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DECORATION

CONSTRUCTION

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CONTENTS

TEXT: pp. 73-80.

EDITORIAL SUMMARY.
BYZANTINE ARCHITECTURE.
PASSENGER ELEVATOR.—III.
SUGGESTIONS FOR INCREASING THE SAFETY OF THEATRES.
NOTES AND CLIPPINGS.

ILLUSTRATIONS.

ENTRANCE FRONT: ROGERS MEMORIAL PARSONAGE, FAIR-
HAVEN, MASS.
TWIN GABLES OF THE SAME.
BANKING BUILDING, BOSTON, MASS.
COTTAGE IN NORWEGIAN STYLE, NEWTON, MASS.

ILLUSTRATIONS—Continued.

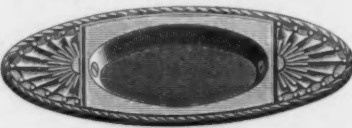
THE ULSTEIN PRINTING OFFICE, BERLIN; NO. 19 KAISER-
ALLEE, WILMERSDORF, PRUSSIA.
HOUSE ON RUSSIAN HILL, SAN FRANCISCO, CAL.; ENTRANCE
TO PALMA ALTA PARK, HOLLYWOOD, CAL.

(Additional Illustrations in the International Edition.)

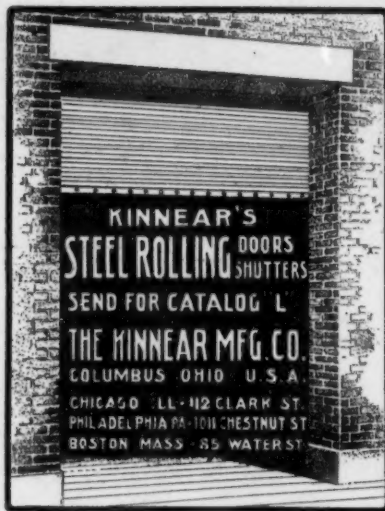
SOUTHERN VIEW: ROGERS MEMORIAL PARSONAGE, FAIR-
HAVEN, MASS.
SINGLE GABLE OF THE SAME.
HALF-TIMBER HOUSE, NEWTON, MASS.
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A	E	L	S
Algonquin Red Slate Co.....v	Elevator Supply and Repair Co.....i	Lawrence Scientific School.....i	Samson Cordage Works.....vi
American Mason Safety Tread Co.....vii	Elston, A. A.....xi	Loomis-Manning Filter Co.....i	Sargent & Co.....(Cov.) 2
American Sheet and Tin Plate Co.....ix	Erickson Electric Equipment Co.....xi	Lord & Burnham Co.....v	Silver Lake Co.....xi
Architect and Contract Reporter, The.....ii	F	M	Simpson Bros. Corporation.....xi
Art Metal Construction Co.....vi	Fisher & Co., Robert C.....i	Mass. Institute of Technology.....i	Sleep, Elliot & King Co.....xi
Associated Expanded Metal Co.....x	Flynt Building & Construction Co.....i	Miller & Bro., James A.....v	Smith & Co., Edward.....i
Atlas Portland Cement Co.....4	Fowle, Herbert.....xi	Morrill & Whiton Construction Co.....xi	Smith Co., H. B.....ii
B	French & Co., Samuel H.....v	Morrill, E. P.....viii	Society of Beaux-Arts Architects, The.....i
Barrett Mfg. Co.....xi	Frink, I. P.....(Cov.) 2	Morse, Williams & Co.....E	Standard Fire-escape & Mfg. Co.....xi
Batchelder & Co., C. H.....xi	G	Moss, Chas. E.....xi	Standard Sanitary Mfg. Co.....E
Benedict & Burnham Mfg. Co.....v	Gallagher & Munro.....xi	Mott, J. L.....viii	Sturtevant Co., B. F.....3
Berger Mfg. Co.....ii	Gilbreth, Frank B.....xi	N	T
Blodgett Clock Co.....vi	Gilbreth Seam-face Granite Co.....xi	National Fireproofing Co.....iii	Taylor Co., N. & G.....ii
Broad Gauge Iron Stall & Vane Works.....xi	Globe Ventilator Co.....(Cov.) 3	Neuchatel Asphalt Co.....vi	Taylor, J. W.....vi
Building News, The.....x	Gurney Heater Mfg. Co.....(Cov.) 4	New England Tank and Tower Co.....vii	Thorn, J. S., Co.....x
Butcher Polish Co.....ii	H	New Jersey Zinc Co.....xi	Troy Laundry Machine Co.....(Cov.) 4
C	Hartmann Bros. Mfg. Co.....vii	Newman, George A.....viii	Truss Metal Lath Co.....vii
Cabot, Samuel.....vi	Harvard University.....v	New York Belting & Packing Co.....vii	U
Cairns, Hugh.....viii	Hayes, Geo.....v	New York Metal Ceiling Co.....vi	University of Pennsylvania.....i
Campbell, Walter M.....viii	Hecla Iron Works.....vii	Northwestern Terra-Cotta Co.....xii	United States Foundry and Sales Co.....vii
Chicago & Alton Railway.....E	J	O	U. S. Mineral Wool Co.....viii
Chicago Clothes Dryer Works.....xi	Jackson & Co., Wm. H.....(Cov.) 4	Okonite Co. (Ltd.).....v	V
Cornell University.....i	Jager Co., Charles J.....E	P	Vaile & Young.....(Cov.) 4
Craig, David.....E	Jenkins Bros.....vi	Panama Steel Co.....x	W
Crane Co.....vi	Johnson & Co., H. A.....xi	Pitt, W. R.....iv	Warren Chemical & Mfg. Co.....vi
Cudell, F. E.....viii	Jones, T. W.....ii	R	Washington University School of Engineering and Architecture.....i
Cutler Mfg. Co.....ii	K	Richey, Browne & Donald.....vi	Whittier Machine Co.....i
D	Keasbey & Mattison Company.....E	Rider-Ericson Engine Co.....v	Williams, John.....viii
Dadmun, Leon E.....xi	Kinnear Mfg. Co., The.....(Cov.) 2	Robey-French Co.....xi	Winslow Bros. Co., The.....i
Deane, E. Eldon.....vii		Rutan, W. L.....xi	Y
Dixon Crucible Co., Jos.....v			Yale & Towne Mfg. Co.....xii

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A WEEKLY JOURNAL OF CONSTRUCTIVE AND DECORATIVE ART.

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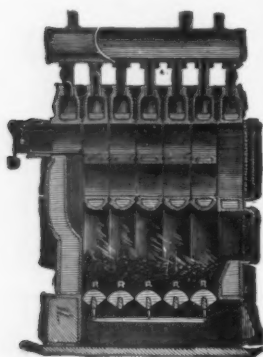
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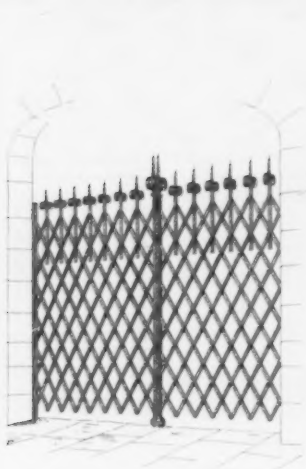
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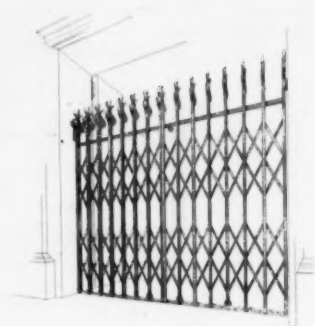
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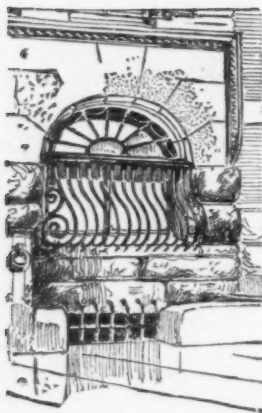
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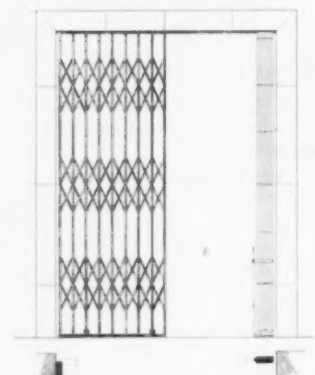
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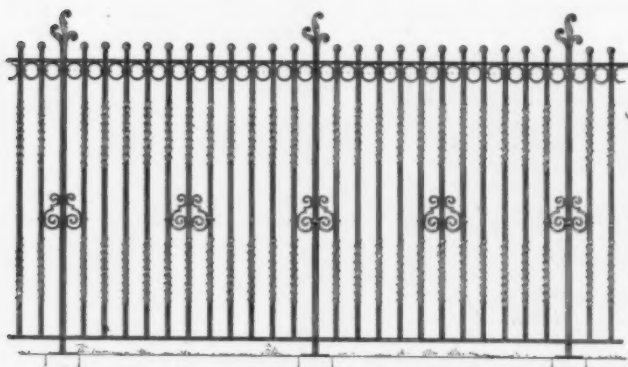


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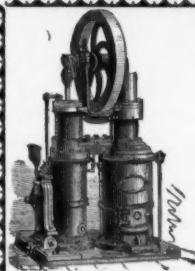
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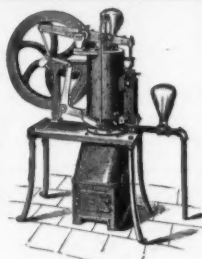
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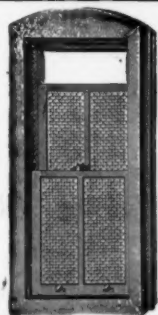
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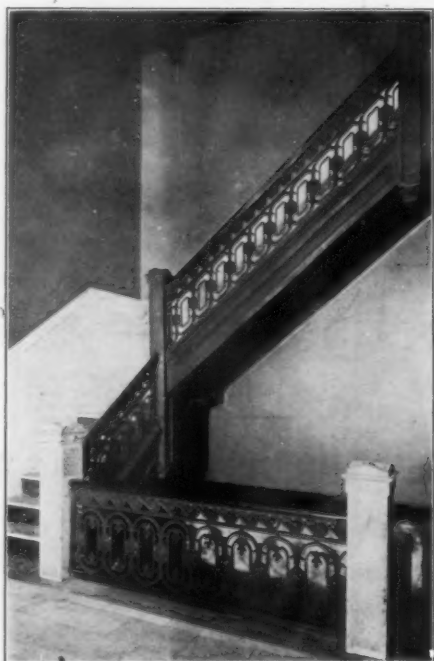
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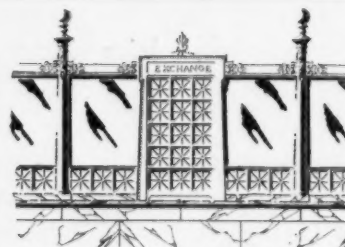
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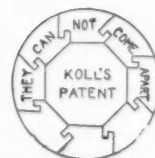
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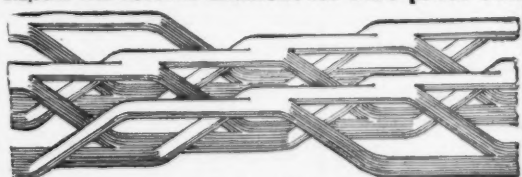
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BUILDING INTELLIGENCE.

(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.

ALBANY, N. Y.—It is stated that Andrew Carnegie has offered to the City of Albany \$150,000 for a library building. A similar offer made by Mr. Carnegie several years ago was rejected.

AMES, IA.—Plans have been drawn by Willis Proudfoot, Des Moines, for \$50,000 engineering building at Iowa State College here.

ATLANTIC CITY, N. J.—J. E. & A. L. Pennock have been awarded a contract for an addition to Galen Hall, at Kentucky and Pacific Aves., to cost \$175,000. It will be eight stories high, of fireproof construction, with extension walls of brick and terra-cotta. Plans are by H. A. Stout, an Atlantic City architect.

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

BALTIMORE, MD.—It is reported that alterations to the St. Paul street side of the Courthouse are contemplated. An appropriation of \$150,000 will be made for the purpose.

An appropriation of \$435,000 has been made and a commission appointed by the Council for erecting markets on Centre Market Space.

BALTIMORE, MD.—Chas. Gilpin, Pennsylvania Bldg., Philadelphia, has contract for \$150,000 hotel at 6-8 North Howard St., for Merchants' Hotel Co.

Pierre, Dugan & Nephew are interested in plan to erect a 4-story hotel, 50 by 100 ft., at Postoffice Ave. and Water St. Estimated cost, \$70,000.

BARABOO, WIS.—It has been decided to erect a \$100,000 courthouse at Baraboo.

BERKELEY, CAL.—J. G. Howard is architect of the Alumni hall, soon to be erected at the University. Cost about \$100,000.

BUTLER, PA.—Bids are desired until Dec. 14, by Porter & Gaisford, for a 4-story hotel, 36 by 86 ft., for C. H. Gies. An electric plant will be built in connection with hotel. Cost, \$35,000.

CHICAGO, ILL.—Bids will be received by the Supervising Architect, Washington, D. C., until Dec. 19th, for installing mail conveying system in the Postoffice, Courthouse, etc., at Chicago, as advertised in THE AMERICAN ARCHITECT.

CHICAGO, ILL.—It is stated that site for proposed naval training station will be located on Lake Bluff, 32 miles north of Chicago, on Lake Michigan. Congress has appropriated \$250,000 for purchase of the site.

D. E. Postle, architect, 204 Dearborn St., is receiving bids for \$75,000 church edifice

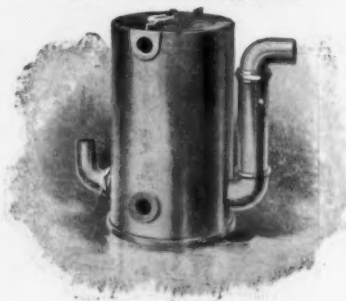
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

to be erected at Jackson Boulevard and 46th Ave., for Calvary Presbyterian Society.

A press report states that J. T. Fortin, New Era Bldg., Harrison St. and Blue Island Ave., is preparing plans for a clubhouse to be built at Ashland Boulevard and Polk St., for Le Monument National Des Canadiens Francais de Chicago. It is to be three stories, 100 by 135 ft., with facade of Bedford stone, and composition roof on steel trusses. Style of architecture, French Renaissance. Cost, \$100,000.

CINCINNATI, OHIO.—James G. Rogers, Ashland Block, Chicago, is said to be receiving bids for a \$100,000 residence to be erected at College Hill for P. Thompson. Three stories, 75 by 150 ft., of stone.

CLINTON, IA.—It is stated that John Morrell & Son, architects, will receive bids about Jan. 1 for a \$45,000 building for the Y. M. C. A.

CONNELLSVILLE, PA.—The Colonial National Bank, L. F. Ruth, president, will erect new bank building at East Pittsburg and Main Sts. Granite and white marble. Plans by E. W. Campbell, City.

DALLAS, TEX.—Plans and specifications will be received until Dec. 15 for the erection of exposition building to have 60,000 ft. of floor space and auditorium with a seating capacity of 2,000 people. Address Mr. Keating, President State Fair of Texas.

DENVER, COLO.—Bids are desired until Dec. 17, by Frank W. Crocker, chairman building committee, for the construction of a library building.

ELDORADO, ARK.—J. M. Sheppard, chairman of Board of Education, will receive bids until January 1 for erecting a 2-story and basement school building.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

ELMGROVE, W. VA.—Plans have been drawn for a \$75,000 manual training school. Address, Bishop P. J. Donahue, Wheeling.

FRESNO, CAL.—Bids will be received by the Supervising Architect, Washington, D. C., until Jan. 19, for construction of the U. S. Post-office and Court-house at Fresno, as advertised in THE AMERICAN ARCHITECT.

HAVRE DE GRACE, Md.—It is stated that plans by Wyatt & Nolting, Builders' Exchange, Baltimore, have been accepted for the new dining hall, to be erected at Tome Institute. Two stories, 150 by 200 ft., stone, concrete, brick and steel, steam heat, electric light, cold storage plant, garbage destroying plant, bakery, laundry, etc. Cost in the neighborhood of \$150,000.

HENDERSON, KY.—Bids will be received by the Supervising Architect, Washington, D. C., until Jan. 9, for the construction of the U. S. Post-office at Henderson, as advertised in THE AMERICAN ARCHITECT.

HOPEDALE, MASS.—A dwelling house to be erected in Hopedale for F. J. Dutcher, of that town, will cost \$40,000. It will be constructed of field stone and wood, 64 by 40 ft., with an L 51 by 28 ft.

INDIANAPOLIS, IND.—Gen. A. R. Chaffée has recommended that a \$500,000 military prison be erected at proposed army post near this city.

JERSEY CITY, N. J.—Clinton & Russell, 32 Nassau St., New York, will prepare plans for the new city hospital. Only a portion of the structure will be erected, as the appropriation is limited to \$200,000.

KANSAS CITY, Mo.—Arch. W. W. Rose, Postal Telegraph Bldg., has plans for a 2-story store building for Carl Rudolph. Press brick, steam heat and all modern improvements. \$75,000.

KANSAS CITY, Mo.—It is said that the Commercial Club will undertake to raise funds for an armory for the Third Regiment. Estimated cost, \$200,000 to \$300,000.

KANSAS CITY, KAN.—Bids will be received by the Supervising Architect, Washington, D. C., until Jan. 3, for the painting, etc., of the U. S. Post-office at Kansas City, as advertised in THE AMERICAN ARCHITECT.

LONG ISLAND CITY, N. Y.—Plans are now before the New York City Art Commission for proposed new borough hall. Preston B. Seamon is architect for one set under consideration.

LOUISVILLE, KY.—Kenneth McDonald and J. F. Shebley, architects, Fourth and Main Sts., will soon receive bids for the Jewish Temple, to be erected on Third Ave., York and Breckenridge Sts., for the Congregation of Adath Israel, mentioned in our issue of Nov. 12.

MARBLEHEAD, MASS.—The modified drawings of Peters & Rice, for the federal building at Marblehead, have been approved and bids advertised for. The bids will be opened on Jan. 3.

MOUNDSVILLE, W. VA.—The Glen Easton Coal & Coke Co. will erect 50 dwelling houses at works near here. E. T. Breisch, Keystone Bldg., Pittsburg, is in charge.

NASHUA, N. H.—The contract for the construction of the U. S. postoffice at Nashua, including heating apparatus, electric wiring and conduits, has been awarded to the Connors Brothers Constructing Company, of Lowell, for \$61,900.

NASHVILLE, TENN.—The plant of the American Snuff Company will be increased



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

by the addition of a \$30,000 warehouse, contract for the construction of which has been awarded to the Fulcher Brick Company. Plans for the warehouse, which will be erected on the corner of Harrison and Belleville Sts., have been drawn by Architect Robert Sharp. The foundation will be of stone and the superstructure of brick. It will be two stories high, 105 by 200 ft. Cement will be used in the construction of the walls. Work will be begun at once under the supervision of James E. Harwood.

NEW CASTLE, PA.—Bids will be received by the Supervising Archt, Washington, D. C., until Jan. 10, for construction of the U. S. Post-office at New Castle, as advertised in THE AMERICAN ARCHITECT.

NEW YORK CITY.—Work is soon to begin on the handsome new residence at 29 E. 50th St. for Mrs. Whitelaw Reid, 451 Madison Ave. The plans have been prepared by Architect Louis Thould, 289 Fourth Ave., and call for a 5-story structure of brick and stone to be elaborately finished and decorated.

OMAHA, NEB.—It is reported that Methodist churches in Nebraska will raise \$75,000 for a hospital to be erected in this city.

PATERSON, N. J.—Charles H. Messereau has received the general contract for the Young Women's Christian Association building at \$38,792.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

PHILADELPHIA, PA.—Contracts for new schools have been awarded as follows: Fifteen division school, Wharton and Sheridan Sts., to Lynch Bros., \$73,700; twelve division building, Third and Christian Sts., Lynch Bros., \$59,400; six division addition to the Elwood School, Oak Lane, near Old York Road, to David Peoples, \$47,728.

PITCAIRN, PA.—The Board of Education is having plans drawn for new school-house here. Brick, three stories, 60 by 88 ft. S. C. Richards, Braddock, Pa., architect. Plans will be ready for estimates about Feb. 1st.

PITTSBURG, PA.—Arch. Edw. J. Shellen-trager, Empire Bldg., has plans for four apartments for an eastern syndicate. Six stories, press brick and terra-cotta, slate roofs, passenger and freight elevators, dumb waiters, steam heat, gas and electric light, mantels, pipe covering, baths, telephones, chandeliers, tile vestibules, cement basements and plate glass. \$400,000. Bids will be taken soon.

PLATTEVILLE, WIS.—It is reported that the next legislature will be asked to appropriate \$100,000 for rebuilding Platteville Normal School.

QUINCY, MASS.—The supervising architect's office has now obtained the site for the public building at Quincy, but no authorization to build has yet been granted.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

SAN ANTONIO, TEX.—Bids are desired until Dec. 14 by Robert R. Stevens, Q. M., for the construction of brick post exchange and gymnasium building, including installation of plumbing and gymnastic apparatus, at Fort McIntosh.

SEATTLE, WASH.—Plans have been drawn by H. Ryan for the new hall to be erected in the Capitol Hill district. Estimated cost, \$50,000.

SELMA, ALA.—Bids will be received by the Supervising Architect, Washington, D. C., until Dec. 28th, for construction of U. S. Postoffice at Selma, as advertised in THE AMERICAN ARCHITECT.

SPRINGFIELD, MASS.—It is hoped that by an omnibus bill the next Congress, which opens in December, will grant to the City of Springfield, an appropriation for the purpose of making additions to the post-office, increasing the floor space and affording more light to the employees. It is estimated that an appropriation of \$100,000 will be necessary to provide for the additions.

ST. LOUIS, MO.—Architects have prepared plans for an addition to the Bell Telephone Company's Lindell Exchange building on Olive St., near Vandeventer Ave., to cost \$40,000. The new building will be erected in front of the present structure.

ST. LOUIS, MO.—Wreckers are demolishing the old building at No. 1117 Olive St., recently purchased from the Tutt estate by clients of Holbrook-Blackwelder, to make way for a modern business building.

The Morgens Bros.' Dyeing and Cleaning Company have bought property, Nos. 3407-11 Olive St., for the erection of a 6-story building next spring.

SALT LAKE CITY, UTAH.—Mr. Fred Wey will erect a new \$100,000 hotel on State St.

TOLEDO, OHIO.—Bacon & Huber are hastening to complete plans for the new office building to be erected by Messrs. C. M. and A. L. Spitzer, at the corner of Madison Ave. and Huron St. It will be known as the "Nicholas" and will contain 900 offices and 43 stores. No office building in any of the large cities will surpass it for symmetrical proportions, light, air and beauty and convenience of design.

WASHINGTON, D. C.—Ambrose B. Stannard, 1133 Broadway, New York, has been awarded the general contract to build two 5-story granite laboratory buildings for the Department of Agriculture, at \$1,117,000.

Plan for District Police Court building, submitted by Henry Simpson, 745 15th St., N. W., has been accepted. Estimated cost, \$72,000.

Competitive plans will be received for group of buildings for George Washington University at Van Ness Park. The University is now known as the Columbian University. The George Washington Memorial Building will cost \$500,000.

(Continued on page XI.)

PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 14, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 20th day of December, 1904, and then opened, for the low pressure steam heating apparatus, complete in place, for the U. S. Post Office and Court House at Harrison, Arkansas, in accordance with drawings and specification, copies of which may be had at this office, or at the office of the Superintendent at Harrison, Arkansas, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1510

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 15, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 13th day of December, 1904, and then opened, for the low pressure steam heating apparatus, complete in

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place, for the U. S. Post Office and Court House at Portland, Oregon, in accordance with drawings and specification, copies of which may be had at this office, or at the office of the Superintendent at Portland, Oregon, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1510

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 16, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 21st day of December, 1904, and then opened, for the construction complete of the U. S. Post Office at Gainesville, Florida, in accordance with the drawings and specifications, copies of which may be had at this office, or at the office of the Postmaster at Gainesville, Florida, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1510

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 17, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 29th day of December, 1904, and then opened, for the construction complete, of the U. S. Post Office at Vincennes, Indiana, in accordance with the drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Vincennes, Indiana, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1510

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 23d, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 28th day of December, 1904, and then opened, for the construction complete, of the U. S. Post Office at Selma, Alabama, in accordance with the drawings and specifications, copies of which may be had at this office or the office of the Postmaster at Selma, Alabama, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 26, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 19th day of December, 1904, and then opened, for a mail conveying system in the U. S. Post Office, Court House, etc., building at Chicago, Illinois, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent of the Building at Chicago, Illinois. Proposals will only be entertained from manufacturers of Conveying Machinery. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 21, 1904.—Sealed proposals will be received at this

office until 3 o'clock p. m. on the 3d day of January, 1905, and then opened, for the construction of the U. S. Post Office, Court House and Custom House building, Wheeling, West Virginia, in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Wheeling, West Virginia, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 29th, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 9th day of January, 1905, and then opened, for the complete construction of the U. S. Post Office at Henderson, Kentucky, in accordance with the drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at Henderson, Kentucky, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 29th, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 19th day of January, 1905, and then opened, for the construction (except heating apparatus, elevator, electric conduits, and wiring) of the U. S. Post Office and Court House at Fresno, California, in accordance with drawings and specifications, copies of which may be had at this office, or at the office of the Postmaster at Fresno, California, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 29th, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 10th day of January, 1905, and then opened, for the construction complete, of the U. S. Post Office at New Castle, Pennsylvania, in accordance with drawings and specifications, copies of which may be had at this office or at the office of the Postmaster at New Castle, Pennsylvania, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

Treasury Department, Office of the Supervising Architect, Washington, D. C., November 29th, 1904.—Sealed proposals will be received at this office until 3 o'clock p. m. on the 3d day of January, 1905, and then opened, for the painting, etc., of the U. S. Post Office at Kansas City, Kansas, in accordance with the drawings and specification, copies of which may be had at this office or the office of the Custodian at Kansas City, Kansas, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect.

1511

BUILDING INTELLIGENCE.

Continued from page x.

(Advance Rumors, Continued.)

ARMOURDALE, Mo.—A rumor, which the officials of Swift & Co. neither deny nor confirm, is spread around Armourdale, to the effect that the packing firm is about to increase its plant through the addition of several buildings, which will cost approximately \$750,000.

ASPINWALL, PA.—W. V. Hughes & Son, of Altoona, have been awarded contract for a passenger station and overhead tracks for Pennsylvania Ry. Co.

ATLANTA, GA.—Plans have been drawn by Willis F. Denny, 1018 Prudential Bldg., for remodeling the Kimball House for the Kimball House Co. Bids will be received about Jan. 1. Cost, \$100,000.

ATLANTIC CITY, N. J.—J. E. & A. L. Pen-nock, Land Title Bldg., Philadelphia, have been awarded contract for addition to Galen Hall Hotel. Estimated cost, \$176,000.

AUBURN, ME.—Chickering & O'Connor, architects, Boston, are preparing plans for a \$40,000 church. Rev. Father Gauthier, 88 Third St.

BALTIMORE, MD.—Woodruff-McLaughlin Co., Pittsburg Pa., and Baltimore, have the contract for the coffee plant building of the Enterprise Coffee Co., on S. Caroline St. Three stories, 40 x 90 ft., brick, stone, concrete and iron, steam heat, elevators, metal window frames, wire glass, tiling and toilets. \$40,000.

BROOKLYN, N. Y.—The new Crescent clubhouse will be erected at an early date at

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BUILDING INTELLIGENCE.

(Advance Rumors, Continued.)

Clinton and Pierrepont Sts. It will be in the Italian renaissance style, 8 stories, 77 by 105 feet.

CINCINNATI, O.—A 12-story concrete building, it is reported, will be erected at Elm and Fourth Sts., at a cost of \$250,000. Gustave W. Drach, architect. L. B. Harrison estate, owner.

CHICAGO, ILL.—A press report states that a commercial city to cost more than \$2,000,000, and to cover thirty acres, is to be built in the Thirteenth Ward. Options on the land have been obtained at a cost exceeding \$300,000. Sears, Roebuck & Co. and E. A. Cummings & Co. handle the realty end of the scheme, and work looking to the construction of the buildings, will commence as soon as arrangements are

BUILDING INTELLIGENCE.

(Advance Rumors, Continued.)

made with the city for vacating certain streets. The location of the vast enterprise is the land lying along the north side of the tracks of the Chicago Terminal Transfer Co., eight city squares being included in the site. The scheme contemplates the erection of a series of modern artistic buildings equipped with every recent device, absolutely fireproof, and all treated artistically and made architecturally attractive. At Kedzie Ave. and Harvard St. is to be a clubhouse devoted exclusively to the comfort and entertainment of the 5,000 employees of the company.

MARION, MASS.—It is reported that ground will be broken in the early spring for a 300-room hotel at Marion, to be erected by Mr. Watt Ruggles.

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[See Alphabetical Index on Cover 2 for Pagination.]

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THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT

No. 269.

SATURDAY, DECEMBER 3, 1904.

VOLUME LXXXVI
No. 1510

EXPANDED METAL IN IMPORTANT NEW YORK ENTERPRISES.

IT will not be amiss to recapitulate the varied uses to which expanded metal has been put in some of the most important enterprises in and around New York. Just at this period, and while reinforced concrete may be said to be in its infancy, it is interesting to know that in practically all of the world-famous engineering enterprises expanded metal has figured in a large degree. It might be mentioned that during the last six years in the building of new and in the rebuilding of old buildings in the Brooklyn Navy Yard, expanded metal has been introduced in almost a score of buildings.

In the erection of the New York Edison Company's famous Waterside Station, Thirty-eighth street and East River, 200,000 feet of expanded metal was used in the floors and roofs.

In the Rapid Transit Subway construction this material has been used in practically every department. In the manholes of the main subway more than 100,000 feet has been used. It was practically used exclusively in the construction of the power house for the entire subway system, also in the repair shops, in the substations, as well as in the passenger stations.

In the Manhattan, or elevated railway system, many hundreds of thousands of feet of our material has been used in the erection of the special features, including hot-air ducts, hot wells, floors in subway stations, repair shops on elevated tracks, etc.

In the North River tunnel, being built for street-car use, it has been used in the construction of manholes and other similar work.

In the vast improvements being made by the New York Central Railroad in their terminal system large quantities are being used.

Likewise in the tunnels and other improvements to cost \$40,000,000, by the Pennsylvania Railroad, expanded metal is an important factor in the reinforcement of concrete.

It is also being used exclusively by the subway companies (in the construction of manhole covers), whose conduits carry all of the telephone and telegraph wires in the city.

The New York Telephone Company make use of it in large quantities in their construction department.

Expanded metal has not only been used by all of these large concerns in the reinforcement of concrete, but in many other ways.

EXPANDED METAL ABROAD.

THE manufacture of expanded metal is rapidly extending to the various countries of the Continent, and unfortunately for indifferent linguists, new names are being manufactured as well. For instance, we have "Métal Déployé" in France, "Streckmetall" in Germany, "Traliccio Di Lamiera Stirata" in Italy, "Tragnetzbleck" in Russia and "Metal Desplegado" in Spain. Large quantities of expanded metal are being used in India also, but it is noted with a feeling of gratitude that as yet no one has had the temerity to attempt the native nomenclature.

Our friends of the "other side" have not taken up the fabric without careful investigation and having subjected it to rigorous tests. In London, the distinguished firm of Fowler & Baker made, during 1896, exhaustive tests of concrete slabs reinforced

with expanded metal. Details of these tests will gladly be furnished upon application, and the following quotation from their report gives a general idea of the results: "This summary shows that the use of expanded metal in the case of 3 ft. 6 in. span increases the strength of a flat concrete slab from six to eight times the strength for carrying a uniform load that it would have if made without expanded metal; and in the case of the 6 ft. 6 in. span the strength is increased to ten and eleven times."

In the reconstruction of the Elswick Works of Armstrong-Whitworth Company, after their partial destruction by fire, expanded metal was used throughout. It was not selected, however, until searching preliminary tests had fully demonstrated its worth. These tests were made before a select committee of the Northern Architectural Association (England) and have been summed up as follows by Mr. A. C. Davis, F.C.S.: "The New Expanded Metal Company have reason to be particularly proud of this achievement, as not only in the satisfaction of so eminent an engineering firm, who, unlike most principals, were personally able to appreciate the splendid character of the work, but in having given satisfaction to Mr. Rich, who ranks among those who are absolutely at the head of the profession in the North of England." The expanded metal floors in these shops carry lathes and other machinery used in turning out the heaviest kind of ordnance manufactured by the Armstrong-Whitworth Company.

The most conspicuous of the many examples of the use of expanded metal in Scotland is the Granton Gas Works erected by the Edinburgh and Leith Corporation Gas Commissioners. The entire floor system is constructed of concrete reinforced with expanded metal, including the foundations for the retort settings.

In the Paris Exposition more than 1,000,000 square yards of expanded metal were used in the erection of buildings and bridges, the most notable being the Mining and Metallurgical Building, the Royal Hungarian Pavilion, the Imperial Russian Pavilion and the Pont Alexander III. across the Seine.

A similar list may be given of buildings in which expanded metal was used at the Glasgow Exhibition of 1901, the Cork Exhibition of 1902 and the Earl's Court Exhibitions.

The New Central Bridewell Jail, erected in Dublin several years ago, is constructed entirely of concrete, the floors, roof and stairs being reinforced with expanded metal. The general effect, while naturally severe, is handsome, conveying at the same time an impression of great strength. Another handsome building in Dublin in which expanded metal floors, partitions and ceilings were used throughout, is the Royal Victoria Eye and Ear Hospital, of which Messrs. Carroll and Batchelor are the architects.

The Pont Ilyssos, Piræus, Greece, is an attractive and substantial looking bridge 90 feet long and 26 feet wide, constructed in three equal spans. This bridge is entirely of reinforced concrete. Expanded metal being used for reinforcing the decking and sidewalks and round rods for reinforcing the beams. The hand rails are of expanded metal, producing a decidedly finished appearance to the structure as a whole. Upon completion the bridge was subjected to a severe test by the government engineers.

Metal lathing and plaster construction in some one of the various forms is quite popular in India. Its use in all classes of

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buildings is reported, from the ornate pavilions of the Delhi Durbar to a large number of laborers' dwellings along the line of the Bengal and Nagpur Railway. Many officers' quarters in Bombay, constructed of steel frames, expanded metal and plaster, present a pleasing appearance and are in keeping with the surroundings.

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TO FIGHT BOOK STACK AWARD.

ON the application of the Hecla Iron Works, Justice Marean, in the Supreme Court, Brooklyn, has granted a preliminary injunction against the Snead Iron Works, the Board of Estimate and Apportionment and Controller Grout, of New York, to restrain them from turning over the contract for providing the book stacks in the New York Public Library to the Snead Company. There is a provision of the law permitting the Board to award to other persons than the lowest bidder if in the opinion of the members of the Board the work will be done more efficiently. The Snead Company was recommended by the Library Board. The Hecla Iron Works bid \$707,300, the Snead Company asking \$889,753.

EFFECT OF COAL SMOKE ON GLASGOW STONWORK.—The good people of Glasgow are somewhat exercised in mind with regard to symptoms of decay in the stone work of their great municipal buildings, which were erected only a few years ago. The stone was selected for its well-known excellent weathering qualities, and some surprise has been expressed that in Glasgow it should so soon have shown signs of decay. But the atmosphere of Glas-

gow is one which is especially trying. It has been calculated that the city consumes over 3,000,000 tons of coal per annum, and this would account for something like 90,000 tons of sulphuric acid as being the quantity which is distributed over the area of the city every year. Although smoke consuming apparatus may reduce the amount of solids floating in the atmosphere, it would not reduce the amount of sulphur dioxide that is being emitted while the coal is being burned. The effect of the gradual deposit of sulphuric acid on sandstones, in which there is a certain amount of lime, is that the stone absorbs the acid, and in so doing the lime is freed from the other constituent parts of the stone, and, coming to the surface, disintegration of the various particles sets in. This is first seen in the masonry immediately beneath the cornices and projecting courses, which are protected by the projection from the heavy rainfall that washes the exposed parts of the building, but these afford no protection on a damp day from the deposit of sulphuric acid, which soaks into every stone, and sooner or later the acid will honeycomb the surface of the masonry, and lead to general disintegration. It appears to be necessary in all towns such as Glasgow, where a large amount of sulphuric acid is always in the atmosphere, to coat all stones except granite with some effective preservative. This can be done by coating the stones with what is known as water glass soda, to which is added pulverized quartz to give it what might be termed a fixing power, and where the exposed surface of stones has been coated several times it may reasonably be expected that they will resist the action of the acids in the atmosphere. There are several preparations of this nature supplied ready for use, and are being used in Glasgow at the present time.—*Stone Trades Journal*.

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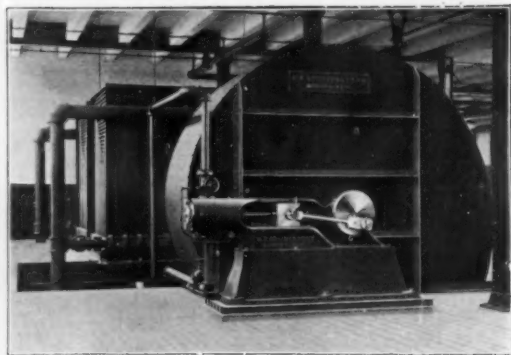
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The American Architect and Building News

VOL. LXXXVI

SATURDAY, DECEMBER 3, 1904

No. 1510



SUMMARY:—

The Disposal of the St. Louis Fair Buildings.—The Decorative Treatment of the New York Subway Stations.—Pink as a Restful Color.—The Explosiveness of Certain Railway-Car Gas-Tanks.—Death of B. T. Batsford, Dealer in Architectural Books.—The Generation of Gas in Steam and Hot-Water Radiators.—Proofs that Architects are Earth-Born, After All. . .	73
BYZANTINE ARCHITECTURE.	75
PASSENGER ELEVATORS.—III.	78
SUGGESTIONS FOR INCREASING THE SAFETY OF THEATRES. . .	79

ILLUSTRATIONS:—

Entrance Front: Rogers Memorial Parsonage, Fairhaven, Mass.—Twin Gables of the Same.—Banking Building for Kidder, Peabody & Co., Boston, Mass.—Cottage in Norwegian Style, Chestnut Hill, Newton, Mass.—The Ulstein Printing-Office, Berlin, Prussia; No. 19 Kaiserallee, Wilmersdorf, Prussia.—House on Russian Hill, San Francisco, Cal.—Entrance to Palma Alta Park, near Hollywood, Cal.	
Additional: Southern View: Rogers Memorial Parsonage, Fairhaven, Mass.—Single Gable of the Same.—Half-timber House, Chestnut Hill, Newton, Mass.—Detail of Entrances: Transportation Palace, St. Louis, Mo.	80
NOTES AND CLIPPINGS.	80

THE question of the disposal of the buildings of the Louisiana Purchase Exposition is now becoming a matter of active concern to the managers of the Fair, and we may soon be having a newspaper discussion as to whether a spectacular fire would not be, after all, the most economical method of disposing of them. We believe it was the general feeling that the fires that did occur during the removal of the Chicago buildings were very far from being unfortunate accidents. Yet we believe that some of the corporations of building-wreckers that were organized at that time have remained in existence ever since, finding sufficient business for themselves in wrecking the buildings at Omaha, Buffalo, Charleston and elsewhere, and disposing of the huge masses of varied material that the process left salable in their hands. As a rule, exposition companies feel themselves fortunate if they can get their buildings removed without cost to themselves, for they are usually under contract to restore the site approximately to its former condition by a stated time, too short ordinarily to enable them to dispose of the second-hand material to commercial advantage. The professional wrecker, however, knowing where outlets are to be found, can usually make a handsome profit.

IT is not surprising that the authors of so generally successful a scheme of decoration as that which Messrs. Heins & LaFarge have worked out for the New York subway stations should be indignant that their efforts should be injured by the intrusion of miraculously ugly advertising signs. But while we can say this willingly, we must point out that they have blundered in at least one particular; they have placed the name panels of the station where they are of least advantage to those who have most need to consult them, that is, the people in the

cars. People descend to the station knowing perfectly what the name of the station is, and it was quite needless to consider the line of sight of people on the platform when it came to determine the proper height at which to fix the name panel. To be of fullest service they should be at two levels, the present one above the heads of those on the platform, and again on the sight-line of those seated in the cars, for the sake of those passengers seated on the off side, who now can only get an idea of where they are by crouching and working back and neck into a reflex curve. As to the advertising matter, we feel that those who instructed the designers were remiss in not warning them that in their scheme of treatment they must not forget to provide space and opportunity for the advertising that seemed to be at least implied in the operating company's contract of lease. We hope the outcome of the investigation may result not in the abolition of the advertising matter, as that generally is useful and informing, but in the establishment of an artistic censorship. Worse things could happen than that the subway stations should in this way be converted into great popular schools of instruction in certain forms of mural decoration.

GENERALLY speaking the color schemes followed at each station have been highly satisfactory, and as was to be expected the schemes which show least color contrast and employ only neutral tones have been the most pleasing. But we were quite unprepared to find that the schemes that are most soothing to the sense, most restful to the eye, are those which are based on pink and salmon tones. A little reflection would seem to show that this might have been expected, since it quite accords with the nature of things, and when it comes to so delicate an organ as the eye, Dame Nature can surely be trusted to know what she is about. To rest the tired eye one naturally drops the eyelid, and though the opaque tissues of the lid give a sense of darkness it certainly is not expressed in any suggestion of greenness—green being the color ordinarily used for eye-shades, blinds, lamp-shades and other shields designed to protect or relieve a tired eye. Opaque as the eyelid is, it is still translucent, and as it is permeated with blood-vessels it would seem that the sense of color that the eye derives through the closed lid must be that of a pink, very low in the scale. Turn to nature again and we find that the blush-rose and the garden pink are amongst the most restful members of the whole garden flora. But there are pinks and pinks, and anything verging on the mauves should be eschewed, while a pink that belongs to the salmon family may, on the testimony of the subway decorations, be safely adopted.

MORE than one magazine story-writer has made the momentarily unaccountable and wholly eerie disappearance of a railroad train the chief incident of his tale, but an accident at Chicago recently shows how, at any time, a modern gas-lighted train might disappear

and leave no trace. At Chicago, twenty-two such tanks exploded at the gas-charging station of one of the railroads and caused a large loss of life and property.

BEFORE the great expansion of the modern public-library system, the man of letters, as well as the general book-lover, was wont to turn for aid and advice in his search for authorities to a class of men whose business it was to be informed in bibliographical matters. These men usually were not publishers of books, but were generally booksellers, or, more often yet, dealers in second-hand books, and many a literary friendship has been established between a well-known author and an obscure but really erudite *bouquiniste*. In the public mind the hierarchical rank runs in an ascending scale from second-hand dealers to publishers, with the bookseller holding the middle place. Yet we doubt whether Quaritch would not reverse the order and hold the élite of the second-hand dealers to be more deserving of honor than most publishers; and we suspect that Mr. B. T. Batsford, who died last month in his eighty-third year, would have held very much the same opinion. On this point Mr. Batsford's opinion would have been of weight, since he had passed through all three grades of the book business, but never lost his interest in that branch—the second-hand—to which he first devoted himself. Mr. Batsford was quite as well known to the profession in this country as to that at home, and there is many an American architect who, in earlier years, left with him a standing order to send to America any architectural books of worth that might come into the market; and it was almost an unknown thing for the recipient to complain that his confidence in Mr. Batsford's knowledge and good judgment had been shaken on examining the latest consignment.

MR. BATSFORD won for himself a unique place in the world of books, since so far as the English-speaking world is concerned he was known as the architectural book dealer *par excellence*, and held to the architectural profession the place that is held towards the engineering profession in this country by the Wileys. It is the relatively large cost and small edition of architectural books that cause books of this class to be found scattered through the lists of many leading publishers, a few here, a few there, but not enough anywhere, save in the Batsford case, to justify calling any one of them a publisher of architectural books. It speaks well of Mr. Batsford's business capacity and of his real and deep knowledge of the subject that in his later life he became a successful publisher of architectural works of real significance and importance, though it is but fair to say that in these later undertakings he had the benefit of the knowledge and active intelligence of his sons, particularly his eldest, who for some years has been managing partner and head of the firm. Better specimens of illustrated books would be hard to find than some that have been issued by the house which for more than half a century has been established on High Holborn, London, and in their way the works of Prentice, Gotch, Sachs, Belcher, McCartney, Fletcher,

Birch, Day and others have become standard authorities, and may some time rank as classics.

ALTHOUGH the *Metal Worker*, or rather an expert whom it quotes, says that the "escape of gas from the air-valves of steam-radiators has been frequently noted by steam-heating engineers," we cannot but feel that the phenomenon is not one that has become generally known, even though it is also said that in certain cases the explosion of steam boilers has been attributed to the explosive action of gases which had been given off by the feed-water, sometimes a carbon monoxide, sometimes a carbon dioxide, the first combustible, while the latter is not. It is said that if, when drawing off the confined air in a steam radiator, one holds his nose to the escaping blast he will perceive a distinct and unpleasant odor, which must be some sort of a gas caused by the decomposition of organic matter contained in the feed water. The *Metal Worker* gives this information in answer to a correspondent who was called on to cure a hot-water radiator, whereof some of the sections would get hot while the middle sections remained cold. While examining the radiator, the valve was unscrewed, as it was thought that clogging might have occurred at that point, and as it was evening the workman held a lighted match to the orifice so as to light the drill hole, whereupon the contained gas ignited with such violence that the flame flashed into the workman's face, burning off eyebrows and searing eyes and hair. In this case the feed-water is pumped from a bore hole eight hundred and fifty feet deep, which passes through three measures of bituminous coal, but for the whole distance the hole had been properly cased and the entrance of any coal gas seemed impossible.

AUTRE pays autres mœurs, says the French proverb, and of the truth of the formulation we have amusing proof in two newspaper scraps which happen to fall under our eye the same day. One of them recites how, in a Hanover hotel the other day, an architect, although a civilian, had felt called upon to box the ears of a student at the Technical High School who was also an officer of the Reserves, because the latter had said that, while not endorsing all the statements in ex-Lieutenant Bilse's realistic tale, "*A Little Garrison*," he felt there was much in it that was true. A duel with sabres was insisted on by a "Court of honor," and the civilian upholder of militarism, wounded in body as well as sensibilities, is to be tried by a civil court; while the military believer in the rights of man, also wounded, was sentenced to three months' imprisonment in a fortress. The other item recounts how a New York landlord, hearing a noise in the apartment occupied by an architect and his wife, which seemed to indicate that the latter was suffering at her husband's hands, entered the room, only to be assaulted by the architect, who is said to have "scratched him in a manner more like a cat than a man." As there seems to be nothing peculiarly architectural about either sabres or finger-nails, the two incidents seem to show once more that architects are made of the same kind of clay used for the rest of the human race, and are not the demi-gods, associating only with the Muses, that they would like to have the rest of the world believe.

BYZANTINE ARCHITECTURE.*

IN the new Roman Catholic Cathedral at Westminster, two of the chapels, one on the right and one on the left, have already received their mosaics. They form complete little specimens of the art in which they deal, but it so happens that several of the architectural features in either chapel are treated in different ways, and these different ways illustrate, as we hope to be able to show, very conveniently the principle on which Byzantine as a distinct architectural style is founded. That principle, which may be briefly stated at once, is that mosaic is to be used as the actual architectural material; that the nature of this material, soft, plastic and flexible, is to dictate the entire arrangement and composition of the structure. It is, emphatically, never to be used superficially, as a mere surface adornment, but always as the architectural motive in obedience to which the main forms and proportions of the building are designed. Further, as the existence in a building of the usual sharply defined architectural features belonging to stone construction must always, when used in conjunction with mosaic, reduce it to a mere skin-deep covering (since these features at once declare the composition of the building to be not of mosaic, but of stone), it will follow that a second indication of the true Byzantine style, over and above the adoption of all forms suited to the softness of mosaic, will be the obliteration of the whole structural system belonging to stone architecture.

The two large window recesses, holding double-light windows, are common features of both the Westminster Cathedral chapels. The recesses of the right-hand chapel, however, are rounded in the mosaic itself, and completely carried out in that material, whereas those of the left are formed of stone arches, the mosaic only beginning above the archivolt. This latter arrangement, and the appearance of the powerful stone arches as the supporting members, immediately proclaim the stone construction of the chapel, and reduce the mosaic to a quite superficial appearance in consequence; while in the former case the rounding of the blunt angles in the gold produces on the spectator the impression that the whole wall is formed entirely of this substance. The difference between the two in effect and feeling is of a fundamental kind. In the right chapel the mosaic is used as the architectural material, and becomes naturally the motive of an architectural style. In the left chapel it is confessedly mere ornament—of a certain effect from that point of view, but entirely without architectural significance.

We need not, however, leave the right-hand chapel itself to have this contrast brought home to us. As though to illustrate at a glance the difference between what we may call the real mosaic style and the sham one, the architect has confronted his solid mosaic window arches with a pair, leading from the chapel into the aisle, treated, as the rival ones in the other chapel were treated, with sharply moulded and projecting stone archivolts. If the reader will glance from the flat gold surface framed in the stone construction on one side to the solidly turned arch wrought in the gold itself on the other, or if he will compare the stone arches with the recessed arch above the altar, which is another specimen of structural mosaic, he will be made instantly conscious of the enormous difference between the two ways of using the material.

And let us emphasize the point here, for it is a crucial one, that it is not a question only of degree of effectiveness between the two treatments. Probably most people will agree that the mosaic is more effective when carried right through the structure than when supported in a stone framework. But it is insufficient to put it in this way. "More effective" conveys the idea of differing degrees of the same effect. That is a quite inadequate distinction. The two arrangements we are considering represent two totally different and opposed principles. One represents mosaic used constructively; the other represents it used decoratively. It will easily be perceived that the latter way of using it never could have originated a separate style. Architecture is construction, and therefore every differentiation of style is bound to be based on a differentiation of construction. This is what mosaic used in subordination to stone forms never could imply, for under these circumstances it is used merely as a superficial accessory in a structural arrangement with which it has no real concern. Once, however, it is allowed to form the substance of the structure, this idea of a differentiation of construction is just what it does introduce. It introduces the idea of a construction suited to a new material, soft and plastic, between which and stone or

marble there is nothing at all in common. It is this assertion of the right of the material to institute laws in conformity with its own nature which marks the solid treatment of mosaic as the true index of the style.

We have, then, in the details of these Westminster chapels a clue to Byzantine art. There, in the couple of arches where the mosaic is used structurally, we have a specimen of the Byzantine style itself. Here, where it is subordinated to stone construction, we have a treatment which is not Byzantine at all; a decorative treatment of mosaic, only interesting as exhibiting the misconception under which the West, by reason of its allegiance to form, has always labored in its dealings with the Eastern ideal of color.

Having provided ourselves with the theory that the structural use of mosaic is the test of the Byzantine style, we may have recourse to a few of the chief examples of that style to see how such a theory applies. Probably Santa Sophia owes its generally conceded position as the central type of the style largely to its mere magnitude and splendor, qualities which, though not unimportant, should not be allowed to outweigh principles of construction. The building is composed of a cluster of domes, rising one above the other, until they culminate in the wide, light, central dome, which, perforated by a circle of tiny windows round its base, and almost detached from the main structure, seems, as Procopius long ago noticed, rather to float above the space beneath than to be built over it. This architectural arrangement has been much admired, and it is indeed expressive in a wonderful degree of a certain airy lightness and grace. The dome is the structural principle. The great central arc is upheld by two half-domes, which abut against and support its lower rim; while the transfer from the circular dome-bases to the square supports is effected by "pendentives," or dome-segments. Thus the whole system is raised on a succession of concave surfaces mutually self-supporting, and lesser domes, half-domes and segments of domes, holding together and rising like a pile of bubbles, realize their appropriate issue at last in the central, perfect specimen in which they all culminate, and towards which they all converge. "All these parts," says Procopius, and his remarks have been echoed since by almost every critic who has written on the church, "surprisingly joined to one another in the air, suspended one from another, and resting only on that which is next to them, form the work into one admirably harmonious whole."

And yet if we look for the motive of this harmonious whole we shall find that it lies rather in the endeavor to harmonize and simplify the composition of an earlier style than to formulate the laws of a new one. In general character, as well as in detail and ornament, Santa Sophia bears, as has often been pointed out, a strong resemblance to the stately palaces and *thermæ* of the Roman Empire. Those earlier buildings, however, represented a confusion of the irreconcilable principles of horizontal or arched support. In Roman architecture these two principles are almost always combined, and the spaces within the architrave and columns belonging to the former principle are bunged up with the arches and walls belonging to the latter. Now the Greeks had already in their temples carried the horizontal principle to its full and perfect expression, but they had never applied themselves seriously to the possibilities of the arch. This had hitherto been left to Roman development. Santa Sophia makes good the deficiency. Out of the unintelligible jumble of Roman construction the Greeks extricated the arch principle and proceeded to enforce it with their usual thoroughness. The dome is the arch form carried to completion. A structure arranged as a system of domes is therefore that in which the arch principle as a structural motive can be most consistently carried out. Santa Sophia is a composition arranged on such a basis. Those lofty curves, supported by and emerging from each other, and soaring upward until they sweep victoriously in a culminating effort across the vast central gap, are the most perfect representation that exists in the world of the resources and possibilities that are latent in the arch principle. The result they achieve, in its purity and consistency, is far beyond anything the Romans had any conception of.

Nevertheless, successful as the great experiment was, it was never repeated. That wonderful and almost fairylike construction which has excited the astonishment and admiration of so many critics remains, in its kind, a solitary example of the Greek genius. It is true that the domical system has remained characteristic of the Byzantine style. It is also true that the arrangement by which the thrust of the dome was received by the pendentives and transmitted by them to the supports constituted a structural principle which was a distinct addition to the science of architecture. Nevertheless, this newly invented domical

*Extracts from a paper in the *Edinburgh Review* for October, 1904.

system was never again used as it had been in Santa Sophia. It was never again used to demonstrate the beauties and resources of the arch principle. What it was used for was to demonstrate the beauties and resources of mosaic as a building material—a quite different object, and one which necessitated a domical arrangement particularly ill-adapted to showing off the structural advantage gained.

On the completion of Santa Sophia an alternative confronted the Byzantine architects. Santa Sophia, as it stands, is a study of form. The mosaics with which it is lined are of no real significance. As we saw in the Westminster chapels, mosaic does not become an architectural motive and determine an architectural style until it changes, in accordance with its own nature, the whole architectural composition. But the architectural composition of Santa Sophia is not in the least affected by its mosaics. Those light and lofty curves, so crisply defined, so clearly structural, were not designed to show off the richness and substance of a flexible material. They were designed as studies of form, and they compose a clearly articulated structural arrangement. As for the effect of the structural articulation on the mosaics themselves, it is, as usual, to reduce them to a mere surface covering. It is obvious at a glance that with the composition of the architecture they have nothing whatever to do. They are, therefore, as here used, a decorative, not an architectural, motive.

We may conjecture, therefore, that a race which had developed the idea of form on the principle of the lintel was not likely to be very deeply impressed by the possibilities of the arch. The Byzantine architects gave the principle a trial. They rescued it from the muddle-headed treatment of the Romans; they divined its character and capabilities; they wove it into a structure the most perfect of its kind that the world has seen, and then they turned their backs upon it forever. Of all criticisms ever uttered the most scathing, to our mind, is that disdainful turning away of the Greek architects from a principle out of which they had wrought what, to most races, would have seemed an unqualified success.

They found compensation in that great Oriental idea which had never yet received due recognition in art. An interior, darkened and solemn, built out of solid gold and studded with figures and groups in swarthy crimsons and blues, might form such an illustration of the idea of color as had never yet been dreamed of. On this thought the Greeks acted. They discarded at once and altogether those structural forms which had hitherto composed all that was meant by the word architecture, but the presence of which was bound to be fatal to the influence of the new material. Architraves and archivolts, cornices, galleries, pilasters, friezes, all were swept aside. Instead of these angular and exact features the forms employed in the new style must, if they were to conform to the nature of the new material, be as much as possible of curved and rounded shape. The vault, the apse and the dome were employed, and became the characteristic features of the style. These were, however, to be used—and this is the distinctive mark of the style—not in the least as an exhibition of domical or arcuated construction, but solely as a vehicle for the display of the new building material. The lofty array of curves that made the fascination of Santa Sophia is exchanged for a group of low, heavy domes, of immense depth and ponderous solidity. It would, indeed, be impossible to imagine any features more different in character than the Santa Sophia domes and those subsequently used in the style. The former, in their lightness, seem scarcely to rest upon the earth at all, and in their exquisite grace and variety form a singular triumph of structural art. The latter, much lower, darker and thicker, seem rather like caverns delved out of the solid earth than buildings erected on its surface, and their squat proportions and plain curves are totally wanting in the Santa Sophia grace and variety.

A further change, in the same direction, was effected by the use made of light and shade. Few points are of more importance in Byzantine effects than this, and the system of *chiaroscuro*, as it may rightly be called, which they adopt, is responsible for a great deal of the power and influence of Byzantine coloring. In Santa Sophia the light is brilliant throughout the church, and the consequence is that the mosaics pale their ineffectual fire and fade away into a feeble, ashen gray. It is only in twilight that that deep glow wakes which is the note of the style. The modifications, then, made in Santa Sophia in the development of the new style seem to have been as follows: 1. All those features which conveyed the idea of a hard and exact structural material were discarded. 2. The lofty and varied dome system was exchanged for a few plain concaves of massive depth and substance. 3. The bright light, suitable enough for the display of form, was

toned down to a solemn twilight in keeping with the effects of rich color. These alterations are of so radical a kind that, if they are admitted as principles, they dispose at once of all pretensions of Santa Sophia to rank as the type of this style. At the same time the reader will see that all these alterations were such as would arise naturally from a resolve to use mosaic not decoratively but structurally.

We know of no better illustration, both of Byzantine art itself and of the obstacles with which it had to contend than is afforded by the little group of Sicilian mosaic churches of the twelfth century, in which, amid the counter influences of other races, the principles which the Byzantine artists were striving to enforce stand out with great distinctness. We will, therefore, turn for a moment to these for some further elucidation of the subject before coming to what we take to be the central specimen of the style.

The Monreale Cathedral was begun in 1174. It is of considerable size, measuring 315 feet in length, and its imposing proportions and the splendor of its mosaic walls and marble wainscoting have secured it a high position among examples of the mosaic style. It has, however, several fatal defects. The roof of the nave is of horizontal wooden beams, much gilded and decorated in the Saracenic manner, and the place of the dome is taken by a construction of woodwork, painted and carved. We have pointed out that, to convey the idea of mosaic used as structural material, the use of mosaic domes, vaults and apses, the curved surfaces of which afford special opportunities for displaying the plastic beauty of the material, is essential. These features are, in fact, the strongholds of the style, and in proportion as it is weak or strong the carrying out of these positions in complete mosaic will be insisted on or failed in. On the other hand, it is evident that features of such magnitude as domes and nave vaults are difficult and laborious works to complete in mosaic; so that by all who were inclined to take the Western or decorative view of the material, it was just these positions that it was sought to abandon. The Greeks knew well what was at stake. So long as these deep, rich folds of gold dominate the interior, the substantiality of the walls and every part of the mosaic elsewhere is placed beyond a doubt. But let them go and their place be taken by other structural forms, and the credit of every atom of mosaic in the building is shaken. Here then, among these curves and hollows, is where the fight between Greek and Barbarian, the fight which has for its issue whether the whole theory of mosaic is to dwindle to a decorative design or remain a great architectural inspiration, rages.

The date of the Capella Palatina, the royal chapel forming part of the palace, is 1142. Here the Greeks were rather more successful than at Monreale. That they should hold the apse is only what we should expect, because the apse being a feature of far easier construction than domes and vaults is naturally less contested; but they have here also succeeded in annexing the dome, which they have turned into a fine specimen of their art, using with special effect those opportunities which the adjustment of the dome itself to its octagonal base and of the octagon to the square of the choir arches gave them of exhibiting the pliability of their material.

We now come to the third and last of the Palermo churches still retaining their mosaics, the little Martorana chapel, finished in 1143, the tiniest and yet, in character, the most interesting and the completest of all. It is no bigger than a large room, and its effect is much interfered with by later additions and enlargement. Nevertheless, the original interior, though now forming part of a larger building, remains much as it was, and affords a fair idea of that effect which the Greeks so steadily aimed at, yet were so seldom permitted to achieve. Apses, dome and vaults are wrought throughout in complete mosaic. No impeding structural element is permitted anywhere to appear, but the whole building down to the marble wainscoting is solidly wrought in unbroken gold. The addition in effect is decisive. What was a mere hint in the cathedral and a contested principle in the Palatina is admitted in the Martorana as the one authoritative law. The mosaic here is not used decoratively at all. It is used in the Greek sense, structurally. A critic who had noted the constant outside interference in the larger churches might very likely be inclined to attribute the tiny perfection of the Martorana to an individual Greek effort. And he would be right. The church was built at the expense of one George of Antioch, a wealthy and influential Greek, who was admiral of the Norman fleet. Its tiny proportions indicate the limits of a purely personal endeavor. Nevertheless, the truth it was necessary to express has been expressed.

The architectural motive which had suffered so much from Norman indifference and the Puck-like interference of the Arab was vindicated at last; and if the value of architecture is to be tested by the idea it embodies, rather than the money and labor lavished on it, then the admiral's chapel may take its place among the significant buildings of the world.

Such is the testimony of these Sicilian churches. They bear witness to the fact that what the Greek theory aimed at was the structural use of mosaic. Wherever, in the churches we have named, that theory is departed from, in that place the work bears the impress of Norman or Arab influence. Wherever it is most perfectly carried out there we find the Greeks exclusively in charge of the building.

If throughout the West generally the art was misunderstood and thwarted, there was one spot at least where it was received with devoted submission. Venice was nurtured from her birth in a detestation of the West. This detestation, which the light of their own blazing homes had kindled in the breasts of the first settlers, which was intensified by subsequent relays of immigrants fleeing before the ravages of the Barbarians, and was fostered by later events and acts of hostility with the mainland, may be faintly traced as a trait of the Venetian character down to the very fall of the Republic. But its effects were most apparent during the centuries when Europe was enveloped in semi-barbarism. Severed from Western life Venice turned her gaze eastward. Slowly, as her Eastern commerce grew, arose the thought of a civilization, a wealth, a culture, derived from that distant source. This Eastern trade was the "enchanter's wand" which drew her many-colored palace walls from the deep. Before the end of the eighth century the island city had become Orientalized. The magnificence of Venetian life, the rich colors and textures of the dresses of her merchants, as well as the dignified composure and courtesy of their manners, are contrasted by contemporary historians with the coarse garments and uncouth manners of the Court of Charlemagne. There is something peculiarly striking in the dazzling apparition of a city so splendid and cultured in an age and among nations so rude and barbarous.

The collective national effort that goes to the creation of a great architecture did not, as we have said, exist in the Byzantine Empire. Where this quality did exist was among the young nations and free communities of the West. Unfortunately these young nations were not inclined to yield themselves wholly to others' guidance. They had ideas of their own to express, in the value of which they were profound believers. A certain skill, scraps of a queer knowledge, they recognized in the Greek race, but they proposed to use that skill and knowledge in furtherance of their own ends. Hence arose that perpetual interference in Greek designs which we have caught a glimpse of among the churches of Sicily, and which was the rule throughout South Europe, wherever the Byzantine style was introduced. The difficulty of getting those who had the practical power to carry out a big work to submit themselves to those who possessed the knowledge of how such a work should be carried out, was apparently insuperable. The creation of Venice, however, solved the problem.

The general aspect of St. Mark's is too familiar to most readers to need detailed description, nor could such description be attempted here. It will be enough to draw attention to the vindication of that principle which, as we have endeavored to show, is the clue to Byzantine art. The mosaics of St. Mark's do not, as is often said by Western critics, "adorn" the church; they compose it. They are used never decoratively, but structurally throughout. The three characteristic Byzantine features are here made use of with great completeness and effect, and domes, vaults and apses combine to display the richness and softness of the material. The whole of the upper portion of the building is composed of curves. There is not a flat expanse, nor a sharp edge, nor a correct right angle in the whole of it. The edges are blunt and heavily turned, the angles filled in and rounded, the surfaces uneven and slightly undulating. Vaults and cavernous recesses melt into each other. Nowhere is the material broken. Whether it protrudes in prominent folds, or opens upward into the great concaves full of soft, yellow light, or sinks into darkness in shadowy tunnels, or burns a steady flame in the final curve of the broad eastern apse, it forms but one mass of rich auriferous paste throughout. That appearance we noted in the Palatina, of curves and folds conveying the idea of the manipulation of a soft material, is here carried out with far greater completeness, and on an immense scale, and greatly heightens the

impression we receive of an interior substantially composed of gold.

Once we fully receive that impression we hold the clue to the architecture. If we compare these domes, as a domical system, with the domes of Santa Sophia, we confess their inferiority. But if we consider them as a manifestation of mosaic, how immeasurably superior are they in their lowness, depth and volume, to the airy structure of the Constantinople church. Santa Sophia is an elaboration of the dome theory as an architectural motive. St. Mark's is something quite different. It is the elaboration of the mosaic theory as an architectural motive. In the former case the domed arrangement owes none of its real power to the mosaics, which are of a purely decorative character, and might give place, without much harm done, to some other form of decorative treatment. It owes its power entirely to its structural merits. But strip St. Mark's of its mosaics, and its very architectural existence is at an end. Those squat domes and gloomy vaults make no sort of claim to structural beauty. Indeed, they scarcely strike one as structural at all. So ponderous, dim and ill-fashioned are they that they appear to be a work of excavation rather than of architecture. They might have been dug out with a spade.

No! the sole beauty that pertains to the domes and vaults of St. Mark's is derived from the substance in which they are wrought. They are not beautiful in themselves. They are not there for any merits of their own. They are beautiful because they suit the mosaic. They are there because they have been chosen by the mosaic as its own fitting vehicle. It is not they that make use of the mosaic; it is the mosaic that makes use of them. We harp on this point, and we hope the reader will forgive us, but the fact is it is the crux of the whole matter. In the West, where architecture is entirely a matter of form, vaults are vaults and domes are domes. They have their own structural value and no other. We shall never understand Byzantine as long as we stick to that point of view, for it is of the essence of the Byzantine style that these forms are entirely to give up this structural value of theirs in order to serve the purposes of the new building material. And it is this assumption by the new material of absolute control over the architectural features of the building which marks it as the inspiration of a distinct architectural style.

Hitherto hard building material, such as marble or stone, had dictated architectures of form, which, in their turn, had involved a purely decorative use of color. The introduction of a soft substance as at once a building material and a color material placed color on a new footing. It enabled it to escape from the thralldom of form and to develop its own sensuous rather than decorative character. And, in effect, if we glance back at the Palermo examples we shall find that only where the mosaic is used structurally is the sensuous effect of color felt. It is felt in the fold of the Monreale apse, in the glowing recesses of the eastern part of the Palatina, and more completely in the drooping vaults of the little Martorana chapel. On the other hand, wherever the mosaic is used superficially and in conjunction with structural forms, there color is limited to its purely decorative function. In short, the deepening hold and power which the color of these interiors gain over the mind and consciousness of the spectator is but the exact measure and reflection which the mosaic obtains over the structural composition of the building. These examples might be added to by scores. At Rome, at Ravenna, at Athens, at Constantinople and throughout the near East there are scattered buildings in which the struggle of color to free itself from the control of form, and the efforts of form to maintain its hold upon color, are illustrated. The result of these contests is always the same. Wherever form is introduced structurally it kills the sensuous appeal of color, and wherever color is introduced structurally it kills the intellectual appeal of form.

It is not too much to say that the inward resemblance between St. Mark's and a Doric temple is as strong as their outward differences are salient. Both display the same singleness of purpose in making use of every means to develop and heighten the artistic effect they have in view. Both reject with the same confidence every means, however tempting, however popular, however prescribed by custom, which does not harmonize with that main artistic effect and help to develop it. Both march with the same splendid composure through all the allurements of detail to the final judgment of the whole. If simplicity consists, as we are very sure it does, not so much in plainness of result as in singleness of purpose, then St. Mark's may share with the temple its claim to supreme simplicity. The cathedral is a single, unalloyed sensation, as truly as the temple is a single, unalloyed

intellectual conception. True, instead of clean-cut proportions, exquisitely shaped and finished, here are soft, melting forms almost indeterminable. Yet the breadth of touch here is equal to the boldness of line there. These great shadows that gather, darkening or smouldering, and spread in dim yet rich obscurity through the building, these huge curves and hollows of ruddy or gleaming gold, these massive piers encased in their dusky marble slabs, are the means, just as carefully thought out and just as carefully adjusted to the impression they are designed to convey as the sharp-cut architraves and columns are adjusted to the design of the temple.

Nor has the influence of St. Mark's been out of keeping with such an artistic pre-eminence. There have arisen in Europe since the extinction of the Byzantine Empire two movements in art which have been obviously inspired by the Eastern conception of color. These are the schools of painting of Venice and of Spain. The resemblance between these is too close to need insisting on. The dark richness, amounting often to gloom, rarely bright, never gay, with much strength in it and some sternness, yet a sternness and strength derived from the color effect alone and unimpeded by limitations of form, is peculiar to Venice and to Spain. It is especially in their management and handling of color that the likeness consists. Color in the Venetian and Spanish schools at their strongest and best is controlled by its own agent, *chiaroscuro*, to a far greater extent than is the case with any other school of painting in Europe. The resemblance between the two is the more striking, because these schools were more widely separated and more disconnected than any others. Influence each other they did not, but both sucked at the same source.

We have not the least doubt that Spain drew her inspiration in color from that strong infusion of Orientalism with which the Moorish invasion and occupation had impregnated the country and which had become a profound national characteristic. As was natural under the circumstances, the Eastern influence in Spain was more powerfully felt in life than in art, though it was strongly felt in art, too. In Venice, on the contrary, its influence was mainly in art and its grip on the artistic sense of successive generations was St. Mark's. Nothing in the history of art is more extraordinary than the influence of this single building, an influence, too, wielded largely in despite of the will even of those who underwent it. No building we know of has been so much misunderstood and so often reviled as St. Mark's. Yet men have felt truer than they have reasoned. Her power has asserted itself, and to-day the results of her influence among us, veiled though they may be, are immense, are incalculable. A very large share of all that Europe knows of color Venice has taught her, and St. Mark's is the center and heart of Venice's color-inspiration. No one who turns from the glow within the basilica to the glow on the canvases of the great Venetian painters can fail to perceive whence that rich suffusion of color, with its power, unique among the Italian schools, for melting down the obstructions of form, was derived. Others have drunk at the same spring. One master pre-eminently among the Netherlands has that glow—Rubens, and he learned it in Venice. One pre-eminently among English painters has it—Reynolds, and he learned it in Venice.

Thus, by channels too numerous to trace, acting primarily on the art that grew up under its immediate sway and, secondarily, through that, on the art and artists of other nations, the influence of the great Greek embodiment of the Eastern ideal has filtered and penetrated through Europe, until now, perhaps, if we stood in any of our galleries and were able to obliterate at a stroke all that St. Mark's had contributed, it would be as if a cloud had passed over the sun. Between East and West, Venice has been the chief interpreter and St. Mark's has prompted Venice.

PASSENGER ELEVATORS.—III.*

THE efficiency of hydraulic elevators depends, not only on their mechanical efficiency, but, to a large extent, on the uncounterbalanced weight of the car necessary to overcome the momentum of the moving masses and bring the car to rest. In stopping, no aid can be obtained by retarding the motion of the piston, as this would slacken the cables and produce a dangerous jumping motion, tending to throw the cables from the sheaves. Hence the minimum space in which a stop can be made, with an empty car running at full speed, is that due to the unbalanced weight of the car. This unbalanced weight, in addition to the live load in the car, must be lifted by the effort of the machine.

The importance of this is very great with high speed and heavy moving parts.

The unbalanced weight is expressed by the following formulas, in which the notation is:

W = weight of car;

G = gear = ratio of car to piston movement;

s = space in which a stop is made;

v = velocity of car, in feet per second;

w = weight of cables per linear foot;

U = unbalanced weight;

P = weight of plunger;

g = gravity = 32.2;

K = weight of cables and other parts, other than car, moving at or reduced to velocity, V ;

L = live load;

R = rise of the elevator car.

The Vertical Hydraulic Elevator.—In this elevator, balanced on piston and traveling sheaves, the counterbalance travels at a velocity, $\frac{v}{G}$, and its weight, therefore, is $(W - U) G$.

The energy stored in the moving parts is:

$$(W + K) \frac{v^2}{2g} + (W - U) G \times \frac{v^2}{2g G^2}.$$

$$\text{Whence } U = v^2 \frac{G(W + K) + W}{2g G s + v^2} \dots \dots \dots (1)$$

For a machine of standard design,

$$K = 100 + 60 G + 3 w R \text{ (approximately).}$$

The Horizontal Hydraulic Elevator.—In this elevator, the moving parts of the engine cannot aid in balancing the car; hence an independent weight, traveling at the velocity of the car, must be used, and its weight is $= W - U$.

Letting B = the weight of the moving parts of the engine, we have, for the stored energy:

$$[W + (W - U) + K] \frac{v^2}{2g} + B \frac{v^2}{2g G^2}.$$

$$\text{Whence } U = v^2 \frac{2W + K + \frac{B}{G^2}}{2g s + v^2} \dots \dots \dots (2)$$

$$B = 4,000 \text{ lb. (approximately).}$$

The Plunger Elevator.—In this elevator, all parts move at the velocity of the car; hence we have the simple "Atwood Machine" of the physical laboratory. The weight of the counterbalance is $(W + P) - K - U$, and the stored energy (neglecting the weight of the sheave) is:

$$[(W + P) - K - U] + (W + P) + K \frac{v^2}{2g}.$$

$$\text{Whence } U = v^2 \frac{2W + P}{2g s + v^2} \dots \dots \dots (3)$$

The usual diameter of plunger is 6½ in. and its weight is $P = 18.9 R$ for light pipe and $P = 28.8 R$ for extra heavy pipe.

Representing the mechanical efficiency of the machine by $M. Ef.$, and calling the ratio of actual live load lifted to the power expended, the load efficiency = $Ld. Ef.$, we have:

$$Ld. Ef. = \left(\frac{L}{L + U} \right) M. Ef. \dots \dots \dots (4)$$

The mechanical efficiencies can be expressed by the following formulas:

Vertical Cylinder:

$$M. Ef. = (0.95 - 0.015 G) \times \left(1 - \frac{1}{4D} \right) \dots \dots \dots (5)$$

Horizontal Cylinder:

$$M. Ef. = (0.95 - 0.011 G) \times \left(1 - \frac{1}{4D} \right) \dots \dots \dots (6)$$

Plunger:

$$M. Ef. = \left(\frac{1}{1.07 + 0.02 \frac{P}{L}} \right) \left(1 - \frac{1}{4D} \right) \dots \dots \dots (7)$$

When D is unknown, we may substitute its approximate value

$$D = \sqrt{\frac{(L + U) G}{0.7854 p}}$$

in which

p = Water pressure, in pounds per square inch;

D = Diameter of piston, in inches.

By inspection of Formula 3, it will be seen that the weight of the plunger, P , has an important effect on the value of U , and as P is a function of the rise, the mechanical efficiency and load

*A paper read at the International Engineering Congress at St. Louis, October, 1904, and published in the *Proceedings of the Am. Society of Civil Engineers*. Continued from No. 1509, page 71.

efficiency decrease as the rise of the car increases. Also, Formulas 1, 2 and 3 show that the economy of operation of elevators increases as the maximum speed provided for is decreased. Hence, the most economical operating conditions in any building are obtained by installing as large a number of elevators as space can be allowed for and operating them at as low a speed as will accommodate the traffic.

The efficiencies are reduced still further by the hydraulic losses in the valves and pipes. These, however, are entirely independent of the type of machine, and are simply a matter of sizes of pipes and valves used, and therefore under the control of the designer. Hence, the case is quite analogous to electric transmission, pressure corresponding to electro-motive force and cost of pipes and valves to cost of copper.

The hydraulic efficiency, Hy. Ef., being determined by the designer, we have, for the final efficiency, at the delivery of the pumping engine:

$$E = (\text{Hy. Ef.}) \times (\text{Ld. Ef.}) = (\text{Hy. Ef.}) \times \left[(\text{M. Ef.}) \left(\frac{L}{L+U} \right) \right] \quad (8)$$

The advantage of high-pressure elevators is in the hydraulic efficiency. Thus, the hydraulic loss in a low-pressure plant when lifting full load at, say, 250 ft. per min., would be, with usual pipe sizes, about 15 lb. per sq. in.; and if the working pressure were 150 lb. = 10% of the total pressure. With a high-pressure system of 750 lb. pressure, to obtain the same frictional loss, the area of the pipes would be approximately one-fifth; but the loss would only be 2% of the total pressure. When the elevator car moves at 600 ft. per min., the losses would be about 86 lb., or 57% and 11½%, respectively, for the low and high pressures. Hence, a high-pressure elevator can maintain full speed up to nearly 90% of full load, while a low-pressure elevator will slow down with less than 60% of full load, if the same ratio of pipe sizes is maintained.

When Frank J. Sprague, M. Am. Soc. C. E., became interested in electric elevators he introduced the system of "car-mile" comparison, borrowed from electric railway practice, and it has become customary to compare elevator systems by the horse-power-hours, kilowatt-hours, or pounds of steam consumed per mile run by the elevators. Such a comparison, made without reference to the lifting capacity, speed or load carried, is as valuable as a comparison of two engines by the pounds of steam consumed per revolution, or of two motors by the current consumed, without reference to their power or the effective work done by each. Nevertheless, it is a convenient comparison of plants designed for similar duties in buildings of similar character of service; and it is useful in estimating fuel consumption for any given plant when the car-mileage is known or can be assumed. A good average for general office service is 15 car-miles per day per elevator, though in some buildings not more than 12, and in others as many as 20 car-miles are made.

In estimating car-mile rates for hydraulic elevators it must be remembered that power is used in one direction only; hence the power used per car-mile is represented by the piston displacement corresponding to a half-mile run of the car. Hence the water horse-power-hours consumed per car-mile are:

$$\left(\frac{2,640 L}{83,000 \times 60} \right) \div E \dots \dots \dots (9)$$

When the diameter of the piston or plunger, D , and the water pressure, p , are known, the estimate of the car-mile rate is very exact, as the hydraulic cylinder is an accurate meter, and the following formulas are convenient, especially for use with the slide-rule:

$$\frac{2,640 D^2}{24.5 G} = \text{United States gallons per car-mile.}$$

$$\frac{\text{U. S. Gallons} \times p}{1,719 \times 60} = \text{Water horse-power-hours per car-mile.}$$

These water horse-power-hours represent the net work to be performed upon the water by the pumping engines, and the economy with which this work is done is dependent entirely upon the class of pumping engine used.

By reference to Formulas 1, 2 and 3 it will be seen that the factor, s (space in which a stop is made), is of prime importance in determining the unbalanced weight and the efficiency of the machine.

In order to obtain good elevator service, the acceleration must be rapid, and the stop made in a minimum space, in order that a reasonable average speed between floors may be maintained. Also, the operator, when stopping, must bring his car to rest at the floor level without premature slowing up, and especially without overrunning and loss of time and power by returns.

In order to accomplish this, the stop must be made within the distance in which the operator can see the landing at which he aims. This is about 3 ft. above the level of his eyes, whence the maximum distance which can be allowed for the stop, in order to obtain good service, is about 8 ft. Hence, rapid and positive elevator service demands provision for a net gravity stop not exceeding 8 ft. Even when this gravity stop is provided for, only a skilled operator will accomplish it, and an ordinary operator may require a considerably longer distance. Hence, in good practice, the space, s , in the formulas, should not exceed 8 ft.

Three types of pumping engines have become standard for elevator service, namely, the direct-acting, compound, duplex engine, the direct-acting, triple-expansion, duplex engine, and the compound, fly-wheel engine.

Worthington, high-duty, pumping engines, such as have been used extensively for water-works service, have been used occasionally for elevator service. Such engines, where they can be kept running steadily, have shown great economy, but, in general, elevator service is not uniform enough to warrant their use, and the saving of fuel hardly compensates for the first cost of installation.

Makers of pumping engines guarantee, with proper conditions of steam pressure, the production of an hourly water horse-power, with a consumption of 70 lb. of steam for the compound and 40 lb. for the triple-expansion. They guarantee 25 lb. of steam per indicated hourly horse-power for the compound, fly-wheel engine. Tests of these engines show that, at this rate per indicated horse-power, the consumption of steam per hourly water horse-power is about 30 lb.

The ordinary specification for an office building elevator plant calls for a maximum load of 2,500 lb. to be lifted at a speed of 250 ft. per min., and a load of about 1,500 lb. to be lifted at 600 ft. per min. Such a building, 18 stories high, would require an elevator travel of about 200 ft.

(To be continued.)

SUGGESTIONS FOR INCREASING THE SAFETY OF THEATRES.

In a German pamphlet published in 1904 the author, Dr. Rautert, calls attention to the fact that the majority of rules and regulations intended to increase the safety of theatre visitors refer first of all to the dangers to the person arising from the heat and flames of a conflagration, while most safety measures are notoriously inefficient as regards the smoke and fire gases which render their victims quickly insensible and cause many deaths. The author calls attention to the fact, which has also been pointed out by other theatre experts, that in the theatre fires at Vienna in 1881 and at Chicago in 1903 the majority of the victims of the calamity had been suffocated within a very few minutes after the outbreak of the fire. He points out that in both cases the smoke and gases from the fire on the stage gained access to the auditorium so quickly that the persons, particularly those of the upper galleries, could not effect an escape. The author therefore claims that the smoke and gases should under all considerations be held back from the auditorium and from the lobbies, passages and staircases surrounding the same.

In order to accomplish this he suggests that the iron fire-curtain at the proscenium opening should be lowered immediately upon the outbreak of a stage fire, and that simultaneously with the lowering of the curtain a large ventilator should be put in operation which would positively remove all gases and smoke above the roof.

Regarding the iron curtain the following requirements are made:

First—It should close as tightly as possible on all sides of the proscenium opening. It should also descend automatically and quickly after being set in action. It should be able to withstand a lateral pressure equivalent to a column of water of 8 in., because there is a perceptible pressure generated on the stage when there is a fire, the pressure being caused by the increase in the volume of air. The iron curtain should also be able to hold back for a long time the flames of a fire on the stage; it should not, therefore, easily turn to a red heat, but it should on the stage side be covered with asbestos sheets or plates. Moreover it should be provided at the proscenium opening with an automatic water-curtain arranged to operate as soon as the curtain is lowered.

Of even more importance than the iron curtain is the quick and perfect removal of smoke and gases from the upper part of the stage. If this can be accomplished during the first stage of a fire the air of the auditorium will move towards the stage,

and not vice versa, and it should be pointed out that the opposite movement of air, namely, from the stage to the auditorium has been the real cause of the danger to the theatre public. This direction of the movement of air appears to be of special importance during the time when the curtain is being lowered, but even after the same has been lowered it is of some value, because in case of openings or cracks between the iron curtain and the proscenium opening the air will flow towards the stage and will prevent the smoke and gases from flowing towards the auditorium. Every stage should, therefore, have in its roof openings of sufficient dimensions which may be closed with easily movable flap valves. These could either be arranged to open automatically or they could be opened simultaneously with the lowering of the fire-curtain. After they are once opened the high temperature of the air in the stage house will certainly create the desired movement of air in the direction from the auditorium to the stage roof.

It would seem better to provide openings in the stage roof which operate automatically rather than to depend upon the work of human hands, and it is quite certain that the removal of the fire gases and smoke effected by such openings may be considered as the most efficient means of safety for the theatregoers in case of fire.

W. P. G.



THE CASTLES ON THE RHINE.—A German authority states that from the mouth to the source of the Rhine 725 castles, formerly the homes of warlike chiefs, are to be found overlooking its waters.

STATUE OF COLIGNY FOR BERLIN.—Emperor William is having a statue of Admiral Coligny erected before the palace, as one of his ancestors. Coligny's blood entered the Hohenzollern family through William of Orange, who married in 1583 the admiral's daughter, Louise, whose granddaughter, Henriette, married the Great Elector, from whom the Emperor is directly descended. The Emperor has entrusted the execution of the monument to Count von Gaertzechitz, the sculptor.—*Exchange.*

THE SUBMARINE CABLE IN THE AMAZON.—The Amazon telegraph cable extends from Para, at the mouth of the Amazon, to Manaos, at the confluence of the Amazon and Rio Negro. It is therefore rather more than 800 miles in length. The Amazon flows through a dense tropical wilderness, almost as virgin and unbroken to-day as when Wallace and Bates first described it, half a century ago. To erect or maintain a land telegraph through the well-nigh impenetrable thickets along its banks would be practically impossible. When, therefore, it was the wish of the Brazilian Government to connect Para and Manaos by telegraph, the bed of the Amazon was chosen as the most feasible route, and an English company engaged to furnish and lay a cable. At Para, the Amazon cable connects with the whole submarine land-telegraph system of the world. Sitting in the cable room, far up the Amazon, at Manaos, I can send a message to any of the six continents, as also to Japan, Java and the Philippine Islands.—*Field and Stream.*

AUTOMATIC FIRE ALARM.—A Danish scientist, C. F. Hilkier, has invented an automatic fire alarm which acts only when a sudden wave of heat is generated in an enclosed space, and is not influenced by an evenly created high temperature such as that caused by intense summer heat or the artificial heat used for warming buildings or in drying rooms and other places where a somewhat abnormal temperature is maintained. It consists of a small glass tube bent into a U shape, with closed ends. It is half filled with mercury and the upper part contains a highly volatile liquid, such as sulphuric ether. One end of the tube is inclosed with some non-heat conducting material, so that a sudden rise in temperature affects only the exposed end. A wire is fused into both ends of the glass, so that it reaches the mercury when the latter is in its normal position and a continuous electric current passes through. But when a sudden wave of heat reaches the instrument it affects only the unprotected end of the tube, and the volatile liquid expands instantly, forcing the mercury into the covered end, thus severing the electric connection and setting

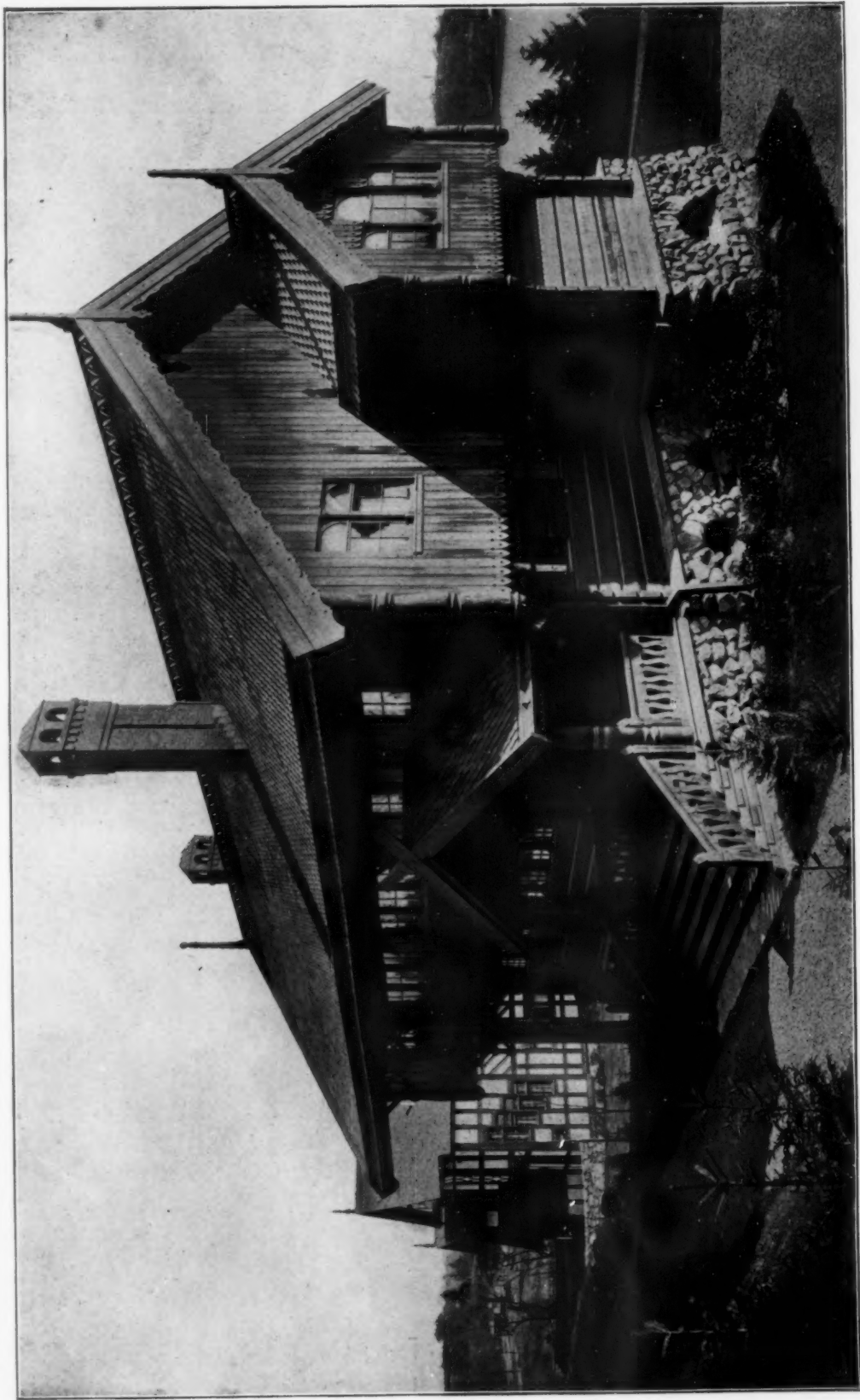
in motion an alarm. The apparatus also indicates a break in the electric current caused by the batteries running down or otherwise, so that there may always be assurance that the device is in working order. It is said to sound the alarm when a small fire of shavings is started in its immediate vicinity.—*Metal Worker.*

GREENWICH PALACE.—A scheme is on foot in England to revive the former glories of Greenwich Palace as a royal residence, with the idea of bringing the Crown in closer touch than at present with that toiling mass of humanity which inhabits the East End of the mighty British metropolis. It may be recalled to mind that Greenwich was the residence of the Kings of England as far back as in the thirteenth century. Henry VIII. and his daughters, Queen Mary and Queen Elizabeth, were both born there, and King Charles II. pulled down the ancient palace and erected the present stately and beautiful pile of buildings, according to the designs of Sir Christopher Wren and Inigo Jones. With its terrace of a thousand feet in length skirting the broad reach of the river, and with old Greenwich Park, full of centenarian trees, as a background, it is in every way a worthy home for the monarch of a great empire. King James II. spent much time at Greenwich, but his daughter, Queen Mary, and her husband, King William, surnamed "of Orange," converted it into a home for old and wounded seamen of the Royal Navy, that is to say, into a species of maritime counterpart of the Invalides at Paris. This was, however, abandoned about forty years ago, and since then the greater part of the palace has stood empty, only a small portion thereof being devoted to the use of the Royal Naval College, for which accommodation could easily be found elsewhere. Of course, the one drawback to the scheme is that the Thames is terribly polluted below London Bridge, and that the stream at Greenwich is apt to be foul smelling, especially at low tide. But when the works have been completed, which by means of a series of huge locks will render the river from Gravesend up independent of the tides, this drawback will of course disappear, and it would certainly be no hardship for either the King, the Prince and Princess of Wales, or some other members of the royal family, to make use of the palace as a suburban riverside residence once more, even if only for two or three weeks, thus according to the masses in the East End of London a glimpse of that royalty for whose benefit they are firmly convinced they are taxed.—*Marquise de Fontenoy in New York Tribune.*

THE LIKENESS BETWEEN CHILEAN AND OLD ROMAN HOUSES.—Chilean life in its most typical form may be seen to far greater advantage at the capital, Santiago, than at the more cosmopolitan and commercial city of Valparaiso. It would appear that the former, as chief center of Chilean civilization, has in general been little inclined to marked innovations of a foreign character, so that a sojourn there takes one back into the past in more than one sense. As one strolls through the older and more picturesque streets, the glimpse of a series of minor courts, or patios, open to the sky, leads one to believe that through one of those unaccountable whims in the history of nations, the most excellent modern counterpart of an old Roman city is to be found in Chile; that certain phases of the culture of ancient Italy had been carried over Spain and across the sea to South America. Nothing could resemble the plan of a Roman house more than some of the old Chilean mansions. The passerby is tempted at every moment to stop and look into some quaint patio, frequently separated from the street only by an iron grating. Very often the long vista is not disturbed by shrubs and flowers, and the many courts extending in a line to the rear of the house are plainly visible. The houses of the old style have only one story, but cover a vast space, which amounts in many cases to the greater part of a square. The majority of the rooms open on the courts, from which they frequently get all of their light and air. Owing to the important role which the patio thus plays, it is generally made the most picturesque part of the house, and few may be found that are not gay with flowers and the noise of fountains. The number of rooms in some of the old patrician mansions is infinite. The typical Chilean family which occupies a house of such large dimensions is very numerous, and embraces, at times, several generations, as well as collateral kindred; it may include, besides the family which forms the nucleus, all the grandparents, as well as uncles and aunts, with their children. The majority of rooms are therefore bedrooms, or are readily turned into such, owing to this common custom of gathering under one roof numerous kinsmen by blood or marriage.—*R. S., in New York Evening Post.*



TWIN GABLES: ROGERS MEMORIAL PARSONAGE, FAIRHAVEN, MASS.
Charles Brigham, Architect.



COTTAGE IN NORWEGIAN STYLE, AT CHESTNUT HILL, NEWTON, MASS.

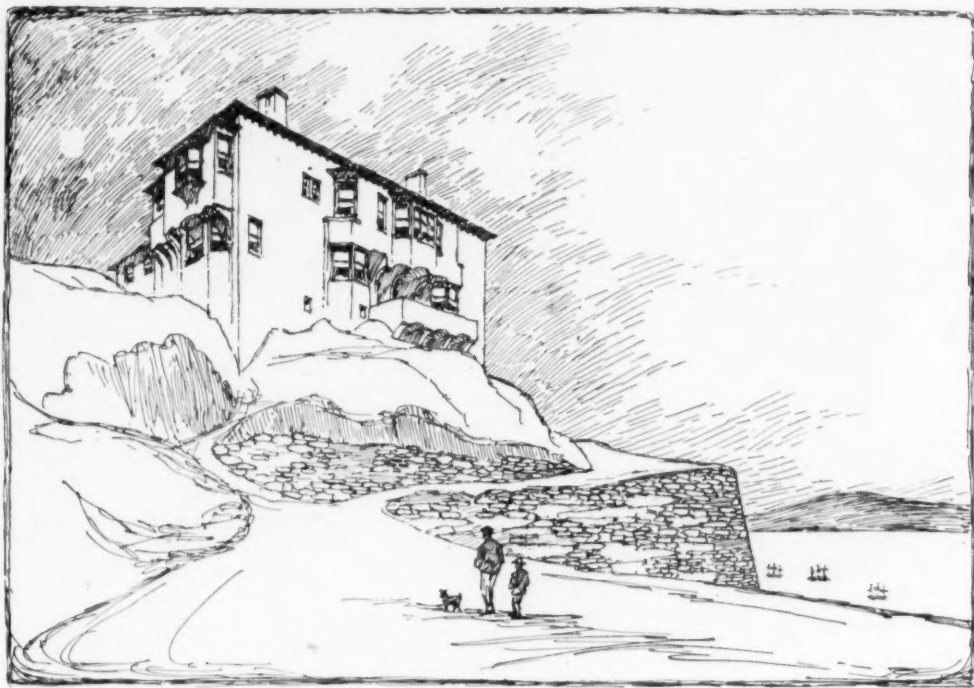
Joseph Everett Chandler, Architect.



THE ULSTEIN PRINTING OFFICE, BERLIN, PRUSSIA
Hart & Lesser, Architects.



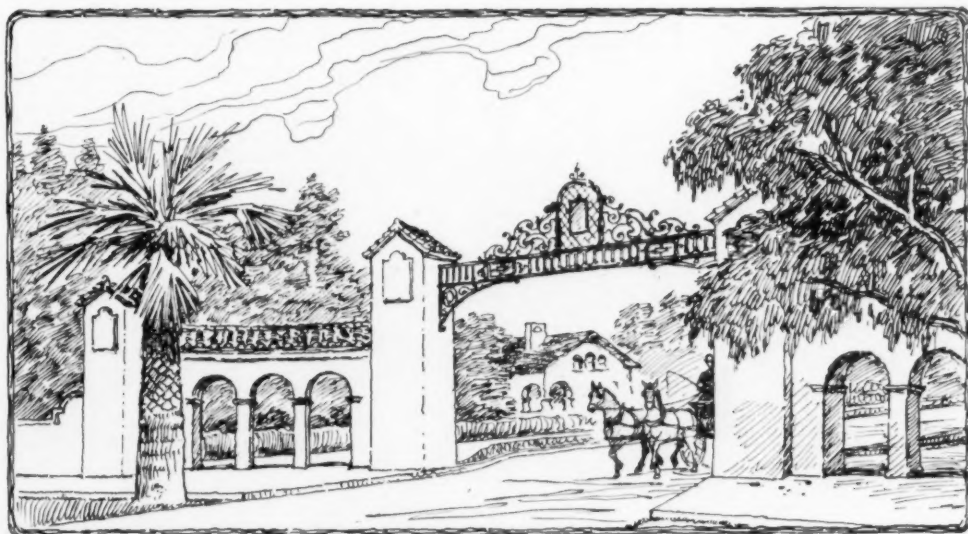
NO. 19 KAISERALLEE, WILMSDORF, PRUSSIA
Bornitz & Langhammer, Architects.



MYRON HUNT, ARCHITECT, — LOS ANGELES.

HOUSE OF LIVINGSTON JENKS, ESQ., RUSSIAN HILL, SAN FRANCISCO, CAL.

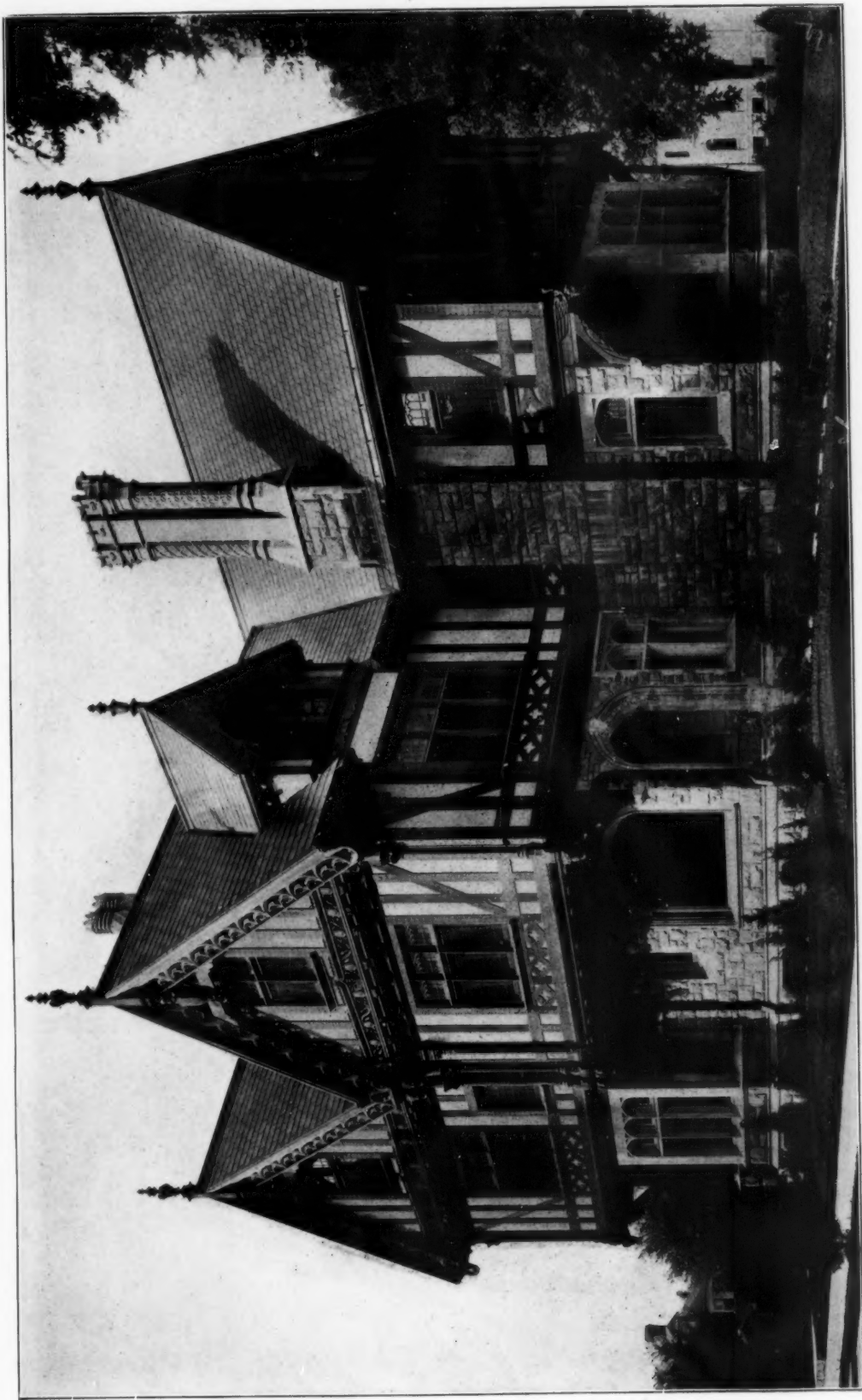
Myron Hunt, Architect.



MYRON HUNT & ELMER GREY, ARCHTS

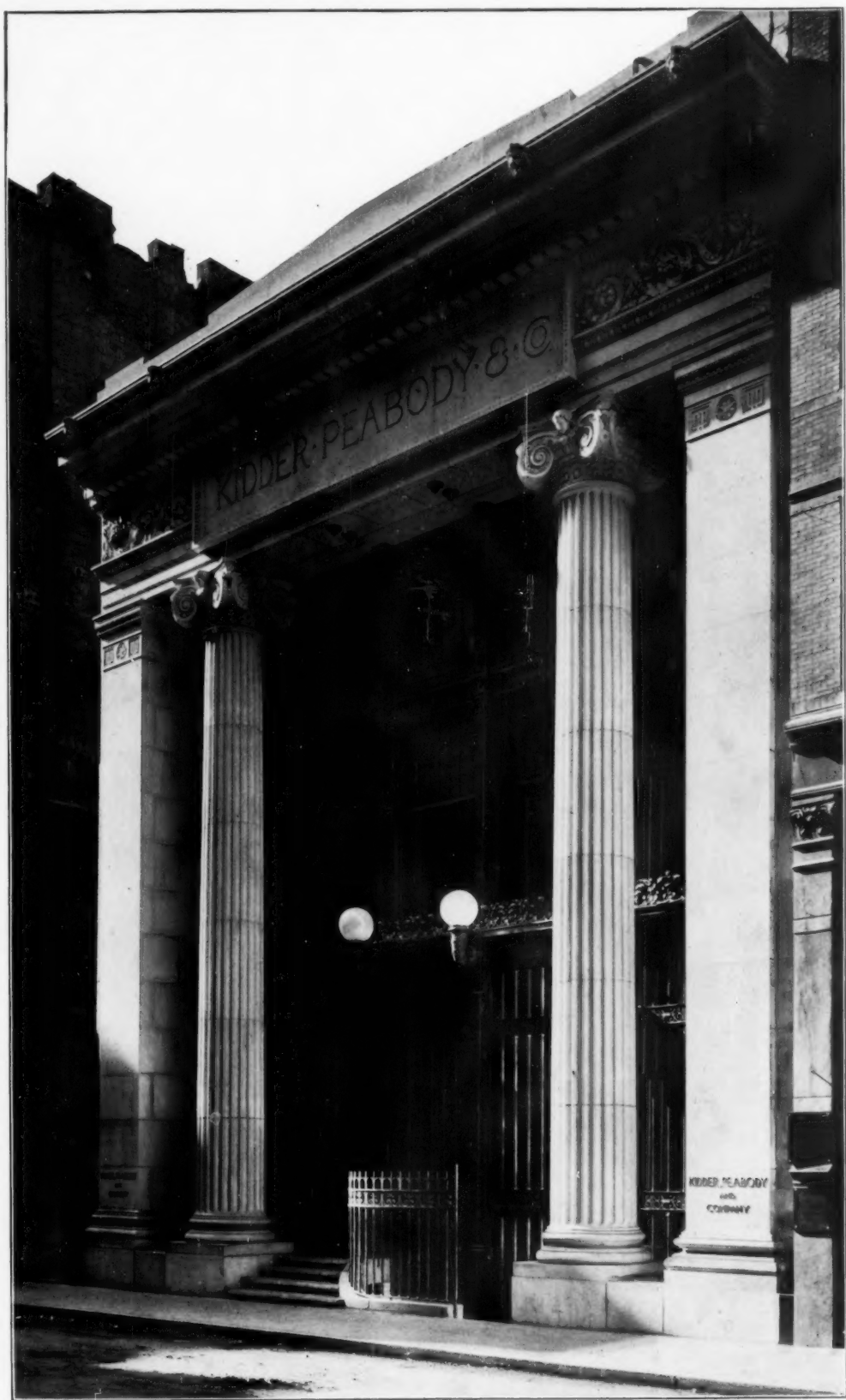
ENTRANCE TO PALMA ALTA PARK, NEAR HOLLYWOOD, CAL.

Myron Hunt & Elmer Grey, Architects.



ENTRANCE FRONT: ROGERS MEMORIAL PARSONAGE, FAIRHAVEN, MASS.

Charles Brigham, Architect.



BANK BUILDING FOR KIDDER, PEABODY & CO., BOSTON, MASS.

Winslow & Bigelow, Architects.