of an investment, sufficient to cover the interest on the first cost of the plant and maintain the every-day operation of the elevator; so that, as the elevator is a necessary feature in the arrangement of any well-equipped apartment building, it remains to make it not an evil to be endured by the owner alone, but a blessing which will fall with equal beneficence on owner and occupant. Experience has demonstrated that this good effect may be brought about by increasing to the natural limit the number of stories of the building; the natural limit being that imposed by local conditions, the width of contiguous streets or alleys, the size of the building lot, the character of the locality, and so on. There is no limit to the height of even a first-class apartment building, except as determined by these and reasons of structural economy and necessity, for the upper stories are the more to be desired, as they are above the dust, noise, and discomfort of the city pavements, and, where prospects are to be had, command wider views.

The elevator has made possible the high building, which itself was the outgrowth of a demand for the concentration of masses of humanity in desirable or seemingly desirable localities, for business or the purposes of residence. The high building has brought in its train many important problems for solution, and among them is the problem of the court. The court which is capable of such liberal and artistic treatment is now apt to be studied only from the standpoints of the necessity for light (and not too much of that) and for air. The unsightliness and ofttimes unwholesomeness of the back alleys, which are a feature in the geography of American cities, have operated against the use of the rear of the lot to the best advantage, and the street front is about all there is architecturally to an American apartment, or, for that matter, business building. In Paris, as there are no back alleys, each lot and almost each building abuts directly upon its neighbor in the rear. This has led to a systematic development of the court, which is made spacious, and is enclosed by walls on the unbuilt sides, and on one or more sides by the building, with apartments in front, or fore and aft, or on all sides, and in each case the principal stairway is reached from the court, and not directly from the street, insuring privacy, as every visitor to the building or

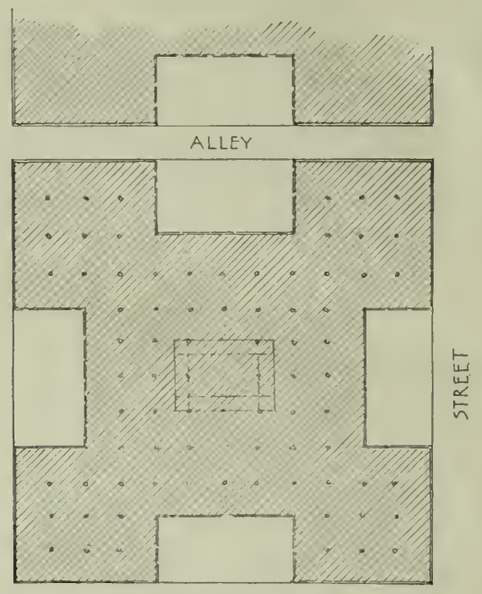
court must pass the *conciergerie*. In all cases the courts receive architectural treatment; in some cases they are embellished with landscape auxiliaries, and in many cases they are made useful beyond what is apparent on the mere surface; the area underneath the pavement being devoted to the use of cellars, storerooms, and not infrequently horse stalls, thus demonstrating how the French architect economizes the last scrap of space in his building, even as the French cook gives the shreds of last week's turkey or potato paring in to-day's croquette or soup. But the fact, interesting in this connection, is that the court is frequently architecturally the most pleasing portion of the building and forms the most inviting prospect from living rooms and principal chambers. Fig. 21 presents a Parisian type, with one apartment to the story, while Fig. 22 shows the French architect's manner of making desirable the rear apartment in a scheme of apartments fore and aft.



FIGVRE 21

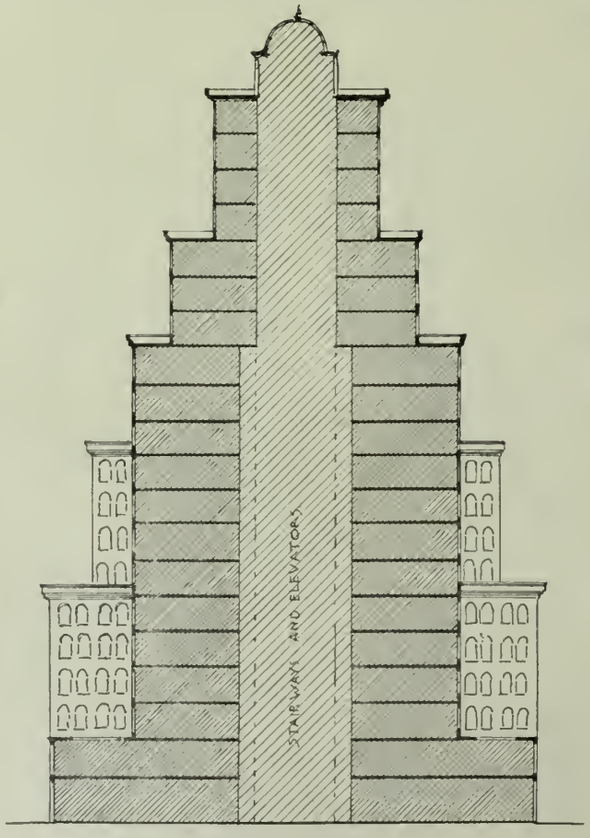


FIGVRE 22

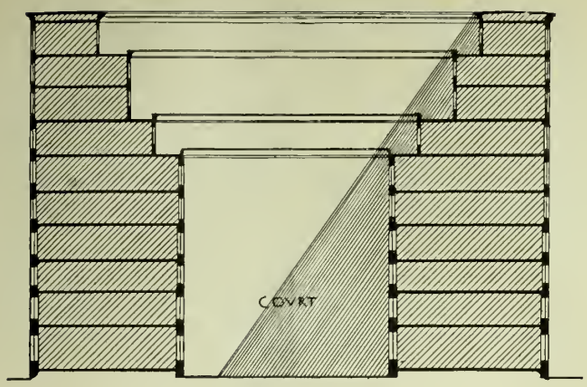


FIGVRE 23

In any proposed scheme for an apartment building in which a court is necessary to the plan (and few apartment buildings are so circumstanced that courts are needless or are merely incidental), in the matter of the arrangement of rooms in any one apartment, and of the relation of apartments to each other, the ground area of the court must be studied in conjunction with and made dependent on the number and height of the stories. For it goes without saying that a court or area which would be sufficiently light and airy for a building of one or two low stories, would be entirely inadequate to its purposes in a structure in which the stories are piled up to the number of six or ten or twenty, growing more and more inadequate as the number increases; so that which a superficial glance at a ground plan may seem to reveal as wasted space in the court, in the ultimate analysis of the case may transpire to be of highest economy, commercial and otherwise; and conversely, many a building has failed as an investment, because while the plan seemed to present an economical arrangement in the finished building, the court was totally inadequate to its purposes. There can be no hard and fast rules regulating the ratio which shall exist between the height of surrounding walls and the ground area of a court, for the special situation and the nature of the chambers depending on the court all count as determining factors. To get air and sunlight into the lower stories of a group of high buildings situated on not over-wide streets is a serious problem, and the high building surrounding a court presents the same difficulties. Attempt has been made by designers of high skill, along the lines suggested in Fig. 23, plan, and Fig. 24, section, and applied in more or less modified form to office building construction with practical results. In such a scheme the streets and alleys receive the benefit of direct sunlight, which is in itself an admirable and much to be desired attainment. The same scheme as applied to an enclosed court is noted in Fig. 25. In the arrangement of stairs and elevators the scheme of Fig. 24 permits of the centralization which is required in a building designed for



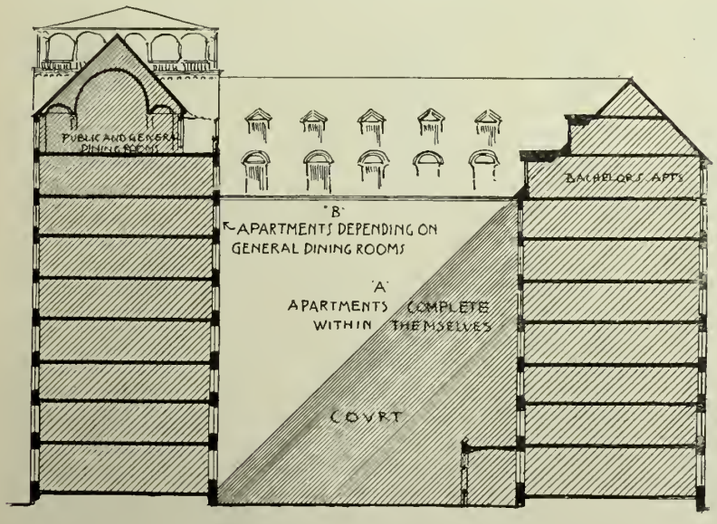
FIGVRE 24



FIGVRE 25

office uses, while a plan such as would result in the section indicated in Fig. 25 would admit of and require widely separated stairway and elevator arrangement, such as is demanded in large buildings with numerous apartments to the story.

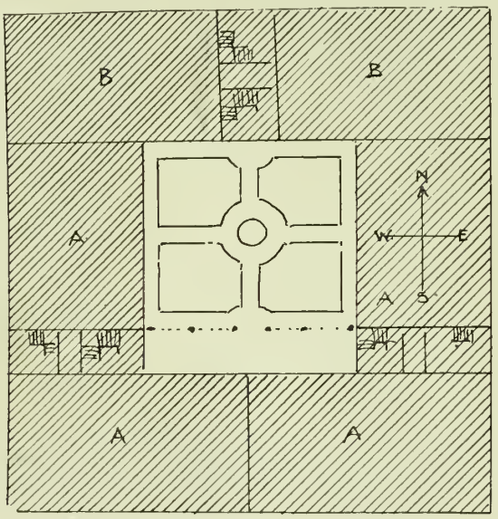
This scheme of offset walls is more practical in an office than in an apartment building, where for sake of economy in plan and internal arrangements one story must repeat in a measure the principal features of the one below. However, a modification is presented in Fig. 26 in plan, and in Fig. 27 in section, which is interesting and may be found to contain much of suggestion. The mansards of Paris and the storied roofs of Nuremberg, adding their suggestiveness to a knowledge of the varied conditions of social life of a Berliner apartment building and of the communal life of a family hotel in Europe or America, but more especially in America, are reflected in the scheme, and present an arrangement designed to meet the requirements of two special and distinct phases of apartment life not heretofore mentioned. For Figs. 26 and 27 are introduced not alone to indicate how the introduction of sunlight may be effected, but also to suggest the possibility of catering to that variety which is essential to the comfort and convenience of the higher social life of to-day. A study of apartment buildings would not be complete if it did not recognize the necessities of those who are painfully self-conscious in the public glare of the hotel and desire the privacy of family life, yet wish also to avoid the cares and responsibilities coincident with the direction of a large corps of servants, and therefore wish to reduce the culinary department to a minimum. Apartments for such as these, in all their appointments, follow types already described, except as to kitchen, which is small, but so efficiently equipped that the household shall not at all times



FIGVRE 27

and under all conditions be dependent on the public restaurant. In a building containing apartments of this type a public restaurant must be maintained, and a general laundry is desirable.

Nor would a study of apartment buildings have fulfilled its purpose if it were to take no notice of the requirements of a large and rapidly growing constituency known as "bachelors," and of another smaller though important section known in fiction as "bachelor maids." Entire buildings are devoted to the accommodation of these members of the bodies politic and social, and these buildings generally are equipped with a restaurant more or less public in its nature. It seems highly desirable to combine bachelor apartments in the scheme with apartments for those who desire to depend for the most part on the public dining service. Such combination does



FIGVRE 26

not tend to isolate the bachelor, but to bring him in closer contact with society and make him more of a factor in the life of civilization. The smallest suite for a bachelor should consist of a sitting room and bed alcove or a connected bedroom and a toilet room with basin, bath, and closet. A practicable fireplace in the sitting room is almost as much of a necessity as the room itself for the companionship and the air of comfortable homelikeness it affords.

Probably the best location for the dining room or café connected with an apartment building is in the topmost story, and so situated as to command the best views without, for while it is desirable to have the attention centered about the board, in a public dining room this is almost impossible, and attractive exterior vistas, together with pleasing interior decorations, serve to occupy thoughts and speech to the exclusion of neighbors. Smaller rooms for private service will be found desirable in connection with the apartment café. The roof café, decorated with potted plants along the lines of the palm garden, is gaining favor and will become a feature of public dining service. In all cases enclosed corridors and elevators must connect the general or public dining room with each and every apartment depending on it. The kitchen of the public café must be isolated and thoroughly ventilated, for kitchen odors are obnoxious in apartments and persist if once introduced.

A possibility of combining these various elements of public and private service and of lesser and more extended accommodation is sought to be suggested in the section presented in Fig. 27.

Another glance at this same figure with special reference to the shadow line will help to an appreciation of some of the problems of court embellishment. The ground of the court

may be treated in one of three manners or in a combination of these. First, the court may be paved with a desirable material, such as marble, brick, or concrete, or these used in combination, and made to be effective viewed from above by the pattern and form and color of the integral parts, or it may be treated as an artificial garden, or again as a natural garden. A court pave which is continually drenched in shadow must be treated as a pave alone. If at some time during the day sunlight touches it, the pave may be embellished in an entirely artificial manner with plants in pots and shrubs and trees in boxes. That this treatment may be charming to a high degree is evidenced in the courts of Old-World hotels, and in the palm gardens of American cities.

A court, however, to be treated as a natural garden, that is, a garden in which is greensward and flowering plants and shrubs in beds, must be bathed in sunshine during a greater portion of the day. Natural gardens, to be entirely harmonious and artistically effective, must be laid out and developed in a formal manner when they come in close conjunction with apartment buildings, for the apartment building is necessarily one which should present a graciously formal front to the world. Courts, to be of sufficient size to admit of this treatment, may not be possible in the older and more completely occupied portions of the great cities, but struggle should be made to procure them in the newer and as yet undeveloped quarters, where the architect and landscapist may have free sway. The ideal scheme to be sought even in the neighborhood of great parks is to have convenient and homelike apartments in buildings of reasonable height, surrounding a cultivated court or garden on which the apartments shall face, gaining thus quiet and privacy and insuring a beautiful prospect, which shall continue undisturbed by neighboring building operations.

If any one accessory of court embellishment is to be given special mention, it must be the fountain, which beyond all else is the most musical, poetical, and vivifying feature of landscape treatment. Whether the court be artificial or natural in its handling or whether it be barren of all other decorative objects, the fountain gives an atmosphere of life and animation. However, it is not the function of this article to enlarge on the possibilities of court treatment beyond that already suggested, which is, in fine, that the ample court has a commercial value and may have an artistic value as well, and should be developed to the full extent of its architectural and decorative capabilities.

As it has been the purpose of these articles to bring to notice such matters of general scheme and detail as appertain particularly to apartment buildings, such other matters as all buildings have in common, as systems of plumbing or of heating or of construction of walls, and floor systems, have been disregarded; nor is it needful to discuss them here, for they are part of the general knowledge of building, requiring, however, considerable care and foresight, not to say insight in the application. And, too, as to the architectural style which shall be adopted for the treatment of apartment buildings, little need be said. Greatly to be desired is a dignified yet domestic feeling, quietly handled in any style which is real style and which may prevail at the time and in the locality. When ideals of domesticity and home life change, style will change and no amount of argumentation will alter the course. The only suggestion that a lover of sincere style can offer is that at all times a simple scheme be made the base of the design both in plan and elevation, and to this as much of elaboration and beautiful decoration be applied as may be deemed desirable, but that no complexity of scheme be offered as a reason for its adoption. In apartments as in life complexity of purpose palls; simplicity gains with age and knowledge.

THE principle which artists now have mainly to contend for is that of *truth*; forgotten, trodden under foot, despised if not hated for ages, this must be their watchword. If they be architects, let them remember how vitally necessary truthfulness in construction, in design, and in decoration is to any permanent success in even the smallest of their works. — *Street.*

Important Problems in Construction.

FOUNDATIONS.

BY WILLIAM W. CREHORE, ASSOC. M. AM. SOC. C. E.

THE less plastic or spongy the soil is, the more weight it will carry per unit of surface. Sometimes the ground has to be excavated to a considerable depth before a sufficiently stable soil can be found. In designing for heavy loads it is always best to investigate beforehand by sinking test holes or by making careful borings, because without the knowledge thus obtained it is impossible to decide upon the most economical method of procedure or to design a foundation that shall be best adapted to the conditions of the case. In making borings it is not sufficient to have ascertained the depth of the hard-pan below the surface, but samples of the soil taken at frequent intervals — every two or three feet if the material is changeable — should be preserved for reference. Nor unless they all yield exactly the same result is it sufficient to make two or three such examinations do for the whole building; but a separate investigation should be made for each footing in order to determine with any degree of precision the best method of executing the work. Furthermore, it is important to continue the borings far enough to find out the thickness of the hard-pan upon which it is proposed to rest; for if it should prove to be only a crust 3 or 4 ft. thick overlying quicksand or other dangerous material, it would be unwise to impose upon it as great a load as if it were 10 or 12 ft. thick.

When upon investigation it is found necessary to go several feet below the proposed cellar floor level in order to obtain a suitable bearing stratum, it will be cheaper and better to design the footings as isolated piers, each of such section as would be determined by the distribution of its load on the bearing stratum (gravel, hard-pan, rock, or whatever it may be) with the proper allowance per unit of area. These piers can be placed well within the limits of the property and the imposed loads brought to them if necessary by means of a system of girders (see Fig. 1); or, being on the property line, may receive the wall load through a system of brick arches (see Fig. 2). If rock is found at a reasonable depth, a more satisfactory result will be obtained by sinking all piers to rock even though a good hard, bearing stratum be found a few feet above it. One reason for this is that a very much larger load per unit of area may be imposed on the rock than on the hard-pan or gravel, and thus the extra expense required to cover the greater area is avoided, and the pier may be built of uniform section from the bottom up. The piers may be built of brick, masonry, or good Portland cement concrete. In excavating for them it is necessary to drive sheet piling in the form of a square or rectangular box, or else to sink a steel cylinder or bottomless box, called a "caisson," the necessity for the latter method depending upon the depth of the hard-pan and the character of the material to be excavated. In this box, when driven or sunk, the pier is built. Good Portland cement concrete is the best and cheapest material to use for the pier, as it may be lowered in place with the least expenditure of time and labor. As caissons have to be driven vertically, each must necessarily have a cross section equal to the required bearing area of the pier. Therefore, if the bearing is to be on rock the size of the pier, the amount of the excavation and the labor required to sink the caisson are all much less than would be required if the bearing stratum were anything except rock.

As just stated, it depends on the depth and the character of the material to be excavated whether to drive sheet piling or to use steel caissons. It also depends on the amount of water in the ground. Alluvial soils or quicksand filled with water cannot be excavated below the water level without danger of drawing into the hole some of the material outside of it, and thus undermining the neighboring ground. Even with the best of tongued and grooved sheet piling quicksand will flow through the cracks and eventually cause a "cave-in" when the excavation has proceeded but a few feet. Through such material it is necessary to excavate by means of a steel caisson tightly riveted and jointed. The cutting edge must

be kept well down below the level of the excavation to prevent any back-flow of the material. It will require heavy weighting with pig iron or old rails to accomplish this, and the bulk of this weight should be piled on shelves inside the caisson as near the cutting edge as possible, without interfering with the men in their work. This will keep the center of gravity low, and thus assist in preventing the caisson from getting out of plumb as it goes down.

With a large amount of water in the ground the work of pumping increases very rapidly as the excavation goes deeper, for the water has to be kept out so that the men can work. When the caisson reaches bottom or the highest point of rock and cannot be driven down any further, the excavation is continued by driving narrow tongued and grooved yellow pine sheeting all around the inside edge (see Fig. 3). This sheeting, or "lagging," as it is called, accommodates itself to the unevenness of the rock, and when down tight all around, the rock can be thoroughly cleansed before the first concrete is thrown in. If the rock lies on a slope too great for a secure bearing and contains no unevenness in its surface into which concrete may settle and form prongs for anchoring the bottom of the pier, it may be necessary to drill a few holes and set iron anchors into the rock, allowing them to stand up an equal distance in the pier, or to dress off the rock in a series of level steps. If the pier is to rest on hard-pan or gravel instead of rock, no lagging is needed. The cutting edge of the caisson should be sunk well into the hard stratum and the bottom of the hole leveled off ready for the concrete. In holes where the water runs in rapidly it is necessary to work fast towards the end. Concrete should be mixed dry in large quantities, and as soon as the bottom of the hole is prepared, the pumps should be withdrawn and the concrete lowered in as quickly as possible, so as to keep ahead of the water, which will at once begin to accumulate.

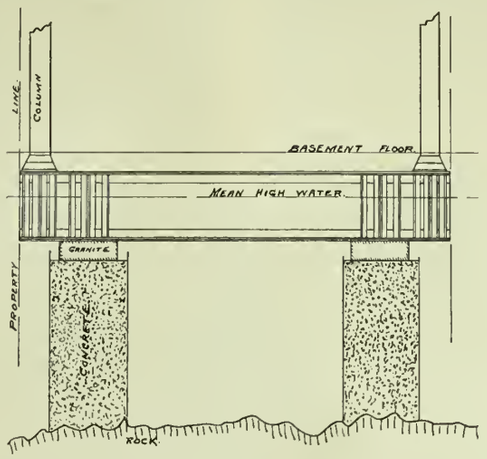


FIG. 1.

When the depth to rock or hard-pan warrants the expenditure, caissons should be sunk by the pneumatic or compressed air process. By this method most of the risks and inconveniences incident to the open caisson method are eliminated or reduced to a minimum. No pumping is required, because the air pressure in the caisson keeps the water back, and if water cannot run in, of course sand cannot either. Then, too, the rock may be thoroughly cleaned off without the use of lagging, no matter how rough or uneven it may be. But it costs money to use compressed air, and the work has to be continued both by night and by day to obtain the greatest economy out of the plant. It is, therefore, an open question how deep the excavation must be to make it profitable to use the pneumatic method. This again depends on the nature of the ground to be excavated and the amount of water in it, because the open caisson work can be carried successfully much deeper in dry soil than in wet. Probably it is safe to say that in alluvial or sandy soil containing much water the open caisson method should not be used further than twenty or twenty-five feet below the ground level.[1] In less dangerous soil it might be used to thirty feet. Beyond this depth, however, it is wiser to estimate on the compressed air method at the outset.

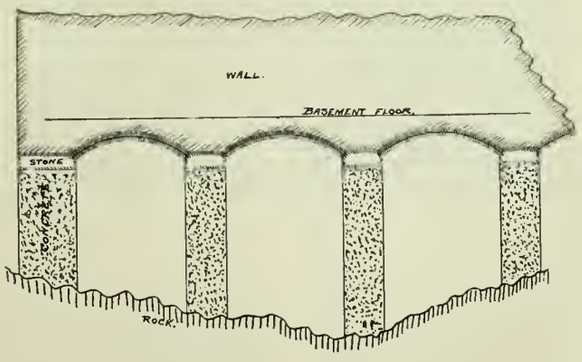


FIG. 2.

[1] By "ground level" is meant the level of the general excavation or the cellar bottom, which is usually twelve to fourteen feet below the street surface.

Reference has already been made in this paper to the fact that the capacity of any bearing stratum depends, among other things, upon its thickness. The angle of repose of any material is the greatest angle at which the material will remain heaped or piled up without sliding. This angle is measured between an element of the sloping surface and the horizontal. As generally calculated, the bearing power of any material is a function of its angle of repose, its density, and its depth or the thickness of the stratum. These last two properties affect the bearing capacity in a direct ratio; that is, if the stratum were twice as thick it would bear twice as much, or if the material in it were twice as dense it would bear twice as much. It is also true that of two kinds of material the one having a greater angle of repose will bear more weight than the other, but not proportionately more.

Another style of foundation very often used where isolated loads have to be taken care of is a pile foundation. Piles are driven in clumps as close together as practicable, but not so close that the last four or five in the clump cannot be driven as far as the first four or five. Of course, the profitableness of pile foundations depends largely upon the kind of material through which the piles have to be driven, and how long they must be to obtain a secure bearing. Then, too, piles cannot be used except in water-bearing soil, and it should be pretty certainly ascertained that the water level will continue to be permanent. This is a somewhat difficult point to determine unless the location is near some body of water which remains at a more or less permanent level. It is then a simple matter to cut off the piles below the lowest water level and start the masonry or concrete at this point. But without some assurance as to the permanency of the water level it is imprudent to use pile foundations. Surface water or surface drainage changes with the different seasons of the year very materially, and the water level in the ground is apt to rise and fall many feet in a short period of time. This action is very injurious to piles or timber of any kind; in a very short time timber under such action will disintegrate and decay, and, of course, piles so injured could not be depended upon to carry weight. This is the chief objection to using piles for foundation work under heavy loads.

Piles should be driven until their points enter the hard-pan three or four feet, especially if the intermediate material is alluvial or spongy soil. In such soil, and in quicksand or other material containing large quantities of water, there is always more or less motion way below the surface of the ground, owing to the variations in pressure from near-by or distant causes. Consequently, piles whose points were not firmly fixed in a hard, immovable stratum would be liable to dislocation from outside forces in the ground. It is thought by some very advantageous to use piles in material of this nature where the underlying stratum is rock, driving the piles down until the points are battered against the rock; but such a method is not to be depended upon. It may work all right and it may not. If the rock presents a sloping surface and the material above it is of the nature just described, liable to motion at times, there is danger that the feet of the piles may slide down the surface of the rock and thus lose their bearing, and even if the rock presented a fairly level surface and the

piles stood squarely on it, there would be some danger that the motion in the material through which the piles passed might displace them or throw their heads (and consequently the foundation itself) out of line. These remarks apply more particularly to short piles, or to localities where the rock is not very far below the surface. Of course, the deeper the rock is, the more material there is above it to hold the pile in position, and therefore the less liability there is that any dislocation will occur. Another objection to driving piles to rock bottom is, that the last few blows of the pile-driver are apt to break the pile some distance from the point, anywhere in fact where the pile is weak. It requires very careful driving to avoid this; the material through which the pile is driven being soft and spongy, when the point strikes the rock the sudden change is so great that it may not be discerned quickly enough by the operator.

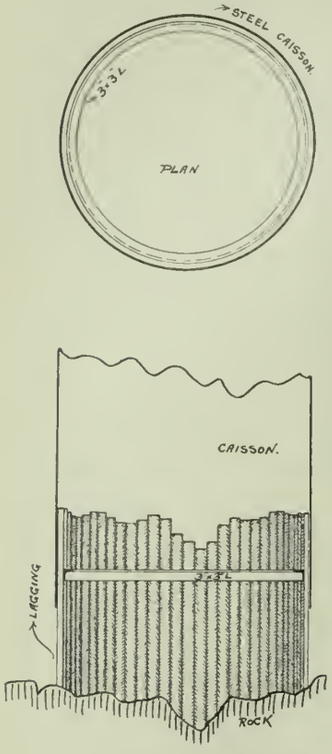


FIG. 3. SECTIONAL ELEVATION.

The usual way of starting the foundation on top of piles is to cut them off at a given level and fill in a solid concrete bed 2 or 3 ft. thick down to a point 18 ins. or 2 ft. below the heads of the piles. On this bed of concrete the masonry is started, or if it is to carry a column it may be covered by grillage beams properly spread over its surface to distribute the load of the column. The amount of load which may be safely imposed upon each pile is in some cities regulated by law, but such a regulation, of course, restricts all cases to the conditions of the worst. Localities differ so much that it is not probable that any two sets of pile foundations constructed in the same manner possess the same efficiency, but it is safe to form a definite conclusion as to the bearing capacity of a pile from its action under the hammer. The usual rule is:—

$$\text{safe load} = \frac{2wh}{S+1} = \frac{2 \times \text{weight of hammer} \times \text{hammer's fall in feet}}{\text{set under last blow in inches} + 1.}$$

There is this objection to the use of any such rule which has to be applied during the progress of the work: namely, that it is not possible to decide in advance just how many piles will be needed and therefore to design the footings with reference to this; but in most cases there is some circumstance from which one may form a fairly correct judgment in advance, and thus approximate the number of piles necessary under each footing. It may be done, for instance, by observing the results of other work in the neighborhood or by comparing samples of the soil with other soil in which piles have been driven. If deemed necessary, a few test piles might be driven to determine the allowance of weight for each. Specifications usually require piles to be driven with a hammer of given weight, falling a given height, until the set under the last blow does not exceed a given specified amount, which has been determined by an application of the foregoing formula for safe load. This works very well where there is a sufficient stratum of hard-pan to receive the points of the piles and embed them properly; but if, as is often the case, the hard-pan is only a thin crust overlying something softer, it then requires considerable skill to stop the pile just at the right point in its downward course, and more often, just as it is thought to be properly set, the last blow will send it crashing through the hard-pan in open defiance of the specification. This only emphasizes the necessity for making preliminary borings or soundings in the case of pile foundations as well as for other kinds.

A very much better although more expensive way of building a foundation in localities where the rock is not far below the surface is to use pipe piles filled solidly with concrete. These pipes, 8 to 12 ins. in diameter, are driven by steady pressure and with water jet, being made up in short lengths, say 4 to 6 ft. each, with the customary pipe fittings on each piece. They are screwed together as wanted, and forced down to a solid bearing on the rock. These pipes, obviously, bear very much more weight than it is safe to allow on wooden piles of the same diameter, and consequently they need not be spaced as closely. When down to solid rock, the bottom should be cleaned off and Portland cement concrete filled in to the top. The heads of these piles should be embedded in a solid bed of concrete similar to the one described, the depth of this bed depending upon the average distance of the piles from each other, so that the farther apart the piles are the thicker the bed should be.

This latter method of footings is an ideal way of underpinning or shoring buildings adjoining which there is to be deep excavation or heavy foundation work (see Fig. 4). Pipe piles may be sunk one at a time and driven down by the use of jacks under the building's own weight. Their distance apart is regulated by the load to be carried, and they should be so placed as to receive this load most advantageously. Such supports as these form the most secure underpinning for a building resting upon more or less spongy or water-bearing soil, which is liable to be drawn away by the operations of the work adjoining. More especially is this true if there is a large underlying stratum of quicksand. Very many buildings are resting upon quicksand, either immediately on or a few feet above it, and in fact such a stratum is perfectly secure and stable so long as it is allowed to remain undisturbed; but as soon as the pressure in the neighborhood is relieved at any point, the quicksand ceases to be confined and moves in the line of least resistance, thereby undermining the actual material upon which the building rests or perhaps the building itself. It is therefore exceedingly necessary to provide carefully for the security of weights or buildings resting upon soil of this nature before any of the pressure in the neighborhood is relieved. In comparison with other methods of shoring buildings which rest upon uncertain soil, the method of pipe-piling is far superior to any. In any system of spur-shoring or needling, the building's weight is merely transferred from one point to another on the same surface, and unless the feet of the shores are resting on stable material, there is just the same danger in undermining them as in undermining the building without them. In fact, to hold a building securely against damage, it must be underpinned to something solid and stable enough to carry its weight without yielding, and furthermore, the underpinning must go down at least as deep as any excavations in the immediate vicinity are to be carried. This can be done thoroughly well and with comparatively little expense by the method of pipe-piling, or "stilts," as it is occasionally called.

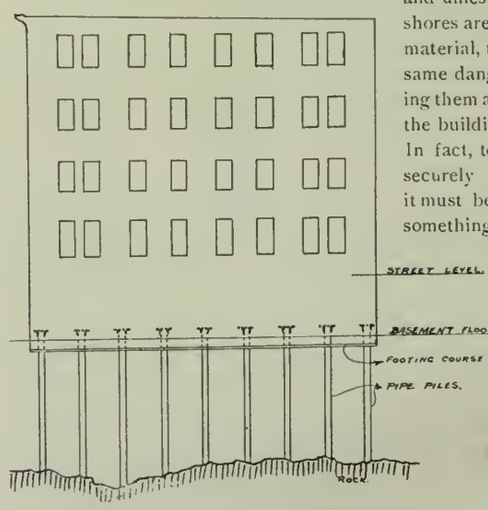


FIG. 4.

A SEVENTEEN-STORY BUILDING TESTED BY FIRE.

THE most crucial test to which a building of typical modern construction has yet been subjected occurred in New York City, a little before midnight, on the 4th inst. A fire originated in the basement of an old-style erection of five stories, stocked with inflammable merchandise. This building stood on the southwest corner of a block, and the fire reached its height during the progress of a wind storm blowing from the northeast. This fiery ordeal was therefore a conclusive one, in point of severity and duration. The facts obtained and observations made by the writer at the scene of this fire on the 5th and again on the 6th inst. suggest a number of important considerations, and will be found to bear out the following deductions:—

First. The fire did not originate in the modern building, but in a structure which had been erected long before the era of fire-proof building. The former had little to fear from fire on its own account, and should one have occurred on any of its floors, there is little doubt but it would have been extinguished by means of the appliances at hand. Certainly it would have been localized, and subdued without serious damage to other parts of the building. The origin, as well as the extent, of the disaster is therefore due, not to the height of the building, or to defects in its construction, but to the proximity of an undesirable and, as it proved, dangerous neighbor.

HOME LIFE INSURANCE BUILDING, NEW YORK CITY.
Burned Dec. 4, 1898.

Second. The omission of iron shutters from the north wall and around the light shaft of the Home Life Building was undoubtedly the secondary cause of the extensive damage which that building sustained. With flames towering up from the seething mass of five stories below, and driven by a fierce wind against twelve stories of plate glass and window sashes, it was, of course, but a question of minutes before they would gain admission to the interior. These windows giving way simultaneously, tongues of flame reached the furniture, fittings, loose papers, and other combustible contents on every one of these floors. The modern building had then to withstand twelve distinct fires of its own, all of which were fed from the sheet of solid flame in which it was enveloped on the outside. Had the window openings been furnished with close-fitting shutters of sheet iron, leaving an air space equal to the depth of the reveals, we doubt whether the flames would have penetrated into any portion of the interior. Doubtless there would have been broken glass, scorched woodwork, and other evidences of a fire that had been held at bay; but the immunity from flame on these twelve floors would have enabled a detail of firemen to remain on each of them, playing water on the inside of the iron window shutters, until the fire in the old building had been exhausted.

Third. Had the Broadway frontage been less pretentious, it would have been more enduring, even when attacked by fire. A free adaptation of French Renaissance detail, carved in the choicest marble, was indeed a thing of beauty — before the fire had calcined the carbonate of lime, and water had reduced it to a hydrate. Our photograph, taken on the day following the fire, gives an idea of the extent to which every projecting member had already suffered. At that time but little water had reached the upper stories, and the utter destruction of the marble will therefore not become apparent until after it has lost all cohesion ("slacked"), which it will do by the immediate action of successive rains, alternating with approaching frost. If allowed to stand untouched, very little of the marble in the upper stories would sustain its own weight during the four months next ensuing.

Fourth. A frontage of terra-cotta and brick walling that had already passed through a white heat in the kiln would have defied the action of the flames, besides affording a corresponding degree of increased protection to the structural steel. We have no hesitation in saying that had these materials been used instead of the more expensive marble, it would have required but a good cleaning down with soap and water to render the Home Life Building the abiding home of its owners. As it is, the apparently casual use of burned clay in the form of tile, hip-roll, and ridge cresting has alone enabled them to retain a roof over their heads. Not a particle of this red roofing tile has suffered, in which respect it stands out in uncompromising contrast with its surroundings.

Fifth. The steel frame remains erect, having stood this remarkable test in a way to dispel doubts as to its efficiency, instead of giving cause for alarm in relation to skeleton construction generally. This fire, so far from being "the death knell of the sky-scraper," has furnished a striking, if not a conclusive, vindication of its safety under the most trying conditions. The superintendent of the building department does not overstate the case in saying that "the firemen would have been blowing up buildings away down below the Astor House in an effort to stop the progress of a conflagration, had there not been such a bulwark interposed between the flames and the blocks below." Our own opinion is, that had the block bounded by Broadway, Murray, Church, and Warren Streets been composed of five-story buildings, such as the one in which the fire took hold, none of them could have escaped destruction. This, we think, will be considered a very conservative estimate, when we recall what happened in Boston, Chicago, etc., during the present generation.

Sixth. With the two fundamental exceptions to which attention has been directed, this building proved that there *is* such a thing as fire-proof construction. It has likewise accentuated a number of things liable to be overlooked or underestimated by architects, in settling the details and selecting the materials to be used in buildings of the class to which it belongs. In the present instance, we have noted what seems to us the two fatal weaknesses to which is due nearly all the damage that has befallen an otherwise successful scheme of construction. With the Broadway frontage executed in architectural terra-cotta, and the rear windows adequately protected, the Home Life Building could have been made equally beautiful and at the same time invulnerable. Now that the upper half of the frontage overlooking this famous thoroughfare will probably be rebuilt, we venture to offer these belated reminders on the principle that capable men can afford to admit their mistakes, and wise men always hasten to correct them.

T. CUSACK.

REPORT ON HOME LIFE BUILDING FIRE, NEW YORK, DEC. 4, 1898.

BY CHARLES J. EVERETT, JR.

CONTRARY to popular opinion, the recent fire in Rogers, Peet & Co.'s large clothing store, and in the adjoining "sky-scraper," furnishes evidence of the efficiency of progressive fire-proof construction, notwithstanding the fact that in some respects the building was not the most advanced type of modern fire-resisting structure, as will be pointed out further on. A change of plan by the owner, doubling the width of the building after reaching the sixth story, rendered necessary certain modifications of detail, and increased the burden of the architects, who are rarely free agents in such matters.

The block on Broadway, between Warren and Murray Streets, was occupied by three buildings, namely, Rogers, Peet & Co.'s five-story store on one corner, the fourteen-story Postal Telegraph Building on the other corner, and the Home Life Insurance Company's building filling the space between. The Home Life Building is a steel frame structure of fifteen stories, surmounted by a tall, wedge-

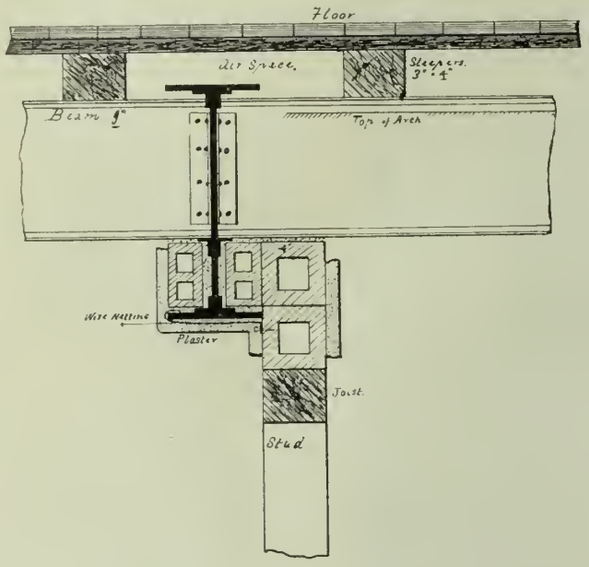


FIG. 1.

shaped tower, and was erected in 1894, from designs of Messrs. N. Le Brun & Sons, architects.

On the night of December 4, at about ten o'clock, fire started in the first story of the store of Rogers, Peet & Co., during a furious northeast gale, which at times reached a velocity of over sixty miles an hour. The flames soon broke through the roof of the building, and were driven by the strong winds against the lofty walls of the Insurance Company's building, rushing up the light shaft, which formed an excellent chimney extending 150 ft. above the roof of the clothing store. Two sides of this light shaft consist almost entirely of window openings unprotected by iron shutters, and the third or rear side shows two windows to each floor, likewise unprotected. The main wall of the building on the same north side also contained two windows at each story, without shutters. The flames from the clothing store, beating against all these windows, shivered the glass, ignited the sashes and frames, and urged by the strong gale, soon filled every story of the taller building above the seventh floor with a mass of fire. This assault from the outside made it impossible for the firemen to fight the flames within the Insurance Building until the clothing store was entirely consumed.

The floor construction of the Home Life's building was 9 in. beams in the front portion and 12 in. beams in the rear, spaced about 4 ft. 6 ins. apart, and 9 in. hard tile terra-cotta side-construction arches between beams. The lower flanges of beams were pro-

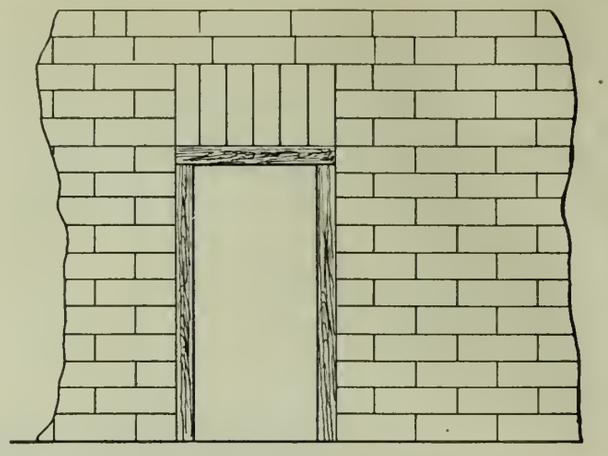


FIG. 2.

tected by skew-backs with protecting lips. The floors were of two thicknesses of ⅞ in. boards nailed every 16 ins. to 3 by 4 in. sleepers laid on beams. Little or no concrete was used over arches, thus leaving a free air space of about 4 ins. in front and 7 ins. in rear, between the top of arches and the wood flooring. The absence of concrete filling over arches left the upper flanges of beams exposed for, say, 1 in. and those of girders for 2 ins. in front portion of building, and still more in rear. While none of these exposed flanges appear to have been injured by fire, except on the fifteenth floor, they escaped only by reason of the limited height of exposed metal, as demonstrated by results on fifteenth floor, mentioned further on. Over a large part of the building above the seventh story the flooring and sleepers were entirely consumed. This air space beneath the floors insures the destruction of all combustible floor material. It should be entirely filled with incombustible matter.

The partitions were of 4 in. porous terra-cotta tile, and the column covering and furring was of same material 2 ins. thick. The partitions rested directly on the arches, or on a ridge of concrete brought to a level with the top of beams, so that there were no fire-runs under the partitions, as has been stated by some critics. The hall partitions, as is usual, did not extend to the ceiling, windows with wooden frames filling the upper 3 ft. or so. The columns were

FIG. 3.

FIG. 4.

covered with 2 in. porous tile blocks ribbed at backs to allow a partial air space. The lower flanges of important girders which projected below ceilings were covered with wire netting and plaster, or mortar, rather.

As the building was practically gutted from the eighth floor to the roof, it is unnecessary to describe the condition of each floor after the fire.

In many of the rooms the fire consumed everything combustible, including all door and window frames and casings, all floors and sleepers. The heat was strong enough to warp and twist ironwork, such as steam and water pipes, typewriters, etc., and in one room the brass of a light bracket was melted; yet the terra-cotta arches (of hard tile), the furring and column covering (of porous tile) were uninjured, and with a very few exceptions, the floor arches are in such condition as to require little or no repair. The first exceptions are where safes resting on floors between beams were dropped a distance of several inches, through the free air space just condemned, on to the tile arches, by the burning away of the flooring. In one instance a safe weighing about two tons fell through the tenth floor into the office of the Rapid Transit Commission on the ninth floor and there stopped. The tile arch directly under the falling safe was knocked out, but the double wooden floor, and the fact that one edge of the safe struck the side of a girder, stopped further descent. The second exception occurs in the rooms on the fifteenth floor, on west side of light shaft, where an entire panel of arch has fallen, and the remaining arches between it and the stairs are bellied so as to necessitate removal. The 12 in. beams of this section are found to be sagged. The failure of these beams can only be due to the heating of the upper portions, which were exposed for a height of 4 ins. above the arches, as the lower flanges of some of them are still well protected by the tile. Some other arches appear to be slightly bellied, and in some places the lower webs of single blocks are cracked off; but the condition of the arches, taken as a whole,

FIG. 5.

FIG. 6.

indicates a splendid resisting power and adequate protection of metal from a very hot and prolonged fire.

This fire warns us against the use of wire netting and plaster for protecting beams in the manner here applied. (See Fig. 1.)

The webs of all girders were well protected underneath by tile blocks supported by lower girder flanges, but the girder flanges depended for protection upon wire netting bent around them and then plastered. Where the wire netting was thus bent around both sides of flanges it held itself in position, but in some cases the netting was nailed on one side to the porous partition blocks, as shown in Fig. 1. In the hall partitions the upper blocks were supported by the wooden framing of the partition windows, and, of course, fell when this framing was burned, and pulled down with them the protecting plaster coat, exposing the girder to the fire. This, however, could hardly have occurred until after the fire had begun to subside, since the girders show no marks of injury; but had the fire continued after the netting fell, some of the main girders must have failed by reason of their lower flanges being exposed for a length of 10 ft. or more.

In general, where the fire played strongly against plastering it fell off from walls and ceiling, and the plaster on the under side of the wire netting likewise dropped off, leaving only that portion which was pressed through on the upper side of the netting to protect the metal framing. In some instances the netting hugged the metal so

FIG. 7.

closely at some points that there was no room for protective plaster on the inner side, and practically left the metal without protection.

Wherever this method of fire protection is adopted, a space of at least 1 in. should always be preserved between the netting and the metal requiring protection, and this space filled with the coating of plaster, etc. Without this precaution the supposed protection may be entirely useless.

Referring again to column covering, the porous tile preserved the plate columns from injury in every case; but in many instances the cement bond of the joints was broken, and the tile must be reset.

The growing opinion is that no air spaces should be left around columns, but that the covering blocks should be set directly against the metal and made as solid as possible with mortar or cement.

Fig. 3 shows condition on the eighth floor after the fire.

Fig. 4, the office of the Rapid Transit Commission on the ninth floor, showing the two-ton safe that fell through from floor above.

Fig. 5 shows one of the main columns on the eleventh floor after being stripped for inspection.

Fig. 6, fourteenth floor; showing arches, girders, and column covering, all in good condition.

Fig. 7, fifteenth floor; west side of light shaft, showing the floor where the whole panel fell, and where the 12 in. beams are bent.

Fig. 8, fifteenth floor; showing the most seriously injured steel member. This is the middle section of the 24 in. by 10 in. plate girder, that crosses the Broadway front of the building. The other two sections of the girder are also distorted, but in a less degree. The upper flange was about 10 ins. above the floor, and by an oversight had no fire protection. The upper flange and upper part of the web of this girder were sufficiently heated to buckle and deflect sidewise; this caused it to twist enough to loosen the fireproofing from the lower flange. The girder has sagged somewhat under its load, and appears to have been very near to the point of collapse.

On cooling, the flanges being bent, the original length was decreased, and the strong end connections pulled the sides of the columns slightly out of line. This appears to be the greatest damage sustained by any part of the metal frame, and is entirely due to absence of fire protection.

There is room for great improvement in the construction of partitions within buildings, that is, for partitions so constructed that they will not tumble down as soon as subjected to attacks of fire or of water. Fig. 5 gives an idea of the destruction of these flimsy partitions. To prevent the falling of the blocks over the doorways as soon as the wood frames are burned, the tile manufacturers recommend constructing flat arches over the doorways by setting the blocks on end, as per Fig. 2.

A lesson taught by this fire is that no unprotected metal of extended and continuous lengths should be employed upon the external walls of buildings. The windows of the light shaft were furnished with cast-iron sills, lintels, and mullions. The sills and lintels were 23½ ft. in length. The fire, drawing up past and into the windows, heated and expanded these iron members, in some places sufficient to force the brick wall, that extended 18 ins. beyond the iron, about an inch out of line, and crack it. If we figure the expansion by heat of a bar of iron 23½ ft. long we find that an increase of 350 degrees in temperature will produce an elongation of about 1 1/16 in.

The Home Life Building in its present condition furnishes a very interesting study for the engineer, and it affords proof of the theory that a steel structure may be so protected by other material as to resist fire without material injury.

From the foregoing facts the following conclusions may be drawn, namely, that in a really fire-proof building: —

First. The steel framing should be entirely protected by burned clay or its equivalent.

Second. No combustible materials should be used for floors, doors, door frames, window frames or sashes.

Third. Partitions should be so built as to resist ordinary impacts and pressure of a fire stream.

Fourth. Wire glass should be employed for partition lights and for door lights.

Fifth. Column covering should be more strongly bound together.

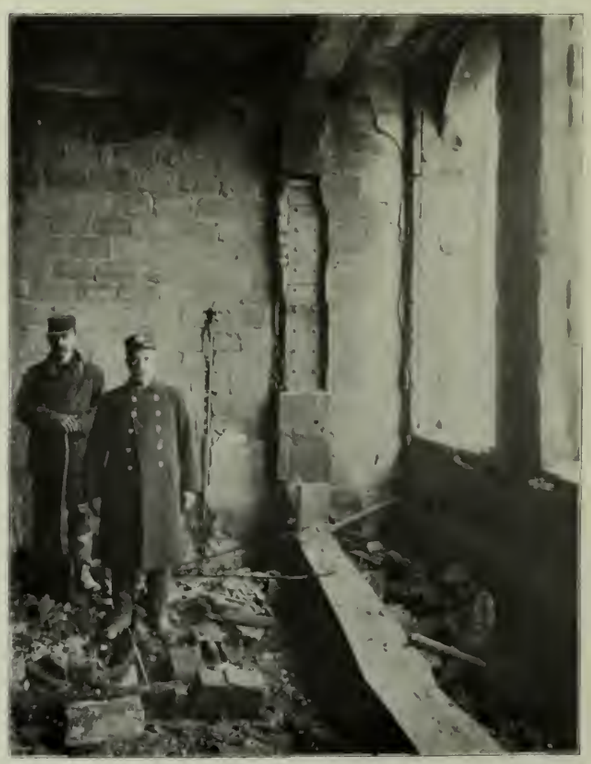


FIG. 8.

Sixth. No continuous or extended lengths of iron should be employed in the external walls.

Seventh. All window openings, liable to be exposed to fire from without, should be provided with shutters of iron or some better fire-resisting material.

The Bonding of Brickwork.

BY ERNEST FLAGG.

ONE might say, with a good deal of confidence, that nothing is more certain than that the next few years will witness a great change in the methods of bricklaying in this country. The principles of good design are being so rapidly introduced among us from France, that the present standard of taste in brickwork and also in the use of many other building materials must give way to more reasonable methods. These principles of good taste in design are so simple and reasonable that any child may understand them, and when once understood, they are sure to be applied.

One of the first things that the student of architecture at the French National School has impressed upon him is that good design calls for the use of reason, or let us say common sense, on the part of the designer. A great work of art is necessarily a great achievement of the intellect. Such a work calls into play the highest powers with which we are endowed. Reason must play an important part. Nothing is more sure than that no work of man can be called great which does not show the use of this wonderful gift, which is the measure of man's superiority over the lower animals.

Now, in none of the fine arts is there so great an opportunity for the use of reason as in architecture, and it is doubtless because of this, no less than that it is the mother art, that it has always been considered among the most artistic and enlightened nations of Europe as the chief of the fine arts. The architect is called upon to use his reasoning faculties at every turn, and the success or failure of his work depends upon the use he makes of them. Some there are who have an innate sense of what is admirable, and apply their reasoning powers to their work almost unconsciously. These are they who create masterpieces, and of whom we say they are endowed with genius.

The architect deals with many different materials, and applies them to many diverse purposes. Each of these materials has certain qualities and limitations which he should understand. These qualities and limitations suggest and call for the use of certain appropriate forms and methods of use prescribed by reason or common sense, as adapted to the material for the purpose for which it is used. The knowledge of these qualities and the humble submission to the limitations which common sense dictates is a great aid to the designer, for if he will humbly follow where reason leads the way, all sorts of interesting forms and methods will suggest themselves as appropriate, which otherwise he might not have thought of. Moreover, he will feel safe in their use, for he will know that he is being guided by a true principle of good taste.

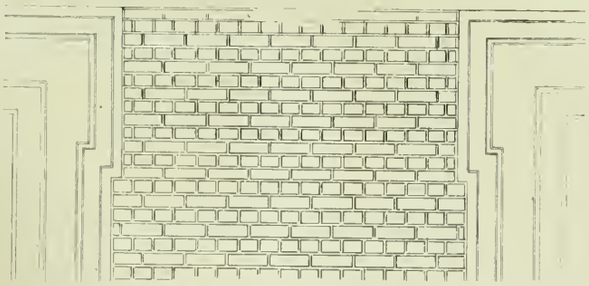


FIG. 1. BRICKWORK FOR SINGER BUILDING.

Joints Recessed ⅜ Inch.

A striking illustration of what I mean is often seen in the use of wood in exterior work by architects of our colonial times. The resources of the builders did not permit of the use of stone where it is generally used abroad, and wood was substituted for it, but this substitution involved no slavish imitation of the stone model. The work generally shows that the architect had a keen and logical appreciation of the nature of the material he was using, and its capabilities and the designs are designs for wood, not for stone. Retaining the main features of the classic forms which are founded upon the eternal principles of common sense, he varied the detail in an endless number of ways appropriate to the nature of the material, thus securing a charming variety of fresh and interesting forms, and by the most simple means giving to the work a stamp of good taste and elegance which to see is to admire.

The very common disregard of this principle, which is one of the fundamental principles of good design, is a most glaring defect in much of our modern work.

On every hand one sees in our modern buildings, the dictates of common sense in the use of materials violated, and nothing is more certain than that until such abuses are corrected we need not expect good results, either from the artistic or practical standpoint. How can one expect, for instance, to crown a building with a sheet-metal cornice to which has been given a stone profile, and expect his work to be classed as a work of art? Common sense is violated; the thing is unreasonable on the face of it and cannot possibly be good. If the limitations of cost prescribe the use of sheet metal for the cornice, why should not that material be frankly used in a common-sense way and be given a form adapted to its qualities and limitations, so that it will appear to be what it is? When a man who is acquainted with the qualities and limitations of sheet metal sets himself to work to think how he can make use of this knowledge in designing a cornice that is appropriate to the building, in forms that are appropriate to the material he intends to use, all sorts of new forms and possibilities will suggest themselves to him, and he may accomplish a result truly artistic, for it will at least have in it one of the principles of good taste, that is to say, truth.

Or, as another illustration, say the architect wishes to use iron for a column; how can he expect a good result if he gives it a form which would be suitable for stone, when the nature of the material calls for an entirely different treatment? To do so is to violate the laws of common sense, and he can hope for praise only from those who are deficient in that quality, or from the ignorant.

It ought to require no argument to convince any one that to each material should be given the forms and profiles adapted to its nature. Profiles suitable for granite are unsuitable for marble, and *vice versa;* profiles suitable for a soft stone are unsuitable for a hard one. Forms adapted to wood are not adapted to iron, and forms suitable for iron are not suitable for stone. Cast iron calls for forms of one kind and wrought iron for forms of another kind, and so on indefinitely through the whole list of building materials. To each material should be given the forms adapted to its qualities and limitations, and only by so doing can one hope for good results. The study of each material will suggest new possibilities, and the designer, letting his reason dictate, may venture in safety upon new and interesting fields of design.

His work will be interesting because it will display the working of the human mind and will appeal to the reason of those who see it. This principle of good design should be inculcated into the architectural student at the very beginning. Unfortunately, it is a principle which he will see violated on every hand by men standing high in the profession, whose works are admired by the unthinking or ignorant. But the progress in art in this country is going to be rapid, and not many decades will pass before it will be pretty thoroughly understood here, even among the laity, as it is understood in France, that common sense is a necessary factor in good design; and a man, to stand high in the profession, will find it necessary to call into play all the highest qualities with which the Almighty has endowed him.

In the use of none of the building materials in this country are the principles of common sense more generally disregarded than in brickwork. In the use of this material we easily lead the world in absurdity. So true is this that good brickwork is a thing practically unknown among us, or perhaps one should say unpractised among us, for every one who knows anything about brickwork, or

who has given the subject a moment's thought, knows that the nature of the material requires that there should be practically no vertical joints more than one brick high, but that every brick should interlock with the surrounding bricks both lengthwise with the wall and transversely through it; in other words, that the brick should be laid up in regular bond, of which there are several standard varieties, and which the apprentice everywhere but in the United States is supposed to be taught. With us, workmanship of this character is deemed unnecessary, and our brickwork consequently loses in strength and character, both artistically and constructively, for it lacks a quality of solidity and technique which in good workmanship impresses itself upon the imagination and constitutes a real beauty. So utterly has this common-sense principle of good workmanship in bricklaying died out among us that it is next to impossible to find a mechanic who can lay up a wall in regular bond. In a large force of bricklayers, all passing as skilled mechanics, the writer has often been unable to find one who knew how to lay up a wall all the way through and at the corners in regular bond. Every fifth course a header course, for rough work and backing, and that abomination known as diagonal bond and microscopic joints for the face work, is what now passes here as good workmanship.

Every now and then one reads of the collapse of some building finished or in process of construction; those casualties are usually ascribed to the use of poor material, but in nine cases out of ten they are due to improper bricklaying. New York is full of buildings which stand apparently in defiance of the laws of statics, and doubtless the same conditions exist in other places; it is extraordinary that there are not many more accidents than there are. If provisions were made for the proper bonding of brickwork in all building laws for cities, these accidents would be almost unknown.

In the United States if a building lasts fifty years it is about all that can be expected of it; they are mostly constructed on thriftless principles of economy. The builder loses sight of the fact that for a very slight increase in the cost, or for a little more care in the construction, the life of a building can be almost indefinitely prolonged, and that the saving in repairs alone will far more than offset the increased expense. When in Paris, the writer lived in a building erected in the time of Louis XIII.; it had recently been remodeled at a slight expense, and was as good as new and may be used for hundreds of years to come. The first cost of building in this way was perhaps 10 or 15 per cent. greater than it would have been if built for a life of fifty years. One would think that common dictates of economy would introduce this sort of construction here.

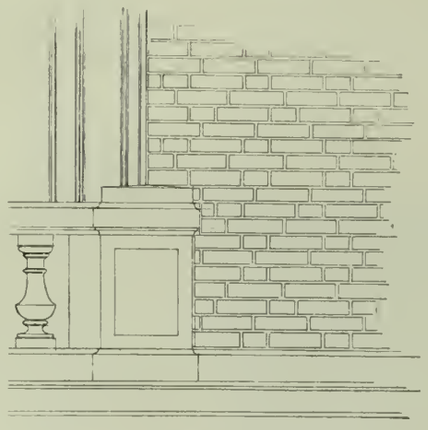


FIG. 2. BRICKWORK OF HOUSE FOR CLARK ESTATE.

The practise of running up certain walls or parts of walls of a building in advance of others is another practise which should never be tolerated by the architect. It is nevertheless a practise which is so common here that one may say it is the general custom to carry up the walls which are composed entirely of common brick in advance of the ornamental façades, and then to connect the two by means of an abomination in bricklaying called toothings. The workman accustomed to laying up his work without proper bond sees nothing inconsistent or slovenly in such a proceeding. It is, indeed, on a par with the rest of the work, that is to say, about as bad as could be contrived; but how can an architect who takes pride in his work permit such practises? They are proceedings which could only be tolerated where pride in good bricklaying is unknown, and that they are common now serves as clearly as anything could to show the present degradation of bricklaying in this country. They are makeshifts, which result from a mistaken notion on the part of the builder that by resorting to them he can hasten the work, but it is evident that the building cannot be inclosed or finished until all the walls are up, and if one part is carried up before the rest nothing is gained. The supposed gain is entirely imaginary, and is accomplished at the expense of good workmanship and in defiance of the common-sense laws of good construction.

It needs no argument to demonstrate that the way to build well is to carry up all the walls simultaneously, interlocking all the materials as the work proceeds. To do otherwise involves an unequal distribution of weight on the foundation during the process of building, which should not be tolerated even if it could be done consistently with good bricklaying, but when this is done in connection with the so-called toothings, it cannot be too strongly condemned.

In the manufacture of fine grades of brick, our progress during the last twenty-five years has been very rapid, and we now produce them in extraordinary variety and of most excellent quality. Strange to say, this progress in brickmaking has not conduced to progress in bricklaying, but rather the contrary. The fine grades are used only for face work, and our designers, losing sight of the fine effects which might be produced by laying them up in regular bond with the backing, have used them solely as a veneer, independent of the main body of the wall, and adding practically nothing to its strength. They are laid in a sort of running bond and are tied to the backing at every fifth or sixth course by what is called diagonal bond. That is, their inner corners are clipped off and the corners of common brick laid diagonally on the wall are lapped over the face work, a process as insecure and slovenly as it is ugly, for by this method the outer veneer has little or no connection with the body of the wall, and looks as if it had absolutely none, appearing to be what it is, weak. The writer has often noticed workmen in taking down old buildings—buildings which would be called new anywhere else — remove great slabs of this outer veneer with a crowbar, showing that there was practically no bond between it and the backing. It seems incredible that such unscientific and inartistic methods could take root anywhere to an extent that architects will deliberately specify this sort of thing; but one who observes our progress in other directions must have far too much faith in the future of good art and its handmaiden, good workmanship, among us to believe for a moment that these methods will endure. At present, this way of laying brick, considered very ugly everywhere else, seems to be admired here. It was first adopted through false notions of economy, but we now find it used almost everywhere in buildings where such considerations evidently did not govern, as well as in buildings of the cheaper kind.

With the introduction of the fine grade of bricks, we have developed a love for fine joints, and this class of work is laid up with joints so thin as to be of no use constructively, and which rob the work of all character, and give to it a hard, dry, sleek appearance, which can appeal to no artistic instinct. Now and then we find an attempt at Flemish or English bond, doubtless made by some one who has seen and admired the genuine article abroad or in old buildings, in this country, but almost all such attempts are sham, for the face is not really bonded to the backing. The headers are not headers, but bats, because the designer cannot bring himself to give up the small fine joints, and to use joints of a size which is necessary to insure good workmanship; with the thin joint retained it is impossible to interlock the face work with the backing. In other words, our brickwork is laid upon the theory that honesty is inconsistent with art. To vary the general monotony sometimes recourse is had to bricks of peculiar shapes, such as the long, narrow, thin bricks called Roman, which do not and could not bond with the backing. Many people think this variety truly artistic. Few seem to realize that the finest

and most artistic effects can be produced by simple means, or to understand what needs only to be tried to be proven, that brick of the commonest kind laid up in interesting and logical bonds will produce far finer effects than the most expensive bricks or the craziest shapes that ever were made, if laid up without regard to the rules of common sense.

One has but to try to find how easy it is to devise all sorts of interesting patterns and endless varieties of beautiful wall surfaces by the use of brick of the standard size regularly bonded to and forming an integral part of the body of the wall. The supposed economy of the present methods, like many other thriftless attempts in the same direction not founded on reason, which spring up in new countries, will be found upon examination not to be economical, but the reverse. With a very slight increase in the number of face brick, the outer 4 ins. of the wall, now practically useless, can be made to contribute its proportionate share to its strength. Let us make some calculations to show how slight is this increase, and how out of all proportion to it is the saving effected. In New York face brick is generally laid up ten courses to 25 ins. and common bricks nine courses to 2 ft. If the face brick is made to bond with the backing, it too will lay up nine courses to 2 ft., or better still, for face brick and backing, nine courses to 25 ins.; then 8.64 face bricks and 10.8 common bricks will be required to each square foot of a wall 1 ft. thick. By the common method there would be required to accomplish the same result 7.2 face bricks and 13.5 common bricks, so that by the use of 1.44 more face bricks, against which there is a saving of 2.7 common bricks, we obtain a wall which is practically one third stronger, for the outer 4 ins. is an integral part, whereas in the other case it is a veneer of little or no value as regards strength.

This calculation is made upon the supposition that for every stretcher there is used a header (Fig. 1); but, if greater economy in the use of face brick is required, good results may be obtained, and interesting patterns devised, by the use of a less number of headers in proportion to the stretchers (see Fig. 2), where one half as many headers are used as in Fig. 1. In this case a square foot of wall surface 1 ft. thick would require 7.56 face bricks and 11.88 common bricks, so that this would require only .36 more of a face brick, against which there would be a saving of 1.62 common bricks.

The taste for good workmanship is fortunately a taste very easily acquired; familiarity with it breeds a desire for more, and when the difference between the appearance of good bricklaying and bad bricklaying is once understood, the demand for the former will spread rapidly. There is now urgent need for good manual training schools where young mechanics can be taught good workmanship in bricklaying; or rather, perhaps one should say, there is urgent need that good bricklaying should be taught in the manual training schools which are already established. It ought to be no more expensive to lay up brick in regular bond than by the "every fifth course a header course" system. That it is more expensive to do so is entirely owing to the fact that the bricklayers are unskilled in the art of good bricklaying. They do not know how to lay the regular bonds because they have never been taught, and if they attempt to do it, of course the progress is slow, and time means money. But if the architects would specify work of this character, there would soon spring up a demand for skilled workmen, and the mechanics would soon adapt themselves to the new conditions; it would soon be demonstrated that good bricklaying costs no more than bad bricklaying, and the benefit both from the artistic and constructive standpoints would be worth a thousand times the cost of introducing this reform.

In the large Eastern cities there is fast being created a great body of skilled mechanics in almost every line, except bricklaying, that has to do with building. This has come to pass because there has been a demand for fine workmanship which has been specified regardless of expense. The building up of these industries and the creation of this body of skilled labor has been of incalculable benefit to the country, and is worth a great deal more than it has cost. Bricklaying is the only building industry which seems to have made rather the reverse of progress during this century.

Brick and Terra-Cotta Work In American Cities, and Manufacturers' Department.

NEW YORK. — The year of 1899 promises to be an exceptionally busy one, if the amount of work which has been postponed on account of the war is any criterion.

In the meantime architects are preparing in every way to make the Fourteenth Annual Exhibition of the Architectural League a great success. In connection with this exhibition two prizes and a gold and silver medal will be awarded to winners of three competitions, details of which are given elsewhere in this issue.

Among items of new work may be mentioned: —

C. L. W. Eidlitz, architect, has planned a four-story brick telephone exchange office to be built on East 30th Street; cost, $30,000.

H. T. Howell, architect, has planned a seven-story brick apartment to be built on 90th Street, near Central Park; cost, $95,000.

Mr. J. Pierpont Morgan has purchased for $148,000 a site for a new club house for the New York Yacht Club, and presented it to the club; $75,000 has been subscribed toward the building itself, and a limited competition is now being held, in the result of which considerable interest is felt. Among the architects who have been invited to compete are Charles C. Haight, Carrere & Hastings, and McKim, Mead & White.

PHILADELPHIA. — The recent Peace Jubilee has left the desire in many minds to have a permanent memorial erected in the heart of the city, — a memorial that would not only serve to keep fresh before us the successful termination of war, but one that would, in addition, be an architectural ornament to the city. The public were intensely pleased with the Jubilee Court of Honor, designed by Joseph M. Huston, architect, consisting of an arch spanning Broad Street with what was really a court north and south of it, formed by detached triumphal columns. At first blush an outcry was made to have this reproduced in white marble (the original being staff), but this was, of course, out of the question, both on account of expense and inconvenience resulting from blocking

TERRA-COTTA FIGURE, RITTENHOUSE APARTMENTS, PHILADELPHIA.

Executed by the Perth Amboy Terra-Cotta Company. Willis G. Hale, Architect.

RESIDENCE FOR HARVEY CHILDS, JR., ESQ., PITTSBURGH, PA.
Peabody & Stearns, Architects.

the sidewalks of a main street. Then came suggestions for various substitutes, which gave architects generally grave fears for the outcome. The T Square Club pledged themselves to give a handsome subscription, and it is the hope of all, that, should the memorial finally be built, the leading members of the club may see to it that some entirely satisfactory design be selected.

Architectural exhibitions have been growing year by year more and more important, and perhaps in no city has this fact been more noticeable than in Philadelphia. For years the Pennsylvania Academy of the Fine Arts had been running an architectural exhibit, but only as an aside to its annual fine arts exhibition, and architecture was gradually becoming very poorly represented, until a few years ago the T Square Club assumed charge. The improvement was immediate and lasting, for each year's exhibit has been an improvement, both in quantity and quality, over the last. The entries for this season's exhibition are now in and promise to keep up the advance. It would seem that one helpful adjunct to the usual array of original drawings of current architectural work might be found in the best of the architectural magazines, the latest yearly volume of each of which could be placed convenient to the hand of the visitor, thereby giving him a broader view of architectural achievement.

Mr. Frederick M. Mann, architect, who, within the year, has allowed the calls of his practise to take him away from professorship at the University Architectural School, has just been successful in a most fairly conducted competition for a church at Overbrook. As showing the proper feeling that exists amongst architects here, it may be stated that after the award was made, an exhibition of the competing designs was held by permission of the competitors, when Prof. Warren P. Laird, who had acted as adviser to the church committee, gave an interesting talk on the method that had been followed in getting up the terms of the competition and in the decision. It seems that the interested members of the profession met, when a draft of the proposed terms was laid before them, and their criticism and suggestions taken before the terms were finally adopted. Professor Laird deprecated the fact that there were eleven competitors instead of from four to six, as he would have wished, but the committee had, in the main, followed his ideas of equity, outside of this one point. Cope & Stewardson were placed second, and David K. Boyd, third.

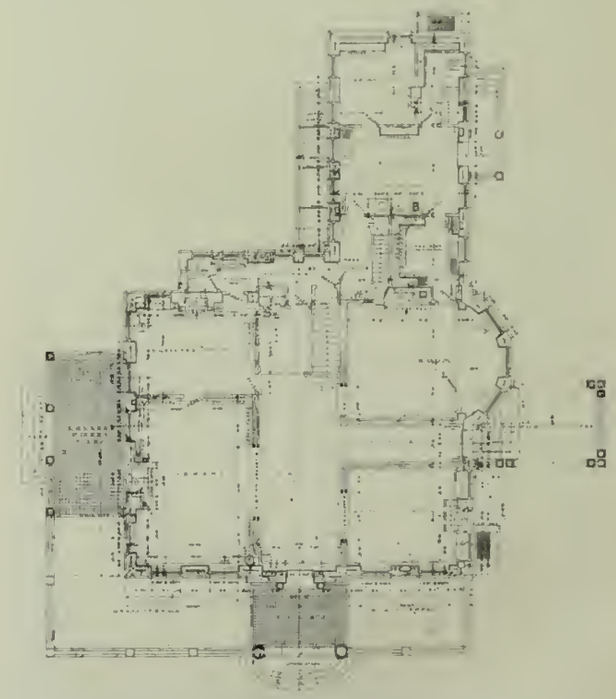
A new front for the Academy of the Fine Arts building on Broad Street is reported from the office of F. M. Day & Bro. All familiar with the present façade will be curious to note the change.

Cope & Stewardson's design for the new law school at the University of Pennsylvania is about to be put into execution. To be built in the neighborhood of the dormitories, by the same firm, its material will be approximately the same, while the architecture is of a later period of English Renaissance. Like the dormitories, the cornices, window frames, etc., will be of light stone, while the body of the walls is of reddish brick with Flemish bond.

Mr. Seeler is about to put up the east portion of his high building at Broad and Chestnut Streets, for the Real Estate Trust Company. This building, although of one continuous design, had to be built in two sections, on account of an unfinished lease on part of the old property.

MINNEAPOLIS.—I was impressed, upon reading the current BRICKBUILDER, with the very general sentiment as to next year's business promises. All reports indicate a stagnation just at present, but the prospects for 1899 are conceded to be the best for years. So it seems to us here in the Twin Cities. While the past year has been a disappointment to most of us, perhaps, we can readily understand it when the eventful year now closing is considered. No doubt the enforced quietude of the past two or three years will result in a healthy forward movement that will average matters up in an eminently satisfactory manner.

The closing up of the year's work is practically all that is stirring with us to-day. Winter has set in at an earlier date than for several years past, so nothing new of importance will be undertaken now before spring. The new Milwaukee depot is now being used, although not entirely finished. It is a credit to its owners and a sub-



FIRST FLOOR PLAN, HOUSE FOR HARVEY CHILDS, JR., ESQ., PITTSBURGH, PA.
Peabody & Stearns, Architects.
(Scale Drawings of Elevations shown in Plate Form.)

EAGLE ON DOME OF PUBLIC LIBRARY AND MUSEUM, MILWAUKEE, WIS.
Executed in Terra-Cotta by the Northwestern Terra-Cotta Company. Ferry & Clas, Architects.

stantial addition to our business architecture. The residences of George T. Partridge and S. A. Harris are nearing completion, and will rank with our finest residences. They are all of Roman buff brick and terra-cotta and mark a substantial advance in our development as a city, a foretaste of what is to come. Our new State Capitol is nearly ready for roof framings and is a decided credit to the State. The periodical agitation looking to completion of our new City Hall has set in, and we hope this time it will result in something tangible, as it is a much-needed improvement.

Among the projects for next year that are known to date are: a new chamber of commerce, three or four new churches, two or three new school buildings, two new buildings at State University, hotels, warehouses, store and office buildings, and residences, etc., almost innumerable. We are promised a new government building in the near future, a promise we fervently hope to see fulfilled. Our present building has never been adequate, the business having outgrown the building during its construction. We trust, in the event of a new building, to see it made the subject of local competition and awarded to a Minneapolis man. We know it will mean a better adaptation to necessities and more vigorous prosecution of the work, as well as a substantial saving in cost.

SEAL OF NEW JERSEY, EAST ORANGE TOWN HALL.
Executed in Terra-Cotta by the Conkling, Armstrong Terra-Cotta Company.
Boring & Tilton, Architects.

ST. LOUIS. — At a special meeting of the St. Louis Architectural Club, held on October 22, the constitution and by-laws were so amended that the annual meeting will be held the first Wednesday in April hereafter instead of January, and the monthly meetings on the first Wednesdays of each month instead of the first Saturdays. The changes were thought advisable that the social features, which still occur on the first Saturday evenings of the month, might not be curtailed or of themselves interfere with the business meetings, while the annual meeting will take place at the close of the working season, that it may not interfere with the club work by a change of administration.

An important event in the history of the local Young Men's Christian Association was celebrated on November 30, in the formal dedication of their new building, corner of Franklin and Grand Avenues. It is five stories, fire-proof, and cost $200,000. Tully & Clark were selected architects, through a competition held in the spring of 1894. Work was commenced at once, but the financial depression prevented raising sufficient money to finish it until this season. The secretary's office and general reception room, reading room, etc., are on the second floor. The gymnasium is in the rear, extending from basement to second floor, and above this is the main auditorium, with a seating capacity for one thousand. Swimming tank, baths, bowling alleys, etc., have been provided in the basement. The roof has been designed for use for summer concerts, etc.

TERRA-COTTA FIGURE, RESIDENCE AT KANSAS CITY, MO.
Executed by the Winkle Terra-Cotta Company.
F. E. Hall, Architect.

During November the Board of Education, W. B. Ittner, architect, took out building permits for a three-story school, 106 by 90 ft., cost, $69,000; a two-story school, 28 by 90 ft., cost, $15,000; and a two-story school 100 by 50 ft., cost, $30,000.

It is with considerable embarrassment that St. Louis acknowledges that she cannot get that which she most needs; and her confession is the strongest evidence that she needs it. Two unsuccessful attempts have been made to vote a half mill on the dollar tax for five years, for the purpose of erecting a public library building. The present building is wholly inadequate, either for the service required or as a proper protection, it being neither fire-proof nor designed for the purpose, it having been arranged for the library when it was merely the public school library. Since becoming a free library it has grown greatly and should have a permanent home.

Messrs. Barnett, Haynes & Barnett have prepared plans for a $150,000 residence in Belle Place, and architect Louis Mullgardt has an apartment house on the boards, to be built opposite the Grand Avenue entrance to Vandeventer Place, at a cost of $30,000.

CURRENT ITEMS OF INTEREST.

THE WINKLE TERRA-COTTA COMPANY are furnishing the architectural terra-cotta for the new armory building at St. Louis,

TERRA-COTTA PANEL, CONVERSE BUILDING, BOSTON.
Executed by the Excelsior Terra-Cotta Company. Winslow & Wetherell, Architects.

also for the Reliance Realty Company's new office building (eleven stories), 6th and Olive Streets, St. Louis.

The Kittanning Brick and Fire Clay Company have secured an order for interior linings for Allegheny County House, Woodville, Pa.; also have brick specified for interior of St. Francis de Sales Church, McKee's Rocks, Pa.

TERRA-COTTA PANEL.
Executed by Gladding, McBean & Co., San Francisco, Cal.

The Powhatan Clay Manufacturing Company are supplying their cream-white bricks for the new Hall for the Board of Education, New York City, N. LeBrun & Sons, architects; also for the new theater building being erected at 42d Street and Seventh Avenue, New York City, for the Hammerstein Amusement Company.

The Brick, Terra-Cotta, and Supply Company, Corning, N. Y., have commenced the erecting of another muffled kiln. This is the third muffled kiln constructed this year by the company, who have also built a large brick kiln, enlarged dryers, and made other necessary improvements to their property.

The Illinois Supply and Construction Company report contract to furnish 100,000 gray brick to be used in the new armory building now being erected for Light Battery A, of Missouri, at Grand Avenue and Rutger Street, St. Louis; also contract from Lincoln, Neb., and one at Muncie, Ind., for the same kind of press brick.

The Canton Sparta Brick Company, Canton, Ohio, have recently added new screens and shape machinery to their plant: built a large storehouse to facilitate shipping brick in winter, and otherwise enlarged and improved their works. The company state that under their present advantages they are making a better brick than ever before.

The Fawcett Ventilated Fire-proof Building Company, Ltd., have just completed the structural steel and fire-proofing for boiler house in yard of House of Correction, East Cambridge, Mass., O. W. Cutter, architect; also fire-proofing of Home for Aged People, Mt. Auburn Avenue, Cambridge, Mass., Stickney & Austin, architects.

The Celadon Terra-Cotta Company is supplying the roofing tiles for residence, E. T. Affleck, Columbus, Ohio, Yost & Packard, architects; Episcopal Church, Ambler, Pa., M. B. Bean, architect; Memorial Library Annex, Westerly, R. I., Longstaff & Longstaff, architects; residence Geo. Crilly, Chicago, W. C. Zimmerman, architect.

The Excelsior Terra-Cotta Company, of New York, have just executed for Mr. Robert Maynicke, architect, the semi-glazed white terra-cotta for a ten-story office building on the northwest corner of Fifth Avenue and 19th Street. This is the only building, with but one exception, in which semi-glaze terra-cotta has been used in New York City, and the material has attracted a great deal of favorable attention.

The Dagus Clay Manufacturing Company, Daguscahonda, Pa., report that they are supplying the brick for three Pittsburgh buildings having ornamental fronts. Colors are to be dark flashed, gray and old gold speckled. They are also supplying 50,000 pink brick for P. J. Carlin & Co., Brooklyn; the front brick for the new store building of Reynolds Hardware Company, Reynoldsville, Pa., and for a number of buildings at Philadelphia.

The Berlin Iron Bridge Company, of East Berlin, Conn., are erecting for the Waterbury Manufacturing Company, Waterbury, Conn., a new blacksmith shop, two stories high. The building is to be of fire-proof construction throughout. The roof has steel trusses supporting the covering of corrugated iron, lined with the Berlin Iron Bridge Company's Patent Anti-Condensation Lining. The building is about 40 ft. square.

At a special meeting of the board of directors of the Atlantic Terra-Cotta Company, held last month, De Forest Grant was elected president and general manager; W. Harris Roome, vice-president; Richard T. Wainwright, secretary. The company wish announced the fact that they are now making a specialty of extra large pieces of terra-cotta with true alignment; also white terra-cotta without slip, guaranteed not to dissolve.

A new factory is being erected at Lowell by the American Mason Safety Tread Company, of Boston, to accommodate its increasing business. The demand for the product of the company is growing by leaps and bounds, as architects throughout the country become acquainted with its merits. It is found particularly applicable

SEAL OF THE NEW YORK ZOOLOGICAL SOCIETY BIRD HOUSE, BRONX PARK, NEW YORK CITY.
Executed in Terra-Cotta by the Atlantic Terra-Cotta Company.
Heins & La Farge, Architects.

COMPETITION DESIGN FOR THE METHODIST CHURCH AT SOUTHPORT, CONN.
Hobart A. Walker, Architect.

to schoolhouse stairs, whether of wood or iron, and its use has been specified in a great many of these buildings in various cities. Work on the equipment of the great South Terminal Station, Boston, has just been completed.

THE OHIO MINING AND MANUFACTURING COMPANY, through their Pittsburgh agents, Burgy & McNeill, have closed a contract with the board of school control to furnish 200,000 face brick for the new building to be erected in twenty-second ward, Pittsburgh, Pa.; E. J. Carlisle & Co., architects; building will cost $175,000. Messrs. Burgy & McNeill are furnishing 150,000 buff brick for new courthouse and jail, Washington, Pa.; also the Norman gray brick for W. A. Zahn residence, Crafton, Pa., and 100,000 buff brick for Crafton M. E. Church.

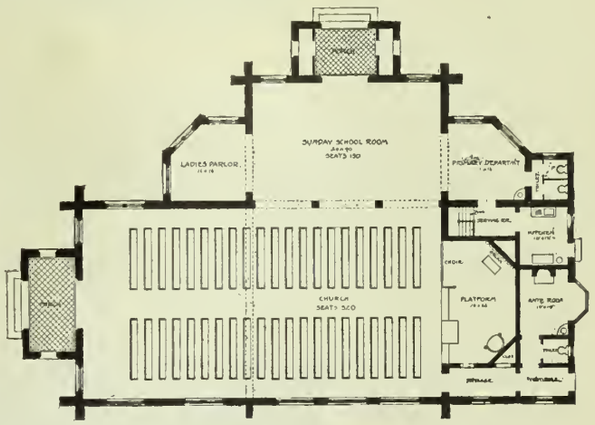
THE MOSAIC TILE COMPANY, Zanesville, Ohio, report the following orders: tiles for the floors and walls of the new convent building of the Sisters of St. Francis, at Oldenburg, Ind., in which will be used about 28,000 sq. ft. of their Ceramic Roman Mosaic Tile; 15,000 sq. ft. of Ceramic Roman Mosaic Tile in the floor space of Montgomery Bros.' jewelry store at Los Angeles, Cal.; 30,000 sq. ft. Ceramic Florentine Mosaic Tile, 6 by 6 in. plate with inset designs, for the floors of the C. H. Allen & Co. building, at Fort Wayne, Ind., B. S. Tolan, architect.

THE ATLANTIC TERRA-COTTA COMPANY are supplying the architectural terra-cotta for the following buildings: Bird House and Reptile House for the New York Zoological Society, Heins & La Farge, architects; apartment house, 129th Street and Third Avenue, New York City, Kurtzer & Rohl, architects; Home for Indians, Buffalo, N. Y., Barney & Chapman, architects; apartment house, 65th Street, New York City, J. E. Ware & Son, architects; apartment house, 123 E. 16th Street, New York City, Alex. O. Finkle, architect.

HOUSES, BROOKLINE, MASS.
Shepley, Rutan & Coolidge, Architects.

AT the annual meeting recently held by the stockholders of the Burlington Architectural Terra-Cotta Company, T. Arlington Macan was appointed general manager. This is a radical change, by which the responsibility of conducting the entire plant is placed under new control. Mr. Macan has an extended reputation in the terra-cotta industry, as being thoroughly conversant with all the details of manufacture, and being fully competent to successfully conduct any business in this line put under his supervision. The company report the general condition of their business as being most promising, their past season having been very successful.

THE recently constructed subway under Avon Street (Boston), connecting the main store of Jordan, Marsh & Co. with their new building, contains a very handsome lining of enameled brick tile furnished by The Grueby Faience Company. The side walls of the whole interior are finished in this material, from the coping of the ceiling arch to the floor, some six feet. The color treatment is most effective, consisting of cream-white tiles between an 8 in. base of green slate and a frieze and cornice of dull green enamel. The company wish



PLAN, COMPETITION FOR THE METHODIST CHURCH AT SOUTHPORT, CONN.

announced that Mr. Philip McKim Garrison, Mohawk Building, 160 Fifth Avenue, New York, N. Y., has been appointed New York agent to handle their product in enameled and faience building materials.

CHAMBERS BROS. COMPANY, Philadelphia, Pa., report that they have the present month either made shipment or received orders to ship the following machines: one of their largest size automatic end-cut brickmaking machines shipped to Virginia; one large size automatic side-cut brick machine, with other fixtures,

to Louisiana; an intermediate size automatic side-cut machine to Georgia: and an automatic end-cut machine to Alabama; besides these, they have other work in preparation on orders calling for shipment after January 1. The company call attention to the fact that the machine sent to Louisiana is to be erected in a yard adjoining that on which was placed, about a year ago, their first No. 1 Automatic Side-Cut Machine, — a good evidence that the first machine has given thorough satisfaction.

RESIDENCE AT BUFFALO, N. Y.
McKim, Mead & White, Architects.

We were much interested to learn recently of what we believe is the first instance of a firm of American manufacturers of burnt clay fire-proofing being awarded contracts to supply their product to building operations in foreign countries. This has been done in the following instances by The Pittsburgh Terra-Cotta Lumber Company, Pittsburgh, Pa. The contract for fire-proofing a building for The Tramway Power Company, Dublin, Ireland, was awarded to them several months ago. This material, amounting to about 1,500 tons, was shipped from their works at East Palestine, Ohio. They also sent men to Dublin to set the material, and have since been advised that everything in connection with the work was satisfactory, and the parties exceedingly well pleased. Another contract amounting to about 1,000 tons for a municipal building has been awarded them from Mexico City, Mexico. The construction on this has not yet been started, but the tile, which was made at their works at Port Murray, N. J., is now *en route*. Men to set this material will be sent by the company.

HAVEMEYER STABLE, NEW YORK CITY.
Thayer & Wallace, Architects.

We have received the following communication from Messrs. Randolph & Clowes: —

Waterbury, Conn.,
Dec. 3, 1898.

Because of the excessive storm in this locality, the roof of our brass and copper rolling mill caved in on Sunday morning, November 27, on account of which we have been somewhat delayed in filling orders for this class of material during the past week.

The entire brass and copper mill will be in full operation December 12. No damage or interruption occurred in any other department of the works, and the seamless tube, brazed tube, kettle boiler plants were in full operation Monday morning, November 28, as usual. The damage to the machinery was very small, less than $1,000, and the cost of replacing the roof with a permanent and substantial wooden roof will not exceed $6,000, or if an iron roof is used will not exceed $12,000, which expenditure will put the mill in better condition than before the accident.

The Boston & Maine Railroad Company are erecting at Portsmouth, N. H., a building for their Electric Power Station. The building is 118 ft. wide and 64 ft. long, divided into two rooms: one for the boilers, and the other for the engines and electric generators. The side walls are of brick, the roof construction fire-proof; the trusses are of steel, and they support steel beams for the purlins, on which is to be placed a concrete roof. The contract for the steel work was given to the Berlin Iron Bridge Company.

For the past month the Grueby Faience Company have been holding an exhibition sale of their products in pottery at the Westminster Chambers, Boylston Street, Boston. From an artistic and also a commercial standpoint, this exhibition has been deservedly successful, attracting much interest among those appreciative of fine ware. The Grueby pottery has an individuality that gives it a distinctive position in this art, both in its glazes, which vary from the rich and brilliant in character to those with soft, dull blooms, and in its beauty of design, wherein every line is indicative of natural forms of floral life. We have in our pages recently described at some length the remarkable qualities of this ware, so will not now touch further on the matter, except to say that their latest efforts have been productive of even finer results than had been achieved at date of our article.

The American Enameled Brick and Tile Company have recently furnished, through their Boston agent, John W. Hahn, the enameled brick used in the Rhode Island Hospital, at Providence, Stone, Carpenter & Wilson, architects: also the enameled brick used in a new primary school at South Boston, William H. Besarick, architect.

CURRENT ITEMS OF INTEREST.

We are in receipt of a very interesting treatise issued by Merchant & Co., Philadelphia, entitled, "How Roofing Tin, Good and Bad, is Made." The facts contained in this little work are, we believe, not known to the architectural profession generally, and are certainly well worth their attention and consideration. The methods of manufacturing roofing plates are briefly outlined, and the two ways by which such plates are coated are described. Particular stress is made of the fact that it is quite impossible to determine by the eye, or any known test, whether or no a plate has been coated by an acid flux or by a palm oil flux, and for this reason the architect should satisfy himself that all plates employed by him in his work are made by reputable concerns, that manufacture goods by that process only which uses the palm oil as a flux. Considerable information is given regarding the system of stamping of sheets as indicating their relative weight, etc., also what to guard against in being misled in this respect by unscrupulous manufacturers. Merchant & Co. will be pleased to mail a copy of this work to any parties interested in same.

In connection with the Convention of the National Brick Manufacturers' Association to be held at Columbus, Ohio, February 7–10, the Baltimore & Ohio Railroad Company announce that they will take pleasure in reserving a special car for the exclusive use of the members from New England and New York going via their system. A similar courtesy was extended by this company last year when the convention was at Pittsburgh, and proved most agreeable to the members from this section. The fare for the round trip will doubtless be based, as heretofore, on the rate of a full fare one way and one third. Privileges of stop-over at Pittsburgh and Washington will be included. In order that the railroad company may know how many to provide accommodations for, they request members in New England and New York that are likely to go via the Baltimore & Ohio System, to communicate before February 1 with Mr. A. J. Simmons, New England Agent, Baltimore & Ohio Railway, 211 Washington Street, Boston.

Renwick, Aspinwall & Owen, Architects,
New York City.

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