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THE
AMERICAN ARCHITECT
AND BUILDING NEWS

VOL. LXXXV

* REGULAR EDITION *

NO. 1494



ARCHITECTURE

ENGINEERING

DECORATION

238 TREMONT ST.

CONSTRUCTION

BOSTON MASS.

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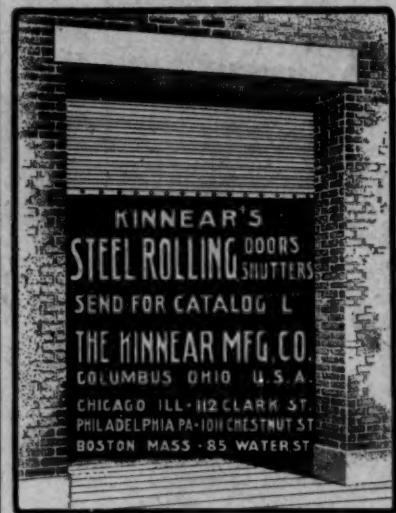


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THE AMERICAN ARCHITECT AND BUILDING NEWS

A WEEKLY JOURNAL OF CONSTRUCTIVE AND DECORATIVE ART

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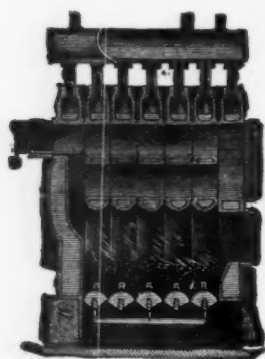
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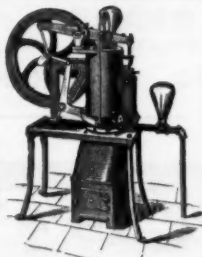
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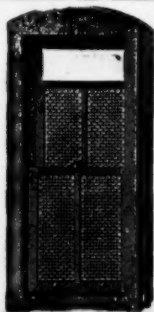
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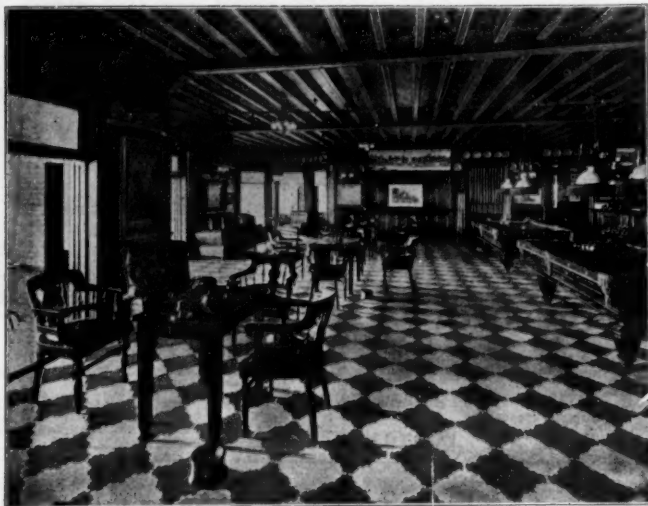
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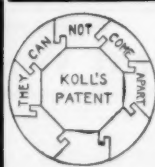
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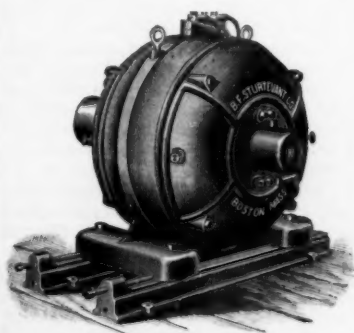
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BUILDING INTELLIGENCE.

(Reported for the American Architect and Building News.)

(Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.)

ADVANCE RUMORS.

ASHEVILLE, N. C.—Report states that plans have been prepared for erecting a six-story hotel at North Main and College Sts., for the Smith estate, at a probable cost of \$150,000.

BARRINGTON, MASS.—Frank H. Wright, Frank Curtiss and John H. C. Church propose to erect on the Searles and Eastland lots and the Mahaiwe property a three-story fireproof building, costing \$200,000.

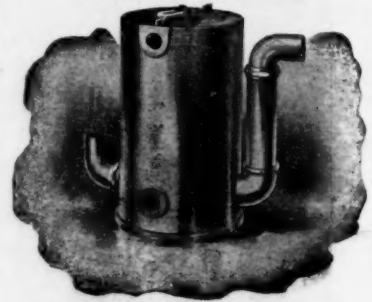
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

BIRMINGHAM, ALA.—Sites for the new school buildings are being considered. It is now roughly estimated by the committee that the high school will cost \$170,000, including the price of the lot, which must present a frontage of at least 100 feet. The minimum dimensions set by the committee are 100 by 140 feet. The two elementary schools will cost \$15,000 each, exclusive of the sites, which are supposed to be already acquired.

Report states that the congregation of Wesley Chapel is planning to erect a new edifice at 17th St. and 17th Ave., of brick, at a cost of about \$12,000.

BOSTON, MASS.—George A. Fuller Construction Company of New York has been awarded the contract to erect the Seigel department store building, at the corner of Washington and Essex Sts. This will be one of the finest stores of its kind in the city when completed, being eight stories high, and contain every modern improvement. The total amount involved in the whole enterprise is over \$5,000,000. Architects, Winslow & Bigelow.

BRAINTREE, MASS.—Connor Bros. Construction Company, of Lowell, have the contract to build the new church for the All Souls' Society. Construction of field stone, with limestone trimmings. Estimated cost, \$30,000. E. J. Lewis, Jr., Boston, architect.

BUFFALO, N. Y.—Plans have been completed for an eight-room brick school to be erected on Clinton St. Estimated cost, \$33,000.

CARTHAGE, N. Y.—The Commissioner of Education is stated to have approved the plans of D. D. Kieff for the addition to be erected to the high school, at a cost of about \$40,000.

CHICAGO, ILL.—It is reported that the Woman's Athletic Club will erect a twelve-story, 80x171-foot brown-stone building on the site of the present structure, at a cost

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

of \$1,000,000. Holabird & Roche, architects.

L. G. Hallberg is preparing plans for a manufacturing building to be occupied by the Addressograph Company. It will be an eight-story structure, covering 89x125 feet, at the intersection of West Van Buren and Peoria Sts., of fireproof construction, and will cost \$200,000.

The property at 175-177 Jackson Boulevard, 50x165 feet, running through to Quincy St., leased to David Mayer, is to be improved with a fourteen-story fireproof office building at a cost of \$400,000. D. H. Burnham & Co. are the architects of the new structure, which will adjoin the Royal Insurance building on the west.

Plans have been completed by C. A. Eckstorm for a manufacturing building to be erected at Sangamon St. and 19th Place, for O. D. Beardsley. It will be four stories high, of mill construction, covering 84x119 feet, and will cost \$40,000.

J. H. Whittemore, of Naugatuck, Conn., who has purchased the properties at 1,223-31 Michigan Boulevard, 87x130 feet, within the last year, will improve the site with a modern four-story business building, at a cost of \$100,000.

The Catholic Bishop of Chicago and the Rev. Father Thomas E. Cox, connected with the Holy Name Cathedral, have jointly taken title to a building site of 115x150 feet at the northwest corner of Fifty-fifth and Honore Sts. The site is to be improved with a church for the new parish to which Father Cox has been assigned.

William G. Barfield is the architect of a three-story apartment building which Henry

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Marsh will erect on Lake Ave., near 51st St. It will be one of the largest buildings of its kind in the Hyde Park district, containing twenty-four suites, and will cost \$100,000.

CINCINNATI, O.—Plans have been completed by Architects Boll & Taylor for the remodeling of the buildings at the northeast corner of Fifth and Race Sts., for the Smith-Kasson Company. The work will cost upward of \$30,000, and will consist of an entire change in the appearance of the corner.

COHOES, N. Y.—The congregation of St. Bernard's intend building a convent and school on the Campbell property in Mohawk St. Rev. Father Keveney, M. A., rector.

DES MOINES, IA.—The State Executive Council has awarded the contract for the construction of the central portion and the east wing of the State Historical Building to Schleuter & Company, of Chicago, for the sum of \$167,086.

DETROIT, MICH.—The North Baptist Church congregation have decided to build a new edifice corner Woodward Ave. and the Boulevard, and have voted to raise \$50,000 for the purpose.

DU BOIS, PA.—It is stated that the Buffalo & Susquehanna Railroad Company (H. H. Herden, chief engineer) has purchased a site, 350x400 feet, on the Boulevard, for the erection of a depot to cost about \$100,000.

DULUTH, MINN.—The Board of County Poor Commissioners have authorized John

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

De Waard to prepare plans for the poor-house, to be erected at a cost of about \$40,000.

ELGIN, ILL.—Report states that D. E. Postle, 204 Dearborn St., Chicago, is preparing plans for a high school to be erected in this city, to cost \$120,000.

ELIZABETH, N. J.—The Board of Education has approved the plans of Louis J. Quien, Jr., for a two-story brick school, to be erected at Prince St. and Union Ave., at a cost of \$38,000.

ELMIRA, N. Y.—Joseph Considine has been commissioned to make plans for a new edifice for St. Cecelia's R. C. Church, to be built in Lake St., north of Linden Pl. Cost, \$14,000. Rev. Father Maley, rector.

FERGUS FALLS, MINN.—Fremont D. Orff, architect, Minneapolis, is preparing plans for a brick schoolhouse to be erected at this place. Cost, \$25,000.

GADSDEN, ALA.—Report states that the citizens have voted to issue \$25,000 bonds for erecting a City Hall here.

GALESBURG, ILL.—Davidson & Rundquist have received the contract for erecting the high school here, for \$97,634.

GRAFTON, MASS.—Fuller & Delano, 452 Main St., Worcester, have prepared plans for a brick hospital to be erected here for the Worcester Insane Asylum. Cost, \$25,000.

GRAND RAPIDS, MICH.—Spiers & Rohn, of Detroit, have prepared plans for a two-story depot, to be erected here for the Grand Trunk Railway Company, at a cost of \$50,000.

GREAT NECK, L. I., N. Y.—It is reported that the congregation of St. Aloysius R. C. Church will erect an edifice here, to cost about \$50,000. Rev. Father Cherry, pastor.

GREENVILLE, MISS.—Report states that plans have been prepared for erecting a high school here, to cost \$25,000.

HAMBURG, ARK.—The Building Commissioners appointed by the County Court have accepted the bid of Messrs. Caldwell & Drake to build the new court-house for the sum of \$32,987.46. Frank W. Gibb, architect, Little Rock, drew the plan.

KNOXVILLE, TENN.—J. W. Allison & Sons have received the contract for building an edifice for the Congregation of the Centenary M. E. Church South, at a probable cost of \$30,000.

LOS ANGELES, CAL.—A fine new building, the most complete and up-to-date of its kind in California, and costing in the neighborhood of \$100,000, will be erected this fall at the corner of Lincoln and Figueroa Sts. by the Fraternal Brotherhood. The building will be of stone and will be four stories high.

MANCHESTER, MASS.—Arthur T. Lyman and George R. Harris, trustees, have sold about 4½ acres of land at Goldsmith Point, Manchester, to George F. Willett, who will build a handsome home.

MILWAUKEE, WIS.—It is stated that W. D. Sawyer will erect a dwelling on Wahl and Terrace Aves., at a cost of \$35,000, from plans of Parker & Thomas, architects, Boston, Mass.

A building permit has been issued to the trustees of Washington Ave. M. E. Church for the construction of a \$40,000 church at Grand Ave. and 25th St.

Architects Bueming & Dick, Pabst Theatre building, have prepared plans for a three-story schoolhouse, 96x152 feet, for the Board of Public Works, to be erected at Cass and Kewaunee Sts. Brick and stone, composition roof, cement fireproofing, hot water heat, etc. Cost, \$130,000.

MISSOULA, MONT.—W. D. Keeney has been awarded the contract to construct the new high school building at \$35,829. It is to be of brick and stone construction.

MOULTRIE, GA.—The contract for erecting

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

the school here is stated to have been awarded to G. W. Milligan, for \$18,100.

NASHVILLE, TENN.—It is stated that the Corner Realty Company, with a capital of \$150,000, will erect a twelve-story office building here.

NEW HAVEN, CONN.—The congregation of St. Joseph's R. C. Church is stated to have completed arrangements for the erection of an edifice on Lawrence St., to cost \$55,000.

Contracts for St. Joseph's R. C. Church, in Edwards St., have been awarded to J. H. Hogan (masonry), and David Clark (carpentry). Cost, \$55,000.

NEW ORLEANS, LA.—Favrot & Livaudais, 219 Carondelet St., have completed plans for a theatre to be erected on St. Charles St., for Dr. G. K. Pratt, the structure to be a two-story, 97x170-foot brick building.

NEW YORK, N. Y.—Superintendent of School Buildings C. B. J. Snyder is revising his plans for the new public school, to be known as No. 149, which will be erected on Sutter Ave., between Wyona and Bradford Streets, and it is expected that bids for the construction will be asked early in September. Another school building, to be known as No. 150, is to be built on Christopher and Sackman Sts., near Belmont Ave., in the near future.

Laboratories for the new Rockefeller Institute of Medical Research will cost \$325,000. Plans were filed recently by the Boston architects, Shepley, Ruttan & Coolidge. The main structure of five stories will front 136 feet on Exterior St., east of Avenue A. It will be 60 feet deep. The façade of brick and limestone will be decorated with pilasters of brick.

Louis Korn, architect, 31 West 33d St., is making plans for an eleven-story office building, 25x100, to be erected at No. 35 Maiden Lane, for Albert Lorsch. The building will be an addition to Nos. 37 and 39, owned by Mr. Lorsch, making a frontage of 75 feet, though no changes will be made in the present buildings. The structure will be of brick and stone, steel frame. Estimated cost, \$150,000.

McKim, Mead & White have completed plans for a residence for John Innes Kane, to be erected at No. 610 Fifth Ave., northwest corner of 49th St., to be four-story and attic, 47.5x100, with a three-story rear extension, 22.6x25, of brick and limestone, with a pitched roof of copper and tile. Estimated cost, \$200,000.

Archer M. Huntington will build a home for his new Hispanic Society on Washington Heights. It will cover eight lots on Audubon Park, from 155th St. to 156th St. The gift to the society of his valuable collection and his library, and including buildings, endowment, etc., will amount to \$1,000,000. The trustees named are Charles H. Tweed, Isaac E. Gates, J. T. H. Hillhouse, Francis Lothrop and M. C. Hillhouse.

Sass & Smallheiser, 23 Park Row, have prepared plans for a six-story brick, steam-heated store and tenement, 50x100 feet, to be built at Nos. 55-59 East 98th St., for Lissman & Sigal, 133 Suffolk St. Cost, about \$50,000.

The same architects are making plans for a five-story brick, steam-heated flat, 50x140 feet, on Washington Ave., near 171st St., Bronx, for Rosenzweig & Elson, 303 Canal St., at a cost of \$40,000.

Horenburger & Straub, 122 Bowery, have made plans for a six-story store and flat, 40x87.11 feet, to be built at Nos. 312-316 East 112th St., for Samuel Mandel, at an estimated cost of \$40,000.

Bernstein & Bernstein, 72 Trinity Pl., have prepared plans for a six-story tenement, 46.9x83.8 feet, at Nos. 391-393 Cherry St., for Binder & Baum, 190 Bowery. Cost, about \$50,000.

The Thompson-Starrett Company have been awarded the contracts for the Produce

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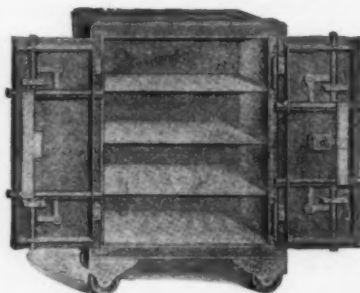
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Exchange Bank building, to be erected at the corner of Beaver St. and Broadway, of which Ernest Flagg is the architect.

OLNEY, PA.—The Zion Evangelist Lutheran Church, it is stated, has decided to erect a new edifice. Address Rev. F. W. Friday, pastor.

PHILADELPHIA, PA.—Rankin, Kellogg & Crane have completed plans for the \$90,000 fireproof office and storehouse for the Quartermaster's Department of the United States Marine Corps, at Broad St. and Washington Ave. Five stories and basement, 83x82 feet, brick, terra-cotta and granite.

John T. Windrim has completed plans for the Lyric Theatre, to be built by Charles B. Dillingham, at Broad and Cherry Sts. Cost, \$210,000.

PITTSBURG, PA.—County Controller Cunningham and Commissioners Mercer and Clark have awarded the contract for the extensions to the county jail to A. & S. Wilson for \$568,050.

PORTLAND, ME.—The Hebrew Society have awarded contracts for the construction of their new synagogue. The proposed structure is to be located on Newbury St., between Hampshire and India Sts., on the lot now owned by the society. The synagogue, according to the plans drawn by John J. Cunningham, a local architect, is to be a building 47x100 feet, and is to be built of brick, with granite and terra-cotta trimmings. Estimated cost, \$30,000.

REISTERTOWN, MD.—Reports state that the School Board has ordered plans prepared for a school to be erected here, to cost \$23,000.

RIDGWAY, PIKE COUNTY, PA.—Bolton & Dull, Philadelphia, Pa., have completed drawings and specifications for a Y. M. C. A. building at Ridgway, Pike County. It

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

will be a three-story and basement structure. The third floor will be used for dormitories, while a gymnasium will be constructed in the basement. The building will be of stone, brick and terra-cotta.

SEATTLE, WASH.—The Occident Trust Company has filed plans for an immense warehouse, of which the estimated cost will be \$150,000, which is to be erected in the near future by the Seattle Hardware Company. The location of the building will be at 501 to 511 First Avenue South, and it is to be of brick. There will be three stories, exclusive of the basement, and each floor will have a space of 120 by 135 feet.

Babb & Mendel, Denny building, are preparing plans for a brick and stone hotel, to be erected at Union St. and 3d Ave., for E. F. Bogardus; approximate cost for three-story structure, \$60,000, and for five-story structure, \$100,000.

SEBOWAING, MICH.—E. A. Bowd, of Lansing, is preparing plans for a \$25,000 school for Sebowaing.

SHEFFIELD, O.—The general contract for a new church to be erected here, for the parish of St. Joseph, has been awarded to Andrews Bros., of Cleveland. It will be a brick and stone building, costing about \$35,000.

SPRINGFIELD, MASS.—The plans of E. C. & G. C. Gardner, 33 Lyman St., have been accepted for a two-story, 136x60-foot brick school, to be erected on White St., at a probable cost of \$60,000.

ST. AUGUSTINE, FLA.—The erection of a court house, to cost \$25,000, is contemplated.

ST. PAUL, MINN.—The Board of Education contemplates the erection of two new high schools and other school buildings, to cost \$318,500. A list of new buildings required has been submitted by the Board of School Inspectors to the City Council, with a recommendation that they be constructed.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

TAYLOR, PA.—Report states that the citizens have voted to erect a high school here, at a cost of \$40,000.

TRENTON, N. J.—The Building Committee of St. Paul's German Evangelical Church, of which Carl Weissert is chairman, has approved the specifications submitted by Architect Brouse for the new church to be erected on the corner of Greenwood Ave. and Mercer St.

YOUNGSTOWN, O.—Owsley & Boucherle, Wick Bank building, are preparing plans for an edifice to be erected here for the congregation of the Hungarian Evangelical Reformed Church of Youngstown, to cost \$15,000.

PROPOSALS.

HEATING, ETC.

[At Hot Springs, S. D.]

Thomas R. Kimball, Architect, Omaha, Neb., has plans and will receive bids until 12 M. August 20 for heating and ventilating apparatus, elevators, wiring, plumbing and water supply for the Battle Mountain Sanitarium at Hot Springs, S. D. Plans may be seen with the Builders' Exchanges in St. Paul, Denver, Chicago and 346 Broadway, New York City. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., July 30, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 13th day of September, 1904, and then opened, for the construction (including plumbing, heating apparatus, electric wiring and conduits) of the U. S. Post-office and Custom house at Grand Haven, Michigan, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Grand Haven, Michigan, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., July 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 14th day of September, 1904, and then opened, for the construction (except heating apparatus) of the U. S. Post-office at Laramie, Wyoming, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Laramie, Wyoming, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., July 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 1st day of September, 1904, and then opened, for the installation of a conduit and electric wiring system for the U. S. Post-office at Norwich, Conn., in accordance with the drawings and specification, copies of which may be obtained at this office, or at the office of the Superintendent of Construction at Norwich, Conn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., July 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 8th day of September, 1904, and then opened, for the low pressure steam heating apparatus, complete in place, for the U. S. Post-office at Norwich, Conn., in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent at Norwich, Conn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., July 28, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 6th day of September, 1904, and then opened, for the construction (including heating apparatus, electric wiring and conduits) of the U. S. Post-office at Marshalltown, Iowa, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Marshalltown, Iowa, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1494

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 8, 1904. Sealed proposals will be received at this office until 3 o'clock P. M., on the 12th day of September, 1904, and then opened, for the construction (except heating apparatus, electric wiring and conduits), of the U. S. Post office at Kankakee, Illinois, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Kankakee, Illinois, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1495

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 2, 1904. Sealed proposals will be received at this office until 3 o'clock P. M. on the 25th day of August, 1904, and then opened, for the construction of the extensions to the U. S. Court-house and Post-office Building at Detroit, Mich., in accordance with drawings and specification, copies of which may be had at this office, or at the office of the Custodian at Detroit, Mich., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1495

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THE AMERICAN ARCHITECT AND BUILDING NEWS

Vol. LXXXV

SATURDAY, AUGUST 13, 1904

No. 1494



SUMMARY:—

Burning of a Wooden Grain-Elevator in Boston.—Reversion to this Style of Building might be safe.—Veto of the New York Fireproof-wood Ordinance.—The San Francisco Chapter, A. I. A. and the Oakland School-house Competition.—The Federal Government declines to give Full-day's Pay for Half-day's Work.—Mutual Defence against Malpractice Charges in the Medical Profession.—Extraordinary Titles invented for the modern Calculating-machine. . . .	49
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A FIRE in Boston a fortnight ago gave the fire-department a very difficult problem to handle, and incidentally afforded an illustration of the virtue of slow-burning construction. We believe the method of construction employed in building the grain-elevator we refer to was a very unusual one; at any rate, when it was built, some thirty years ago, it attracted much attention. The walls above the brick basement were of solid timber eight inches thick, formed by laying two-by-eight spruce plank flatwise all about the building and spiking each succeeding layer of plank to the course below, the cross-walls of the grain-bins being built in the same way, each alternate plank of the cross-walls lapping over the wall-planking, so as to give proper bond; the outside walls were covered with slate. At the time of the fire the building was empty, the lumber was dry as tinder and, as is shown, there was plenty of it, so that the fire was one of unusual intensity, for the material was admirably disposed, as the lower story into which the outer doors opened served admirably as a fire-box, with abundant air-supply. As there were no windows in the walls, the firemen had to fight the fire through the lower doors and through the roof when that gave way, having, we believe, to keep streams upon the ruins for something like thirty hours. One would think that such a building exposed to so intense a fire would have been consumed, but this was far from being the case. When one of the lower corners gave way, through the action of fire and the yielding of the basement brick-work, the huge parallelipedon formed by the solid timber walls simply canted in that direction and dropped to a new bearing on the ground; and there the ruin stands at present, only to be got rid of by tearing it to pieces plank by plank. One of the sides where the timber is exposed through the flying of the slate covering looks as if it had been attacked by a flock of giant wood-peckers, for the flames here and there had worked through a crevice and might have got a hold

on the outside surface but for the hose streams. Fierce and lasting as the fire was, it succeeded in burning only about two inches of the substance of the inner surface of the walls, while its intensity is shown by the fact that some of the yellow pine uprights in the lower story, which supported the bottoms of the bins, were, though sixteen inches square, entirely burned away at their tops, leaving only more or less acutely pointed frustums standing.

NOW that there are fairly satisfactory processes for fireproofing wood, it would seem as if it might be worth while to revert to this method of building grain-elevators. Usage and time have shown that bins so built are capable of withstanding the immense and ever-varying static pressure that service puts upon them, while other elevators built of brick, of iron and of concrete have failed in different parts of the country, causing large loss of property and sometimes of life. As built, the Boston elevator had only two disadvantages: it was combustible—a defect which modern fireproofing methods could now avoid—and a very considerable shrinkage had to be allowed for. As most of the machinery was in the lower story, shrinkage did not materially affect operations, but we remember that for a long time it caused serious trouble with the slating on the vertical walls.

SPEAKING of fireproof wood, it is well, since we have referred to the matter, to say that Mayor McClellan put his veto on the ordinance by which the New York Aldermen attempted to make the employment of fireproof wood compulsory in all private buildings seventy-five feet high, and all public buildings over thirty-five feet high. The Mayor pointed out that the new measure would not only in certain cases allow less satisfactory buildings to be built than under the present regulations, but that the building operations of the city would be brought to a standstill, since it would not be possible to secure enough of the treated wood to supply the average needs of builders.

BECAUSE the city of Oakland, Cal., wishes to hold a public competition to secure designs, specifications and drawings for several schoolhouses under conditions that seem to be unsatisfactory to the architects of that neighborhood, the San Francisco Chapter, A. I. A., has prepared and distributed a protest embodying fourteen "whereases" and four resolutions, which to us seem more likely to cause irritation than to bring about an amelioration of the situation. The mistake, it seems to us, lies in the resolution that it would be "detrimental to the interests of the city of Oakland if any but certificated architects were admitted to compete." This smacks of trade-unionism pure and simple, and comes with ill grace from men who probably are outspoken in condemnation of the similar efforts at exclusion made by labor unions. Actions speak louder than words, and if the holders of certificates are really superior to those practitioners who do not hold them, there is no need to say anything

about it. The circular would have been more effective if shorter and if it had said more simply that one per cent for six different sets of drawings calling for a building outlay of six hundred thousand dollars was too small pay for the work; that giving a bond was quite out of the question; that an expert adviser would be a help to both the officials and the competitors, and that the Chapter would provide such expert free of cost. The "dignity of the architectural profession" and the "rules of the American Institute of Architects" are matters which such building-committees have no respect for, and they are likely to resent all such references as so many attempts to teach them "manners."

ALTHOUGH the Chapter has replied at great length to the unusually unfair invitation of the Oakland Board of Education, it has neglected to reply to one of the unfairest of the stipulations. In this stipulation the Board "reserves the right in accepting any plan or plans to have such alterations made in the plans as will in the opinion of the Board improve the building without adding to the estimated cost of the same, and such changes in the plans shall be made by the architect without additional cost to the Board." Under this stipulation the Board could oblige its unfortunate architect to alter every feature of his design and absolutely rearrange every combination of his plan, steps which would, of course, entail a careful revision of the specifications. The Board would only have to allege that the required changes "will in the opinion of the Board improve the building." How the Board proposes to deal with the architect in case the changes commanded compel an increase in the "estimated cost" does not appear. As payment for the fruitless labor cannot be intended, it may be that in such case the Board intends to confiscate the private property of the unfortunate "successful competitor."

THE Comptroller of the Treasury is either a very poor politician, a very bellicose man or a good business man who has a respect for the law. He has assured the Secretary of War that it is not proper to pay a full day's wages for Saturday's half-day work, and as he has the decision in such matters, it is not likely that the workmen employed on the barrack building at Washington, the scene of the recent bricklayers' strike against a non-union man, will get the "unearned increment" they counted on. It would be very refreshing to find that, through its contests with the Federal Government, Labor could be brought to understand that all men alike are subject to the operation not only of statute law but economic law as well. A great deal of unnecessary mischief has been done through the yielding, for political reasons, of municipal and State authorities to the demands of laboring men. It has been easy to secure the passage of ordinances requiring shorter working days and better pay for men employed on public work, and that has always had an unsettling effect on the labor market, both in the matter of hours and the rate of pay, the constant and natural effort of workmen not in public service being to secure the same shorter hours and better pay. But if the Federal Government will insist that if workmen wish to work shorter hours they must accept propor-

tionately less pay, perhaps States and municipalities may take courage and decline to treat the laboring man occupied in the public service as an exceptionally favored citizen.

MUTUAL professional defence, which, as we have frequently pointed out, is so desirable and so possible for the architect, is still more desirable for the members of another profession. The ordinary man does not guess how often it is that a physician is either actually sued or threatened with a suit for damages because of alleged malpractice—not criminal malpractice, but the ordinary kind, due to ignorance or carelessness. Except in the surgical branch, medicine cannot be considered an exact science, and the chances of mistaken diagnosis and prognosis are inevitably great, and blunders are continually made, however innocently, and consequently the unreasonable or evil-disposed have ample opportunity for bringing genuine or blackmailing damage suits against an unfortunate practitioner whose only defense must and can be that his treatment was that which would have been adopted by other practitioners under the same circumstances. The New York State Medical Association, and perhaps similar organizations in other States, defends at its own cost suits brought against its own members in all cases where the officials of the society are satisfied that the accused physician has exercised due care and diligence. In the last three years it has had twenty such cases to defend and has won every one of them. The due care and diligence required of a doctor are not different in the essence from the due care and diligence which the law exacts from the architect, and it but adds to our own belief in the desirability of establishing a mutual defense association for architects in this country to know that physicians are enjoying the benefits of the method.

IF one has any interest in philology, the growth of a language through the invention and adoption of new words is an interesting matter to watch, and it is only reasonable to foresee a considerable increase in the American branch of the English language through the adoption of more or less foreign words that have caught the fancy of our workmen as they labor side by side with mechanics coming from all parts of the globe. Mechanics find themselves continually compelled to invent new names for new parts of new machines, and inventors often invent a name at the same time that they invent a machine, and now and then one of these names secures universal adoption, both as noun and verb, as "kodak," for instance, a word which has no philological derivation whatever. Botanists, chemists and, latterly, electricians have been prolific in the invention of new words, a large part of which are mere philological grotesques. But we do not believe it would be possible to find a more detestible series of new words than has been provided for that very useful apparatus, the modern calculating machine. Not being satisfied with such simple names as adder, calculator and mechanical accountant, the inventors of recent machines have bestowed on them such abhorrent titles as "addograph," "arithmometer," "arith-machine," "comptograph," "calcumeter," and "omni-metre."

THE STEEL-CONCRETE WORK OF THE HARVARD STADIUM.¹

ALTHOUGH the Harvard Stadium is well known in its general character to many members of this society, it may be well at the outset to recall briefly some of its main features.

The Stadium is a steel-concrete and steel grand-stand, U-shaped in plan, to accommodate some 23,000 spectators at football and other games on Soldiers' Field, in the Brighton district of Boston. It is intended to furnish a permanent, fireproof and architecturally pleasing structure in place of the short-lived and unsightly wooden grand-stands hitherto in use.

The structure consists essentially of five parallel rows of steel-concrete girders, columns and piers, extending around the U from tip to tip, and supporting a system of steel beams and trusses crossing them transversely. This transverse steel work in turn supports lines of steel-concrete slabs running around the U and forming the seating surface. The rows of steel-concrete work are designated by the letters A, B, C, D and E, counting from the interior outward. Row A, besides supporting ends of steel beams, includes the front parapet, a wall about nine feet in height and continuous around the U. Rows B and C support only steel work; row D supports the outer ends of the steel work and shares with row E the support of two steel-concrete promenades or galleries about twenty feet in width at levels of about 25 and 50 feet above the ground and running from tip to tip of the Stadium. Row E is a line of hollow piers separated by two stories of arched openings, and ultimately to carry a wall at the third story which, with the aid of a colonnade surmounting row D, will support the roof of the upper promenade. The openings of the lower of the two arcades of row E afford access to the stairways to the seating surface, and the openings of the upper afford outlooks from the promenade behind them.

The steel-concrete work includes, besides all the columns, piers, main girders, floors and the seating surface above mentioned, the outside and end walls, the staircases and all parapets and railings. The foundations are all of concrete, some reinforced, some plain. All parts exposed directly to the weather are of steel-concrete.

The developed length of the U at the outside row is 1,390 feet, and the uniform width across from front to back of the wings of the U is 98 feet. The area actually under cover is some 120,000 square feet, about 40 per cent of which is devoted to the semi-circular end, and the rest to the two straight wings. The lowest seat is about 8 feet and the highest about 48 feet above finished grade. The number of rows of seats is 31.

The over-all length of the Stadium is 575 feet, and the width is 420 feet, both exclusive of some small towers to occur at each tip of the U and a flight of two or three steps to extend the whole length of the outside. The highest part of the structure now finished is about 53 feet above the ground, but the addition of the covering for the upper promenade will make the final height 71 feet.

Durability, adaptability to rapid construction, coupled with its æsthetic possibilities and moderate cost, are the qualities which led to the use of steel-concrete to the extent above described. The steel work used to supplement it is under cover, accessible for painting, and will be kept isolated from combustibles, and is hence deemed acceptable from the point of view of permanence. It was fabricated while the concrete to support it was being placed, and much time was thus saved, and, under the circumstances, probably some money.

Most of the concrete work was cast in place in wooden forms in the ordinary way, but the slabs of which the seating surface is composed were of a special mixture and were cast in sand molds upon the ground in units weighing about 1,200 pounds each, and after hardening were hoisted into place and set upon the supports which were meanwhile being prepared for them. The concrete cast in the wooden forms is to be picked so as to remove the board marks, while the seat slabs have a satisfactory surface given by the sand mold. The steel reinforcement in all the concrete consisted of Ransome cold-twisted square steel bars (ranging in size from quarter-inch to inch), supplemented in the seat slabs with a special wire netting with rectangular meshes, electrically welded at the joints.

The concrete was mixed by machinery, two Smith mixers operated by gasoline engines constituting the plant for the purpose.

Constants for use in the concrete design were taken at figures

to be regarded as suitable for ordinary Portland-cement concrete of 1:3:6 mixture, though the concrete used was of varying mixtures, always considerably richer than 1:3:6. An attempt was made to use concrete of special mixtures for special places in the work, but this was found to be impracticable under the conditions—except, as above stated, in the case of the seat slabs.

Three grand divisions of the work went on simultaneously—the casting of the standing concrete (work going on on both wings at once), the manufacture of the structural steel work and of the concrete slabs. The results of these three operations were assembled by the setting of the steel work and the slabs.

The Boston Bridge Works had the contract for the manufacture and erection of the structural steel, but the steel-concrete work was done by day labor, the Aberthaw Construction Company being employed as purchasing agents and as field executives to devise, install and operate the steel-concrete construction plant.

The Harvard Athletic Association furnished the general and detailed designs for the entire structure, the architecture being in the hands of Messrs. C. F. McKim and G. B. de Gersdorff, of New York; the engineering design was the work of Mr. J. R. Worcester and the writer, and the whole was under the direction of Professor I. N. Hollis.

The foundations are of the simplest character, as borings showed only hard gravel and clay to a depth of at least 40 feet. They are mere concrete or steel-concrete blocks laid on the natural ground just below frost, so proportioned as to keep the maximum pressure on the ground from exceeding 7,000 pounds per square foot.

The methods and principles followed in the design of the remainder of the concrete work may conveniently be taken up under three general heads, viz:—

- (1) Columns.
- (2) Girders (simple and cantilever).
- (3) Walls and parapets.

COLUMNS.

All the columns contain twisted rods in the form of verticals at the corners, with or without horizontal hoops at close intervals. This steel was not, however, counted on as furnishing compressive resistance. Its utility was conceived to lie in withstanding any slight flexure that might come upon the columns from lateral forces due to temperature changes or other causes. This reinforcement consisted of three-eighths and half-inch rods, depending on the size of the column, one such rod being placed near each corner of the column. In order to guard against the risk of such slender rods buckling when too near the surface, square hoops of quarter-inch rods encompass them in horizontal planes at intervals, keeping their free or unsupported lengths within reasonable limits.

Besides adding flexural strength, as just described, this steel furnishes some protection against the failure by shearing on planes inclined about 55 degrees to the horizon characteristic of prisms of materials like plain concrete. It was not overlooked that Professor Hatt found² reinforced concrete prisms to stand compression rather less well than plain ones, but it was by no means clear that his conditions were repeated in the Stadium, and the desirability of a slight amount of flexural strength already mentioned, and of the increased protection furnished by the steel against shrinkage or other cracks, made it seem on the whole preferable to use it. The columns proper range in size from 14 x 14 inches to 24 x 33 inches. Besides these, and designed in the same general way, with corner vertical rods and horizontal hoops, except that they are hollow, are the piers showing in the outside wall and already mentioned, which are externally 66 x 36 inches, the walls along the 66-inch side being 4 inches thick and the other two 6 to 8 inches thick, the 8 and 6 inch ends being counted on as furnishing the whole compressive strength.

The cross-sections of the columns were determined by applying an allowable compressive stress of 350 to 400 pounds per square inch to the maximum combined live and dead load, increasing the results thus obtained whenever necessary to keep the ratio of the length to least side of column down to about twelve, or to give round numbers for dimensions of the section. The structural steel work and concrete girders and struts were arranged to aid in keeping down the ratio of length to least side.

GIRDERS.

Out of the multitude of methods advanced for the design of steel-concrete girders, one based upon the observations of Prof.

¹ Extracts from a paper by Mr. Lewis J. Johnson, M. S. C. E., read before the Boston Society of Civil Engineers and published in the *Journal of the Association of Engineering Societies*.

² *Engineering News*, July 17, 1902, p. 54.

W. K. Hatt¹ was adopted throughout the work. This method seemed at least as rational as any; it gave conservative results, and (thanks to suggestions drawn from Mr. J. W. Schaub's letter in the *Engineering News* of April 30, 1903, p. 392) was very easy to use. This method ignores the tensile strength of the concrete, assumes a parabolic distribution of compressive stress and assigns a position to the neutral axis dependent upon the percentage which the cross-section of the steel tension flange bears to the whole cross-section of the girder. The proper and economical percentage of steel being dependent upon the relative cost of concrete and steel, about seven-tenths of one per cent was a value commonly used in the Stadium, though it is a question whether a higher one might not have been generally more economical. With the assumed steel percentage, the maximum unit compressive stress in the concrete was determined for the load which would be supported at the appearance of the first crack on the tension side, and a fraction of this load was taken as the allowable load, this fraction being the ratio of the assumed allowable 500 pounds per square inch to that figured out by the parabolic principle as the maximum at the time of the first crack. Thus the maximum working compressive stress on the concrete is believed to be kept from exceeding 500 pounds to the square inch.

The appearance of the first crack was assumed to be accompanied by a tensile unit stress of 36,000 pounds per square inch in the steel. This is considerably below the elastic limit of the steel used, but it implies an elongation of about one-eighth of 1 per cent, which was taken to be as much as even armored concrete should be trusted to stretch without a crack.

The steel-concrete beam work included simple girders, 24 feet 9 inches in span, with sections 16 x 47 inches, 18 x 45 inches, 22 x 60 inches and 24 x 60 inches, and two systems of curved (radius 190 feet) cantilever girders in row D with sections 18 x 45 inches and 24 x 60 inches respectively. The cantilever system permitted the retention of the same cross-section throughout the curve in this line of girders as was used on the tangent, and to some extent counterbalanced the rotary effect of the curvature of the girder. The ends of cantilevers and of suspended spans being critical points subject to very severe shear, they were stepped so as to reduce the effective concrete area as little as possible and armored with special care. The stirrups used here were of special construction, placed in an inclined position, and were designed to resist the whole vertical shear.

The cantilever ends tend to act as joints at which the shrinkage stresses are relieved. The first suspended span to be built shortened in hardening and slipped on the treads of one of the stepped ends so as to show a crack throughout the extent of the risers of the joint, and in slipping spalled the corners of the steps slightly. After this, four 1-inch rods were put in at mid-height of the girder and lengthwise with it, crossing the joint and extending into both the cantilever end and suspended span far enough to develop the strength of the rods with a view to prevent this slipping, and, so far as seen, the result has been a success. Shrinkage joints are thus kept about 115 feet apart in this line. At the ends of these intervals are opportunities for shrinkage to take place harmlessly. Besides using the rods, the steps were finished off with a troweled surface truly level, so as to leave things in shape for a harmless slip should the rods prove ineffective. It was at one time planned to use two quarter-inch steel plates lubricated with graphite at each of these treads to facilitate sliding and to prevent spalling, but it did not finally seem necessary to go to such a length.

These lines of cantilever girders were subject to a very complex set of loads and were much cut up by promenade-floor beams and passageways for stairs. The girders in row C, on the curve, were all straight—a series of chords—but they support the ends of trusses and are hence much larger than the girders of the same row on the tangent, their section being 22x60 inches as against 16x47 inches.

The promenade floors were made of slabs of inverted trough section about 8 feet 3 inches wide and some 20 feet in span, cast alternately in place, thus providing shrinkage joints at the edge of every slab; the thickness of the body of the slab is 4½ inches, exclusive of the granolithic finish, and the flanges are 6x18, making practically a 4½-inch flat floor resting on 12x18 joists 8 feet 3 inches on centres and 17 feet in span.

The seat slabs are a series of —'s set up so as to form a flight of treads and risers. They are of crusher-dust concrete (poured at a consistency of cream) reinforced by a half-inch

rod at the base of each riser and electrically welded steel wire netting with rectangular mesh furnishing straight wires 0.162 inches in diameter, 5 inches on centres running across the treads and up the risers. The wires running the other way are somewhat smaller and closer together. In the treads this netting furnishes the ordinary tensile reinforcement for the span from riser to riser, besides hanging one edge of the tread to the base of the riser, and in the risers it furnished vertical reinforcement against shear, for the risers constituted a series of joists running from one steel beam to the next, the span being usually 8 feet 3 inches.

These slabs were cast in small units of about eight cubic feet each to facilitate handling and to provide amply against shrinkage cracks. They were some 4,800 in number, and, including those on the curves, required ninety-five different patterns, counting rights and lefts as alike, and in many cases counting as alike such patterns as varied only slightly in length. On the semi-circle they were made curved, but a constant radius was used for all, regardless of their distance from the centre. The true radii would have had thirty-one different values, ranging from 115 to 189 feet, but 166 feet 8 inches was chosen as a convenient mean to use for them all.

The handling which all these slabs underwent in storing and placing formed an automatic system of testing, which was considered a distinct advantage of the method of manufacture. They were cast with one-eighth-inch allowance for end joints, but the sand casting proving to be a less accurate process than was expected, more or less picking and clipping had to be resorted to in setting them. An additional and probably more important cause for such modifications was inaccuracy in the steel-setting.

The treads of these slabs are an illustration of concrete reinforced with a small percentage of steel and accordingly rated for strength from the point of view of the steel. This strength is ample almost to excess, even with this small allowance of steel, yet thinner sections of concrete were not seriously considered, three and a quarter inches on the average being adjudged a suitable minimum from the point of view of resistance to abrasion, shocks, etc., and the omission of the steel netting altogether was, of course, not seriously entertained—even though the concrete might, by counting on its tensile strength, be figured out as strong enough.

WALLS AND PARAPETS.

The special problem in the design of the walls and parapets which will be considered here is how best to provide for shrinkage so as to minimize the evil of cracking from this cause or from temperature changes. One way is frankly to leave joints at short intervals free to open, using steel reinforcements between these joints to compel all the cracking effect to appear, if at all, at the joints left. These joints are supposed to open in tolerably straight, clean cracks, less unsightly than random cracks would be. They are unsightly enough, however, and it is difficult to make the cracks turn out as straight as expected. There is, therefore, a strong incentive to resort to the other method of treatment and attempt to prevent all cracks from temperature and shrinkage changes by the aid of proper reinforcement with steel. M. Considère's experiments afford a rational basis for expecting success from such a venture, reinforced concrete having been shown by him to be capable of stretching, without showing cracks, to an extent far greater than that of plain concrete. Mr. A. L. Johnson reports² actual success in building a concrete wall 300 feet long, 8 inches thick and exposed on both sides to the weather, without any joints, and with no cracks appearing in the first year, or up to the time of his report.

In the outside wall of row E of the Stadium there was nothing else to do but to depend upon steel reinforcements to prevent shrinkage cracks. It was a place where cracks of any kind would be most objectionable. Expansion joints were left at intervals of 16½ feet, as in the front parapet, but they had to be placed over the centre of the piers, in spite of its being realized that the friction from the weight of the superimposed mass would probably prevent all sliding, and thus prevent such joints from being effective. The amount of shrinkage to be expected in setting, or cooling to the minimum temperature, was estimated not to exceed about 0.0005 to 0.0006 of the length. Professor Hatt found³ that 1:2:4 concrete with 1 per cent reinforcement would stretch 0.00088 before cracking. Considère and A. L. Johnson lead us to suppose that this stretch may be considerably more. At any rate, the margin seemed sufficient, and as the

¹ *Engineering News*, February 27, 1902, p. 170 and July 17, 1902, p. 53.

² *Railroad Gazette*, March 13, 1903, p. 183.

³ *Engineering News*, July 17, 1902, p. 55.

two faces of the wall in question were only 4 inches thick, 1 per cent reinforcement was quite feasible—only a half-inch rod every six inches being required—and was adopted. Thus far, after several months from the completion of the first of this work, neither crack nor opening of the joints in the whole extent of the two lines of nearly 1,400 linear feet each (with one or two insignificant exceptions) has come to the writer's notice. The joints not opening show that the concrete between them must have stretched as expected. The results of the winter's exposure are looked forward to with much interest.

The front parapet was executed upon the principle first mentioned, shrinkage joints being left every 16½ feet, which opened perceptibly immediately upon the hardening of the concrete, and now constitute open joints sometimes a sixteenth of an inch in width, changing as the temperature rises and falls.

The experience with the back wall being reassuring, and the tying together of row D into continuous sections of about 115 feet each causing no harm, it was determined to apply the same principle to the broad expanse of the end walls, which forms the finish at the tips of the U. These walls are some 75 feet long and from 9 to 50 feet high. They are in the main mere curtain walls only 4 inches thick, supported by a series of columns with which they are monolithic. These walls are armored freely with quarter-inch rods—less care being taken to keep the percentage up to 1 per cent than was observed in the back wall, the smaller area involved being regarded as justification for venturing below the 1 per cent. These walls have now been stripped several weeks, and so far no cracks in them have come to the writer's notice.

It was seen, as the work progressed, that the completion of the Stadium with all the architectural ornaments before the Yale game was out of the question, but work was pushed on the parts essential for carrying the seats, and by the use of temporary woodwork instead of concrete slabs on the steel beams of a portion of the structure, the whole seating surface was ready for use some days before the Yale game, and on the day of that game, five months and two days from the setting of the first batterboards, and less than five months from the turning of the first shovelful of earth, the Stadium was occupied comfortably to its full final capacity.

DISCUSSION.

PROF. ARTHUR W. FRENCH, Worcester Polytechnic Institute.—In planning a concrete-steel building, before reaching the details, careful consideration of the peculiarities of concrete-steel combinations may well decide many important features in the layout of walls, columns and beams.

With the available space below the seats of the Stadium, it may be a question whether the girders of 24 feet 9 inches span, carrying heavy concentrated loads, might economically have been replaced by shorter spans and a greater number of columns.

I can but feel a bit of regret that such a monumental structure was not planned to avoid all exposed structural steel, and that reinforced concrete, which forms so large a part of the Stadium, was not used exclusively.

The first thing that strikes one as peculiar in the construction of concrete work is the fact that the structure cannot be built as a monolith; that it is cut up, as Professor Johnson has shown—cut up into sections to provide for expansion and for possible cracks. This leads to many complications. The day's work is stopped at places where, on the plans, it would look as though filling up with concrete might go on; the day's work at certain points is limited, and the work must be spread over considerable areas. If we dared to build such structures without joints it would greatly simplify the matter.

The spacing of the steel in the columns offers some difficulties, especially with the hoops. The four rods in the corners of the columns, without the hoops, are very easy to keep in place, and to keep exactly at the right distance from the corner.

The minute the hoops are introduced we must have a free chance, from the top to the bottom, to drop the hoop over the four corner rods, and it was with some fear of having them show through the concrete that I placed them as shown. However, I think none of them have shown through. The packing of the steel in the beams has been well illustrated; and the introduction of stay rods, for the purpose of taking up the shearing, adds to the difficulties of placing the concrete.

One feature of the concreting, very pleasing to me, was the agreement, between Professor Johnson and the Aberthaw Company, as to the consistency of the concrete. Being a firm believer in wet concrete, I was delighted to have a chance to use it.

Those columns, 14, 16 and 24 inches square and 25 feet in

height, we found it would be impracticable to fill, except from one stage at the top. If that concrete had been put in dry, or of the consistency advocated by some in the past, it would have been difficult to produce smooth or solid work. It was put in wet enough to spade easily into place, the spades being worked continuously, usually by two men. I think those of you who have seen the work have noticed that it shows full, without voids. Experiments show that it is equally solid throughout.

As to the effect of consistency upon the strength of the concrete, there may be a difference of opinion. I believe that, after a lapse of time, it will compare favorably with any drier mixture.

The work at the Stadium was a summer's vacation for me, and one leading to very pleasant connections with the supervisors and those in charge at Harvard. My particular interest was in the study how to place that work. The plan adopted was, I think, fairly satisfactory, as shown by the time taken to bring the work to such a state of completion that it could be used. The structure is 50 to 60 feet in height, and has various heights. Except the 16-foot promenades, there were no level landings upon which to place derricks, and the first question was to design the handling plant. We adopted towers and cableways, as you noticed on the slides. They have their limitations, but, on the whole, were fairly satisfactory. The towers were rolled along on tracks and placed wherever the cables could be used to the best advantage. The casting floor of the foundry was served with cranes and railroad tracks, as was clearly shown.

The subject of concreting with steel reinforcement may be made too complicated, so far as theory goes. I am perhaps not competent to judge, but it seems to me the design of the section of a beam will be changed. The variations in the modulus of elasticity in concrete prohibits any fine computation of sections, and I believe it will be, as Professor Johnson has shown, so simplified that any engineer will pick out his concrete-steel beams with something of the confidence he feels in choosing timber, and with similar limitations.

I think there is nothing further I can now add to the discussion. I am glad to acknowledge my indebtedness to the Society and to Professor Johnson for a chance to hear the paper.

PROF. GEORGE F. SWAIN.—With reference to the protection of steel by concrete, foreign authorities claim, as is well known, that rusty steel or iron, if covered with concrete, will lose its rust and become bright. I should like to ask Professor Norton whether he has any experiments which substantiate this. In the East Boston tunnel the steel rods used were cleaned by the sand blast, it being considered best to be on the safe side. Perhaps this precaution was unnecessary.

PROFESSOR NORTON.—In answer to Professor Swain's question, I would say that, paradoxical as it may seem, with quite a number of specimens, which were coated with what would be called rust (not oxide, but rather hydrate of iron), or rather the beginning of rust, we found the specimens were cleaner after the experiment than before, and that they weighed a little less than when the concrete was put on. The action is small, because we had taken every precaution to treat them as harshly as possible. The weighings were made as carefully as could be done. I have been very chary about making statements on that point. The evidence certainly points to a real formation, on some of the heavier specimens of iron, free of iron hydrate or iron oxide. Whether this formation is of any use or not I do not know. It looks like a black smouch on the iron itself rather than a return to the structural material.

I had commenced to make one hundred or more slabs of cinder and stone concrete for one of the construction companies. The results of that investigation not being complete, we have not yet been able to publish it, but one of the things we did find out was that mixing the concrete just as wet as we could mix it, so wet that we had to put waxed paper on the bottom and sides of the mold, and then mixing it just as dry as we could mix it and tamping from above, so that the mixture was solid—that is, well together,—the one was gelatinous; you could have run a shovel in and cut a groove in it and it would return to its position; while the other was of such rigidity that if you stepped on it the imprint of your heel would remain in it; all were made and the slabs were broken. In the meantime we weighed some of the smaller pieces. We could not find out by breaking or weighing which was mixed wet and which was mixed dry. In breakage, the difference between wet and dry was less than 5 per cent, which was less than would be expected. Some were cinder-concrete and some were stone-concrete. They were of different

thicknesses; 2, 2½, 3 inches, etc., to 8 inches, and the sizes of the slabs from 2x3 feet to 8x10 feet.

Moisture in the mixture seems to aid in making a first-class bond between the concrete and the steel. The metal was imbedded within an inch of the lower surface. Every one of the slabs carried a certain definite load, up to the point of developing a tension crack. The cracks give very ample warning. Some deflected 6 inches before they broke, a very interesting point in view of the question of safety to viewpoints of a building.

We are having a good deal of steel-concrete with corner-tension rods of steel, a most excellent place to put it, from the point of view of strength, but a poor place in case of fire. I have known a concrete structure, built for testing purposes by Professor Lanza and myself, having one inch of concrete between the steel and the fire. Then we put it through the New York fire test. It stood it for 3 hours and 40 minutes, and then the posts gradually weakened. The concrete softened and the iron began to pull through. Finally, when the concrete was weakened, the whole thing fell down and was discredited, as it would not have been had there been an inch more of concrete between the steel and the outside of the posts. I would suggest that no work be put up with less than an inch and a half of concrete outside the steel.

THE VALUE OF ACCIDENTAL EFFECTS.¹

MR. PRESIDENT, LADIES AND GENTLEMEN:—The few thoughts that I have to lay before you cannot claim any such title as a lecture, and if they lack continuity you will, I hope, kindly overlook it, and at the same time believe that I am proud to be allowed to lay before you a few of my convictions upon the many absorbing matters that are now exercising the minds of those who are keeping abreast of the times in the movements of the artistic world, and especially to that part of it that is concerned with the fitting and decoration of houses.

I am following with great interest the struggles of the trade to keep up with the ever-increasing and ever-improving demands of the public for superior kinds of wall decoration. They have to fight against a desire on the part of every man who builds or occupies a house to have it quite differently arranged and finished from the way in which his friends and neighbors have done theirs. He wishes his own idiosyncrasy to make itself felt; but in the multitude of patterns with which the shopman assails him, he feels his personality slipping away from him, and the inevitable tendency overtakes him to give way to the tastes of others. The amount of trouble that is entailed by a really personal or individual treatment of a room is enormous. The expense is not necessarily greater than, and often not so great as, the more generally employed methods; but a lot of time and care has to be used and any amount of patience.

Public interest in art has shown no greater activity than in the matter of wall coverings and decorations, and the trade has made enormous efforts to keep pace with the times. But beautiful as some of the later wall papers are, they can never quite satisfy the needs of the most discriminating, unless they are tempered by individual discretion. This individual interference with the regularity of effect derived from machine-made papers and friezes is nothing else than the introduction of intentional accident. It seems to me, therefore, that the use of flat papers on walls of living rooms is the inevitable outcome of our modern refinements, and that the use of these papers will quickly become the rule rather than the exception. Now when an architect can persuade his client to have the woodwork perfectly plain, and the walls perfectly plain, he has done all that can be asked of him to do in the way of saving that client from the domination of pattern, and leaves him a perfectly free field wherein to exercise his own particular likes and dislikes.

If floor, walls and ceiling are treated on the principle of flat colors for flat spaces, what more responsive material can a tasteful person desire wherein to turn loose his own individuality? A room treated in such a way at once puts the occupier on good terms with himself, and arouses his slumbering discriminations, and he finds himself possessed of niceties of thought and intention the very existence of which he had never dreamed. But there are some who ask more of an architect than this, for the excellencies of this treatment are rather negative than positive. He prepares the ground, as it were, but of the nature of the crop that the ground is prepared to carry he is silent. Now, I am amongst those who think that it is within the province of the architect to give at least a limit as to how the precious and inti-

mate touches that remain to complete the scheme should be given. An architect has a finer sense of proportion and of values than laymen as a rule can claim. He knows just where an enrichment should be, and how much of it is required to gain a certain end. His power of reserve is much more in practice, and he can restrain—for in domestic work restraint is the rarest and the most valuable of all the virtues. A wall, or any given space, gives a sense of having been decorated, or treated, if one definite spot within that space has received careful thought in relation with the whole. And the sense of decoration so obtained is much more telling and more valuable than if the space we speak of had been worried and teased over every portion of its surface with a fussy repeat pattern that may be good enough in the unit, but in the remorseless repetition a weariness and a grief to all honest folk. Stock patterns are the whole making of business; but an architect must not hesitate to protest against their permanence.

Why should it have been possible, in the last few years, to revolutionize the whole of the interior arrangement and decoration of passenger steamers, to the joy and delight of all those who go down to the sea in ships, and do their business in deep waters, while our own houses are still filled with the lumber of the seventies and the eighties? It will not do to temporize with these things. If the architect takes up a firm position, based upon a foundation of good taste, it would soon become impossible for the most self-willed client to "commit mahogany" in the vestibule or "stuccocide" in the front veranda. To the man who says we must hasten slowly, we must be courteous but firm. "These things must go, for there is no appeal against good taste." The marble clocks and geometrical wall papers must be pulled out at once, and along with the antimacassars and painted coal-scuttles must be "nailed like vermin to the gates of time." Compromise and arbitration are not signs of strength and of enlightenment. They are skillfully concealed traps into which the most well-meaning may fall. They are not what they seem, and need deceive no one, even though they bear the imprint of the Trades Hall.

I say that it is unwise to admit that there is a question about the need of still further improving the interior arrangement of dwellings. Finality and autocracy is as becoming for an architect as it is to a doctor, and in the question of well-placed and precious enrichment it behooves you to be very firm with your patients.

Quite lately I have been working in a house that has been recently constructed out of two smaller adjacent houses. The original ten or twelve rooms of the two former houses are now reduced to six larger rooms of the new house; and I have been very much struck by the unsuspected effects that have resulted from this unusual manner of house making. We have rooms of unheard-of shapes, floors of different levels, doors and arches of all sizes and shapes, with a general air of what I suppose would be called quaintness. What is the most remarkable thing about it is that nothing seems to be out of place. It is the easiest house in the world to decorate, because whatever you do seems right. I have spent some time in consideration of this problem, for to me it is a real problem, and I regret that I have arrived so far at no very definite thesis to lay before you; but I would like to place it before you as an instructive question as to how the accidental effects so obtained are all so very happy, and why, as might have been expected, there are no waste corners and inconvenient passages. I am not, of course, going to assert that the planning is as good as it could be; but I can vouch for the pleasure that the house gives to those who live in it, and the kind and appreciative way the house receives all efforts to embellish it. Are we inclined to make our homes too formal, with the ever-present bogey of the contractor before us? It is cheaper to build as we do, no doubt, but I will raise a plea for accident in everything. I believe that the effects that we gain from accident are of sufficient value in the long run to make it worth while, sometimes, for an architect to throw away his dividers and his T-square, and to draw his plan and his elevations without them.

ATTEMPT TO EXTINGUISH A BURNING COAL MINE.

A SYSTEMATIC effort to extinguish the greatest mine fire in the anthracite coal region was commenced this week, says the *New York Evening Post* of Aug. 6, by the Lehigh Coal and Navigation Company, which owns the Greenwood mine near Tamaqua. The mine has been on fire for the past fifty years, and in all that time has not been worked. It still contains, so the mining experts calculate, millions of tons of fine coal, chiefly in

¹ A paper, by Blamire Young, M. A., read before the Royal Victorian Institute of Architects at Melbourne, Victoria.

the Mammoth vein, which at this portion of the region is from thirty to sixty feet thick, and it is for this wealth of coal that the company has started a fight which it is estimated will cost \$1,000,000 and will take two years to win. Preparations to fight the fire have been under way for a year, following a careful survey of the workings, the extent of the fire, and the possibility of putting it out. All previous efforts have been confined to a spasmodic flooding of the burning portion, which has not been effective.

The mining officials have discovered that the fire is raging in the loose coal above the water level, that the great pillars of the Mammoth vein are still standing undamaged, and that all of the lower veins are intact, the millions of gallons of water which have from time to time been poured into the mine having saved the coal despite the fact that it had no other effect upon the fire than confining it to a certain portion of the mine.

The fight will be conducted from the mountain-top above the highest levels of the workings, and not far from the spot where it is believed the fire started fifty years ago, when some timbers were ignited by a miner's lamp, or the ignition of a gas feeder.

A mixture of culm and water will be the fire-fighting agent. This not only smothers the fire wherever it reaches it, but hardens into a mass almost as solid as coal, and forms a pillar which prevents the workings caving. It will have the valuable effect in this case of extinguishing the fire and filling up the fire-eaten workings, so that the adjoining pillars, which have supported these workings, may be removed. The company will thus gain great quantities of coal which could not otherwise be touched.

Four 100-horse-power boilers have been erected on the banks of the Schuylkill River, and will operate two mammoth duplex pumps, which will pour into the mine 1,728,000 gallons of water every day. This water will be carried 1,600 feet in ten-inch pipes from the river to the top of the mountain. There it will be turned into big troughs and mixed with immense quantities of the culm, which will be hauled by train from the Hauto culm banks six miles away. The mixed culm and water will then be run down steep chutes into the burning workings.

At the same time, at a number of points over the fire, bore holes will be drilled from the surface. These will not only serve to locate the fire, but will also draw off the gases formed by the burning coal, which have been in such volume that they have held the water back from the fire.

As one working after another is flushed with the culm and the fire extinguished, the long chutes down which the culm and water is washed will be moved to another working and the fire will in this manner be slowly but surely smothered. At the same time barriers will be built in the mine to prevent the fire spreading to untouched portions. These barriers have been built from time to time, and many of them are still serviceable.

When the fire is all out and the mine again ready to be worked, the company will erect one of the largest breakers in the region, and the breaker and mine will give employment to over 1,000 men and boys.

AMERICAN MARBLE.

ACCORDING to a correspondent of the *Commercial Intelligence*, the prejudice so long entertained by many workers and dealers in marble against the marbles of America, either for architectural or statuary purposes, was probably due to the fact that the most famous and successful of our sculptors and architects were educated abroad. They maintained that the American marbles were not sufficiently solid; that the texture was not uniform; that the colour varied greatly throughout the same mass, and that it was not susceptible of high polish. And yet fifty years ago, when these opinions were widely held by Americans, the Vermont quarries were worked to the extent of between \$2,000,000 and \$3,000,000 a year.

This prejudice was finally overcome by a comparison of the white marble in Rutland County, Vermont, with that of the ancient and world-famous Carrara marble of Italy. The marble of the Alps had a reputation so old that it was commonly believed to be without colour or defects of any kind, but this was soon discovered to be an error. Much of the common Carrara marble is of a bluish colour, and, therefore, unfit for statuary purposes; it somewhat resembles the so-called "Wincoski" marble of Northern Vermont, except that it is streaked with gray instead of red veins.

The Cambrian beds of Vermont, forming headlands and cliffs along the shore of Lake Champlain, extend from Canada southward for about ninety miles. Though nowhere more than a few miles abroad, they have a total thickness of not less than 10,000

feet. Included in these beds are thick layers of a beautifully mottled red and white dolomite, now extensively used in America for architectural purposes.

The purity and solidity of the white marble from the Rutland quarries is now acknowledged in Europe as well as in America, and all that part of Vermont has been named the "American Carrara." It is well adapted to the needs of sculpture as to the finer forms of architectural ornamentation, and almost all the statuary now executed in this country, especially if it is intended for a public building, is carved from blocks of Rutland marble. Moreover, the marble of the "American Carrara" not only compares favourably with that quarried in Italy, but bids fair to prove as inexhaustible.



[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

THE KARL MULLER PEOPLE'S BATHS, MUNICH, BAVARIA. HERR KARL HOCHNER, ARCHITECT.

This and the following plates illustrating this building are copied from *Zeitschrift für Bauwesen*.

PLANS OF THE SAME.

LONGITUDINAL SECTIONS OF THE SAME: TWO PLATES.

DETAILS FROM THE PALACE OF LIBERAL ARTS: LOUISIANA PURCHASE EXPOSITION, ST. LOUIS, MO. MESSRS. BARNETT, HAYNES & BARNETT, ARCHITECTS, ST. LOUIS, MO.

COTTAGE OF HERR HERMAN SOLGER, SUDENDE-BERLIN, PRUSSIA. HERR GUSTAV JANICKE, ARCHITECT.

This plate is copied from *Architektonische Rundschau*.

Additional Illustrations in the International Edition.

THE ALBERT MEMORIAL CHAPEL, WINDSOR, ENGLAND.

INTERIOR OF THE SAME.

DOORWAY TO CHURCH OF SAN ANDREA, VALENCIA, SPAIN.

GENERAL VIEW AND MAIN ENTRANCE: HOUSE OF THE MARQUIS DE DOS AGUAS, VALENCIA, SPAIN.



A PSEUDO GREEK GEM.—The history of Pistrucchi's gem, "Anacreon and His Roses," is at once ludicrous, humiliating, and almost tragic. It was doubtless not a little mortifying to Payne Knight when, convinced of its value as an antique, he showed his prize to Sir Joseph Banks, to find himself in the presence of the man who "minded the bigging o't." Knight became as angry as Scott's Antiquary, and persisted not less vehemently that Pistrucchi, who claimed it as his own work, must be mistaken. To his assertion that it was the finest Greek cameo in existence, the engraver replied by an expression of thanks for the compliment thus paid to him. Knight, growing still more angry, said something to Sir Joseph Banks which made Sir Joseph angry with Payne Knight, and when the antiquity of the gem was made to rest on the alleged fact that the flowers in the hair were different from any modern ones and that the seed was lost, Sir Joseph exclaimed, "They are roses, and I am a botanist." What follows cannot be fairly given except in Pistrucchi's own words: "Then Knight turned his face towards me again and began to cross-examine me, which was a new thing to me, as it is not the custom in our country, and said very sharply to me, 'For whom did you do it?' 'For Angiolo Bonelli.' 'How long ago?' 'About six years.' 'How much did he pay you?' 'Twenty Roman crowns' (under 5*l.*). 'What stone is it?' 'It is a breccia di carniola.' 'How long were you doing it?' 'About eight years.' 'Who had it set in the form of a ring?' 'I myself.' 'For whom?' 'For Angiolo Bonelli.' 'But I think you are mistaken.' 'Certainly not.' 'Look at it well.' 'I do not want to look at it. I remember it as if I had done it at this moment. However, if you look well at the top of the head, you will find upon the twist of the hair a letter, which is my private mark.' 'That is no proof. You may have got it done, and it may not be your work.' 'Why

should I have got this done, when I know how to do much better?' 'I do not believe it. You may say what you please.' 'It is of no consequence to me. These hands can convince you.' 'I should like to see.' 'But many persons in Rome remember when I began and when I finished it, and I have the original model at Rome in my house.' In short, after repeated examinations he gave in, and said, 'You will leave England loaded with riches, and I will be the first to tell my friends that you are an extraordinary man.' The promise was not redeemed, and Payne Knight's conduct in the sequel was assuredly most unlike that of a man who loved truth better than his gems. Not choosing to confess himself in error, he challenged Pistrucci to model a similar subject differently treated; and when he found that the model was more beautiful than his so-called Flora, he went no more to see the engraver. The engraver accordingly went to him as soon as the model was ready, carrying with him a number of stones, none of which, however, satisfied Payne Knight, who in the end promised to send Pistrucci a stone. This was never done; and having further refused to unset the gem and convince himself that the Flora was a whole cameo, not a fragment, Payne Knight ended by describing it in the catalogue of his gems as a head of Proserpine, with a wreath, not of roses, but pomegranate flowers, and by asserting that the patina found on the gem clearly gave the lie to Pistrucci.—*The Architect*.

DISCOVERIES AT OLBIA.—Some highly interesting and valuable archaeological discoveries have been made on the site of the ancient Greek city Olbia. The site is situated on the southern bank of the Boug, about midway between Otchakoff and Nicolaieff, and not far distant from the estuary of the Dnieper. This ancient city was a colony of Miletus 655 B. C., and was a great centre for Greek trade with the interior. It is generally maintained among archaeological authorities that a trade route extended from Olbia across country to the northern sea, and when a find of ancient Greek coins was made, it was contended to be substantial proof of the fact. Recently, however, it was proved Getæ about 70 to 60 B. C., but it revived, and when it was that these coins were spurious. Olbia was destroyed by the visited by Dion Chrysostom, about 100 A. D., it was again a flourishing city. The excavations that are now in progress upon the site of this city are being carried out by M. Formakovski under the auspices of the Russian Archaeological Society. Mr. Formakovski has succeeded in unearthing extensive portions of the walls and foundations of the original city, which date back from the seventh century B. C. The masonry is identical with that of the ruins of ancient cities excavated in various parts of Greece. Before this depth was reached, two different strata of walls and basements bearing descriptions of the fourth and first centuries B. C. were encountered. The stone blocks composing the ruins of houses, temples, etc., in these upper strata are of remarkably exact area, square proportions, and excellently dressed. The more solid constructive work is, however, found in the remains of the original city. At this depth there was unearthed a perfectly preserved wine cellar. Some fifty huge jars or vases had evidently contained red wine, now turned to a light powdery substance. A large collection of valuable antiques in gold, marble and ancient pottery has also been found in these newly uncovered ruins. These have been dispatched to the Hermitage at St. Petersburg. M. Formakovski, however, is carefully examining every antique unearthed, to establish its genuine character, as it was on this site that the spurious tiara of Saitapharnes, now in the Louvre, was alleged to have been discovered.—*The Scientific American*.

ADAB, AN ANCIENT CITY.—Udnunki, the ancient Adab, perhaps the oldest city in the world, has been discovered by the University of Chicago's excavating expedition in Babylonia. This city has for many years been the object of search by Orientalists. It is mentioned in the code of Hammurabi, an early king of Babylonia, which document was translated recently by Professor Robert F. Harper, director of the expedition. He has just received news in a cablegram from Professor E. J. Banks, field director of the expedition, who since leaving this country last winter for Bismaya, in Babylonia, has announced many important discoveries. The uncovering of ancient Adab is one of the most important archaeological achievements of recent years. Dr. Banks informed Professor Harper that he had found bricks bearing the syllables Ud-nun-ki at the lowest level of the ruins. He is certain that these bricks identify the city as Adab. With a force of 120 men he excavated the ruins at Bismaya and found the remains of four temples, built one above the other, which he named according to the kings who built them. The dates become earlier until finally the bricks identifying Udnunki were found. Among other articles which Dr. Banks found are marble statues, onyx and sandstone lamps and many bronze objects.—*Exchange*.

THE LARGEST WIRELESS STATION.—The largest station for wireless telegraphy is being erected near Pisa, Italy. On its completion, by the end of this year, it is expected to afford direct communication with all countries of Europe, as well as the United

States and Canada, and with all vessels on the Mediterranean, Indian and Atlantic Oceans.—*N. Y. Evening Post*.

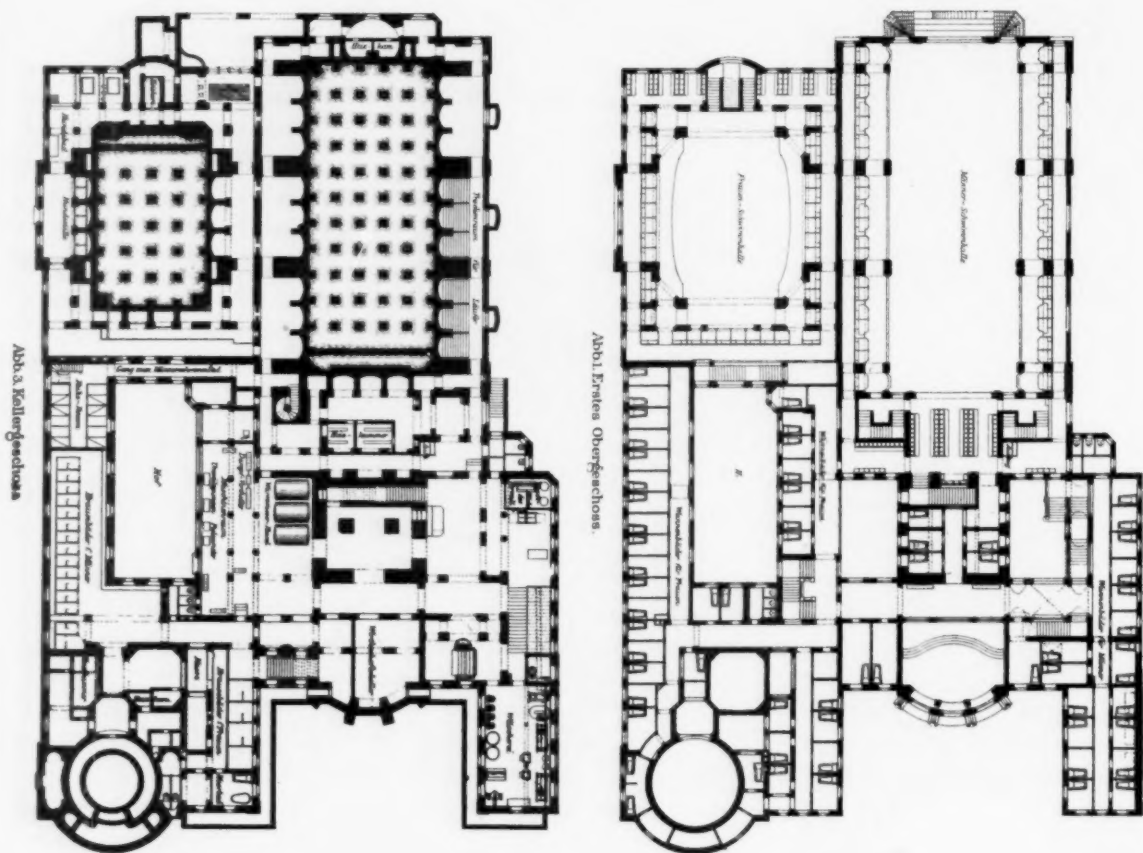
MEASURING PRESSURE OF WIND.—Some very interesting experiments upon the resistance of the air have been recently made by M. G. Eiffel at the tower which bears his name, by means of an apparatus of his invention which may be daily seen in operation when the air is calm. At a given signal a cylinder, carried by a double spring, falls with great velocity from the second floor of the tower (that is to say, from a height of about 375 feet), along a vertical cable, and then progressively slows up, and stops without any shock at 3.28 feet from the ground, remaining attached to the cable. This cylinder, a part of which is conical, carries in front a plate which is thrust backward by the pressure of the wind during the fall. Such displacements compress an accurately tared spring which measures the pressure and inscribes it upon a registering drum, the revolution of which is regulated by the fall itself. The ordinary inscribing style is replaced by a tuning-fork that makes a hundred vibrations a second. When the apparatus is opened there is, therefore, found inscribed upon the drum an undulating curve that gives for every point the height of fall, the pressure acting at this moment and the velocity, within an approximation of a hundredth of a second. This is the first time that one and the same apparatus has continually indicated these various results from the zero velocity to that of 130 feet a second, which is that of the most violent winds. As the pressure device may be of any form and size whatever (a normal or oblique plane, a cone, sphere or cylinder), the apparatus is capable of giving more accurate results than have hitherto been obtained in experiments on the resistance that the air offers to a moving body, and which is nothing else than the pressure of the wind upon a stationary body. Such determination presents great practical interest, either as regards the utilization of the pressure of the wind as a motor or the resisting of it, as becomes necessary in the practice of the profession of the engineer and in experiments with dirigible balloons. In order to complete the description of the apparatus the principle of which has just been indicated, it suffices to add that in order to diminish the effect of the velocity of this mass of 265 pounds, moving at the rate of 130 feet a second, say nearly ninety miles an hour, the frame of the apparatus is carried by a very powerful double spring, which slides freely along the cable as far as to within sixty-five feet of the ground, at which point the diameter of the cable progressively widens and the double spring also is forced to widen, and then exerts a pressure upon the cable, and through its friction gradually diminishes the velocity. The experiments have shown that the pressure of the wind is notably less than that admitted up to the present. After they have been finished this question, which has hitherto been very uncertain, will have made important progress and have demonstrated once again the services that the Eiffel tower is capable of rendering to science.—*Scientific American*.

TREES PLANTED AT NIGHT.—It was long since observed that budding trees, when transplanted in the evening and immediately and copiously watered, were much more likely to thrive than those that had been moved in the day. But this knowledge did not lead to any well-defined theory on the subject until the experiments of M. René Rounault, a French expert, proved beyond a doubt that distinctly beneficial results could be gained by transplanting wholly at night. Being called upon to transplant a large tract toward the end of May, 1903, M. Rounault determined to work at night, and in order to be sure that he made no mistake he transplanted a Holland linden, which had been in his own nursery for five years, at 10 o'clock at night. He carefully watered the tree, and the branches which bore buds were freely moistened. The linden did not appear to suffer from this transplanting, and continued to grow normally, without showing any signs of weakness. Encouraged by this success, M. Rounault performed the work of transplantation entirely in the night time. The results were excellent, only two trees dying, though the choice of the species was extremely wide, containing many which do not readily submit to the process of transplantation. With reference to the precautions to be observed, it should be stated that trees should not be transplanted while their buds are too tender, and that the work should be done between 10 o'clock p. m. and 2 o'clock a. m. It is desirable that the roots should be covered with earth which has for several days been exposed to the effects of air and light. This should be settled by copious watering, which forces the earth between the roots, and not by pressure with the feet. For the first fifteen days after transplanting the boughs and leaves of the trees should be abundantly sprinkled.—*Philadelphia Record*.

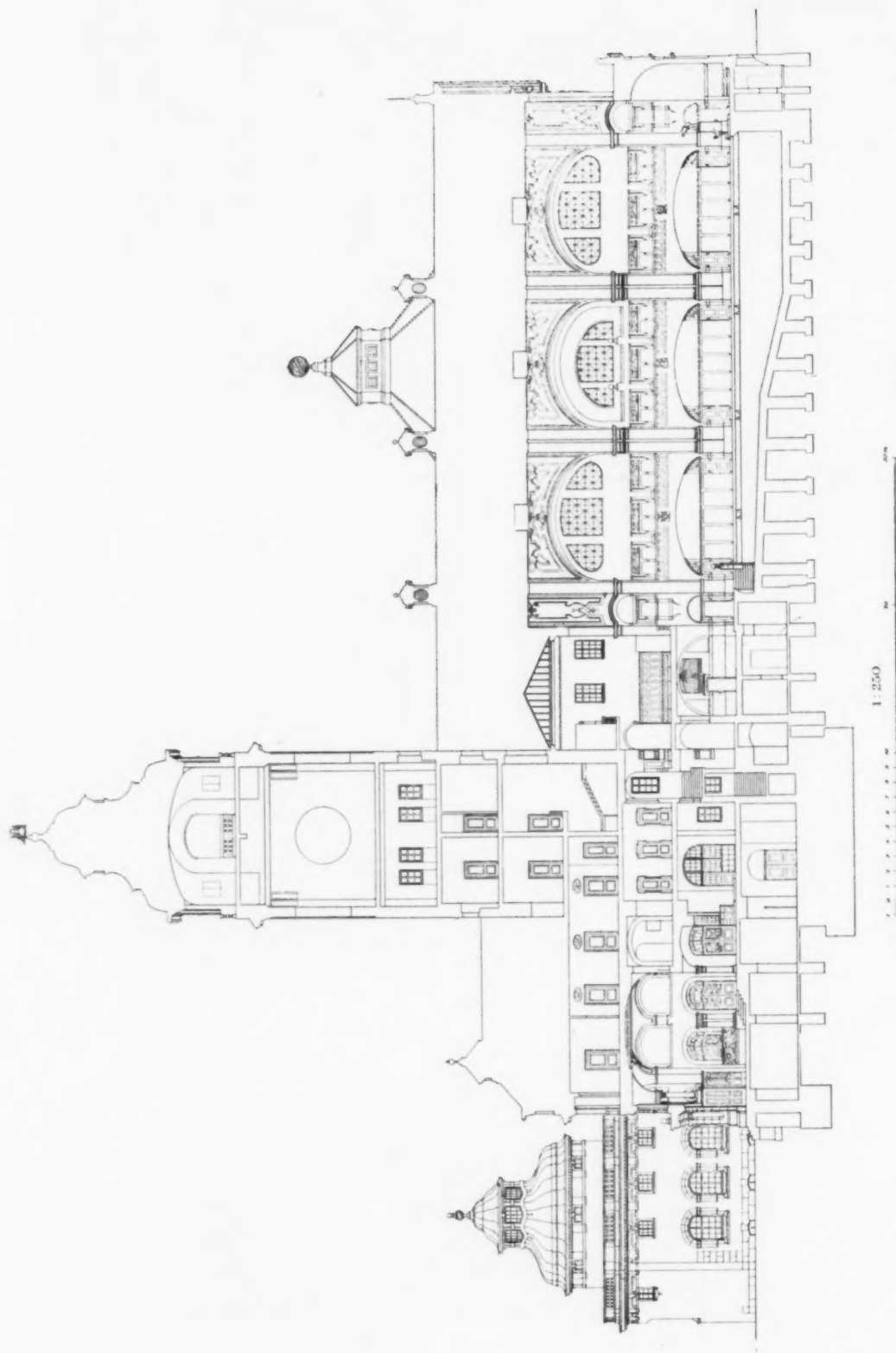
STATUS OF CEMENT INDUSTRY.—A report on the cement industry in the United States for the calendar year 1903 issued by the United States Geological Survey says the total production of Portland, natural rock, and slag, or pozzuolana cements amounted to 28,454,140 barrels, valued at \$30,364,341. This was an increase of 2,700,636 barrels over the preceding year. The aggregate embraces 20,897,973 barrels of Portland cement, valued at \$26,146,319; 7,030,271 barrels of natural rock cement, value \$3,675,520; and 525,896 barrels of slag cement, value \$542,502.



The Karl Muller Peoples' Baths, Munich, Bavaria.
Karl Hocheder, Architect.



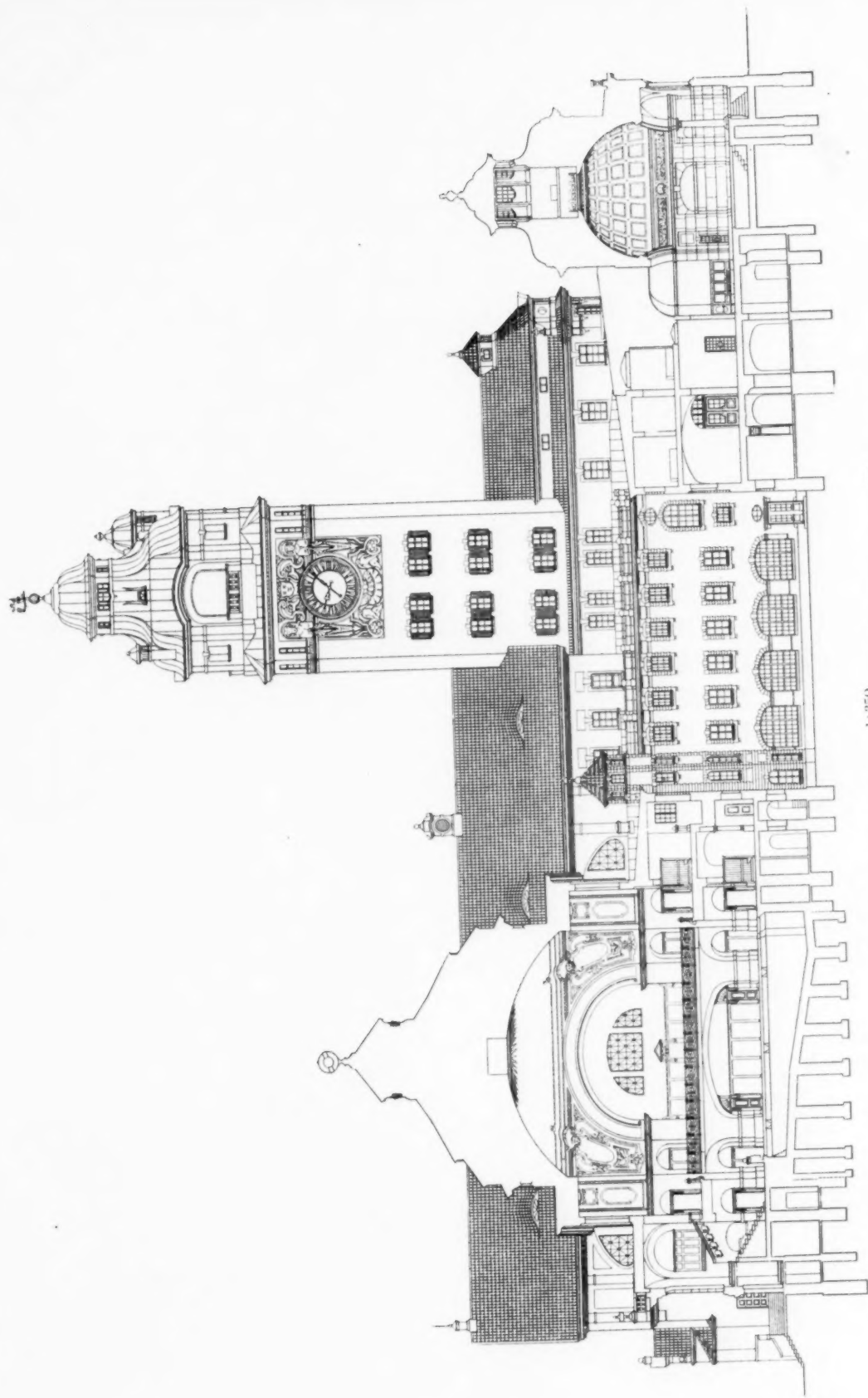
Plans of the Karl Muller Peoples' Baths, Munich, Bavar



Longitudinal Section: The Karl Muller Peoples' Baths, Munich, Bavaria

From Zeitschrift für Bauwesen.

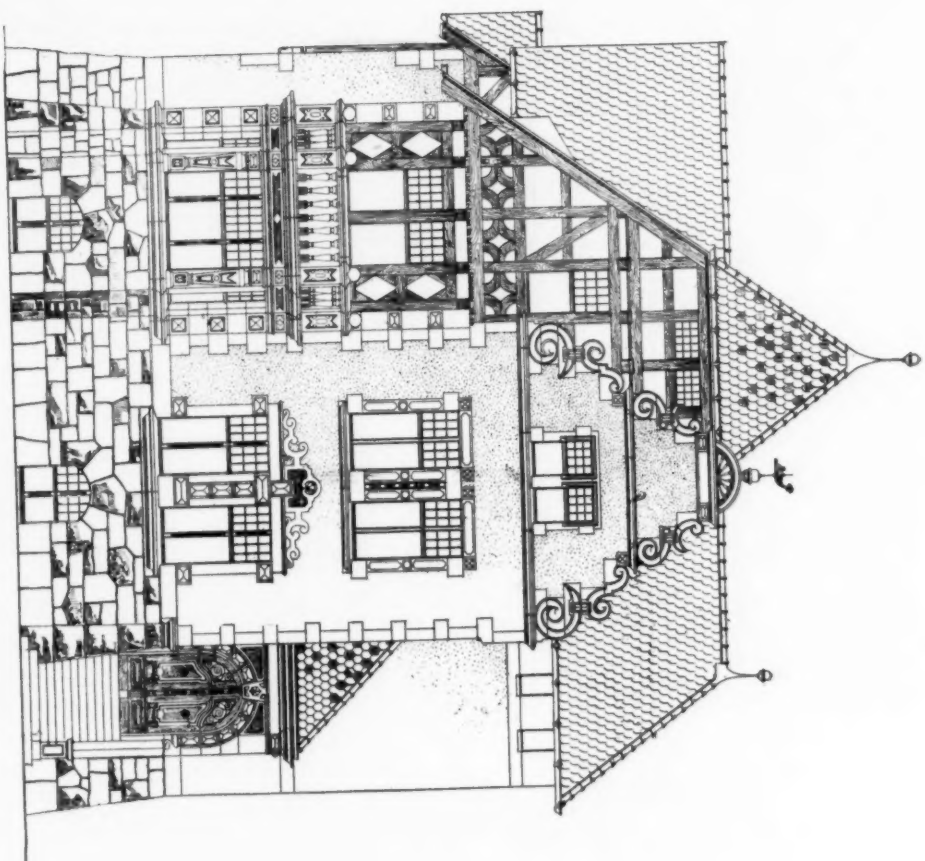
The American Architect,
August 13, 1904.
No. 1494



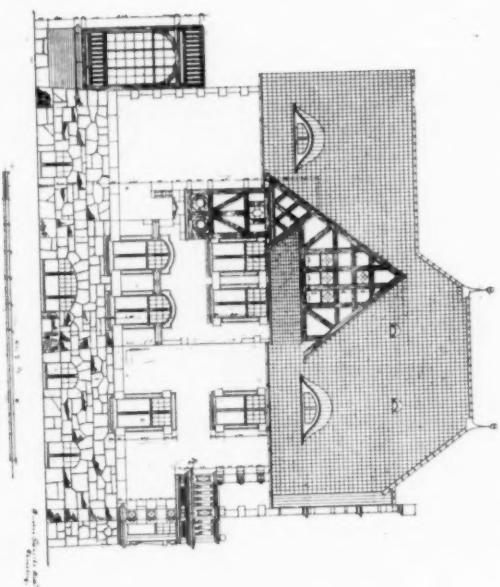
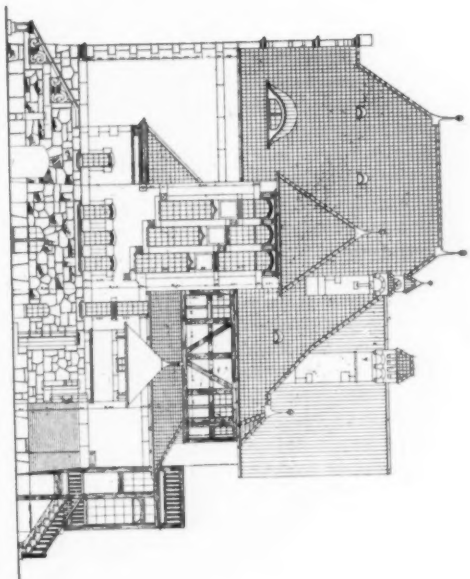
Longitudinal Section: The Karl Müller Peoples' Baths, Munich, Bavaria.

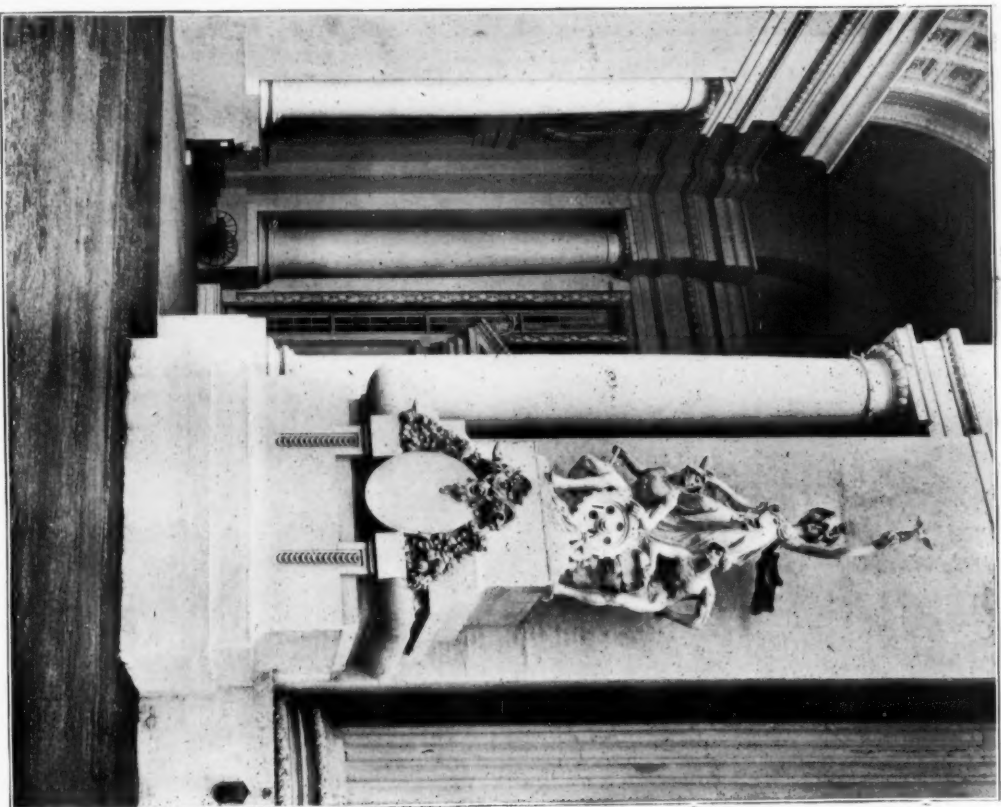
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From Zeitschrift für Bauwesen.



Cottage of Herr Herman Solger, Sudende-Berlin, Prussia.
Gustav Jenke, Architect.





*Details from the Palace of Liberal Arts: Louisiana Purchase Exposition, St. Louis, Mo.
Barnett, Haynes & Barnett, Architects.*

