THE BALTIMORE FERRO CONCRETE CO.
INCORPORATED

BALTIMORE, MD. ATLANTA, GA.
OTTAWA, CANADA

FERRO CONCRETE CONSTRUCTION

INDESTRUCTIBLE AND FIRE-PROOF

JUNE 1904

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INDESTRUCTIBLE
AND FIRE-PROOF

U. S. PATENT No. 762,479

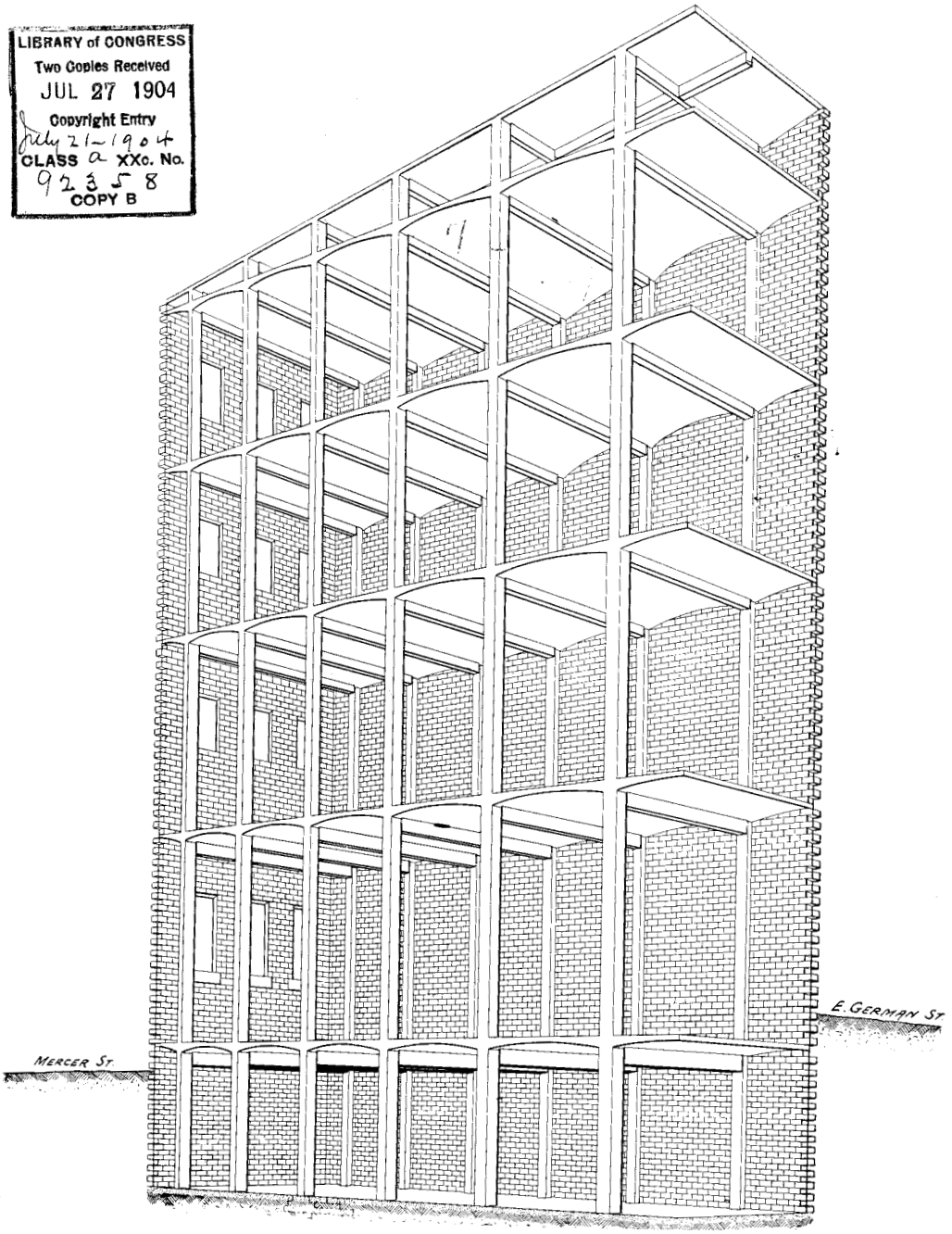
Description of the Work Done by The Baltimore Ferro Concrete Company during the Year 1903

MAIN OFFICE
409 ST. PAUL STREET, BALTIMORE, MD.

Annex Building of The United States Fidelity & Guaranty Company,

111 EAST GERMAN STREET.

WITHSTOOD THE BALTIMORE FIRE.



The five floors and roof were built of **Ferro Concrete** replacing mill construction between old brick walls. The floors were supported by **Ferro Concrete** columns, thus making a fireproof monolithic building, from foundations to and including the roof. In the fire the brick walls gave way, but the concrete structure remains intact among all the ruins, being the only standing building in that block.

PRINCIPLE OF THE FERRO CONCRETE CONSTRUCTION.

But few buildings in the stricken business district of Baltimore withstood the terrible fire of February, 1904, and the fact that among these were the buildings where Ferro Concrete Construction had been used has caused widespread comment. These were the International Trust Building, the Transformer Station at McClellan's Alley and the Annex to the United States Fidelity and Guaranty Company Building, German and Calvert Streets.

Everybody is asking, "What is Ferro Concrete? It appears to be a genuine Fire-Proof Construction."

This construction, however, is not as new as is generally thought. It has been used extensively for many years in Europe, and was introduced in the United States in 1901, when it was adopted for the first time by a Baltimore Architect. Almost immediately it was adopted by another at Washington. Since that time this construction has been in great favor, as can easily be seen by the many examples mentioned in this pamphlet.

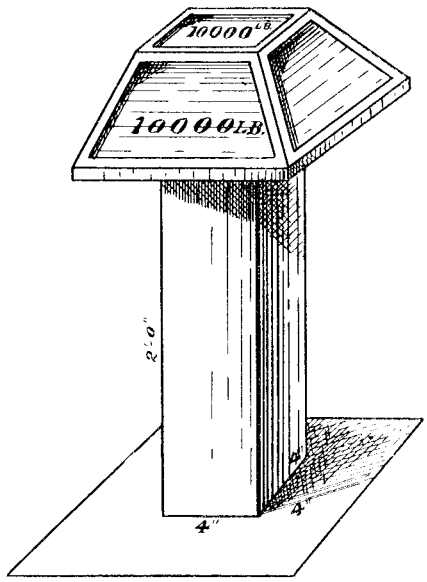


Fig. 1.

Concrete as is generally understood is a mixture of Portland cement, sand and gravel or crushed stone.

It is a plastic material which becomes hard in a short time and continues to grow harder.

It is practically indestructible.

It is formed by molding in wooden boxes and when hard becomes a monolithic mass, thus being free from joint, which is the weak point of brick or steel construction.

Concrete does not rust like steel, nor crumble like stone, nor burn like wood. Water or dampness, fumes or rodents, have no effect upon it. Finally, the resistance of concrete is greater than that of brick and of many building stones. The advantages of concrete as building material therefore can easily be seen. We can also say that concrete is not an expensive material.

Everybody knows that it would not be possible to build a concrete floor not reënforced capable of carrying a sufficient load; it would break because, although concrete has a great resistance to crushing stresses, it has not a sufficient resistance to tensile stresses. These facts can be illustrated in a few words. Let us take

a piece of good concrete, which has been made for forty days. It is four inches square in section and two feet long. When it is standing upright (Fig. 1.), we can pile on the top 10,000 lbs. of material without injuring the mass of concrete, but if the same prism is set on two blocks as a beam and loaded in the middle (Fig. 2), it will certainly break by cracking, under 600 lbs., because the concrete has a small resistance to tension stresses, which occur in the lower part of the beam.

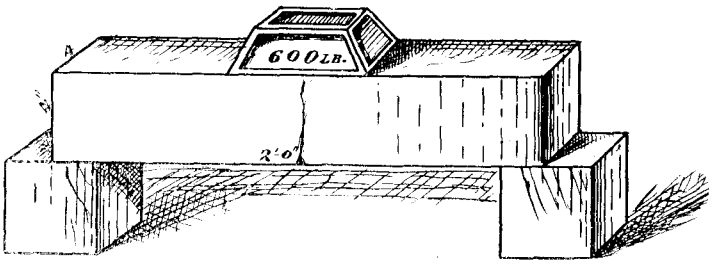


Fig. 2.

Is it possible to reënforce this lower part of the beam? Yes, in adding to the concrete a material which supplies this resistance to tension, that is steel. Let us introduce two small steel wires, 1/8 inch in diameter, in the concrete when it is molded and, when the cement has set, let us try again the bearing resistance of our little beam. It is now able to carry 1200 lbs., and does not break (Fig. 3). Thus, by adding to the concrete two little wires, we have given it a tensile strength that it had not before.

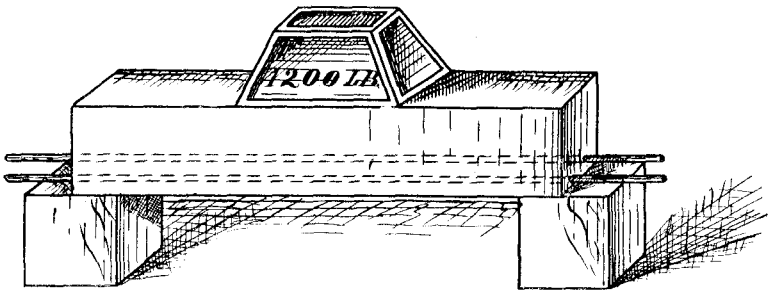


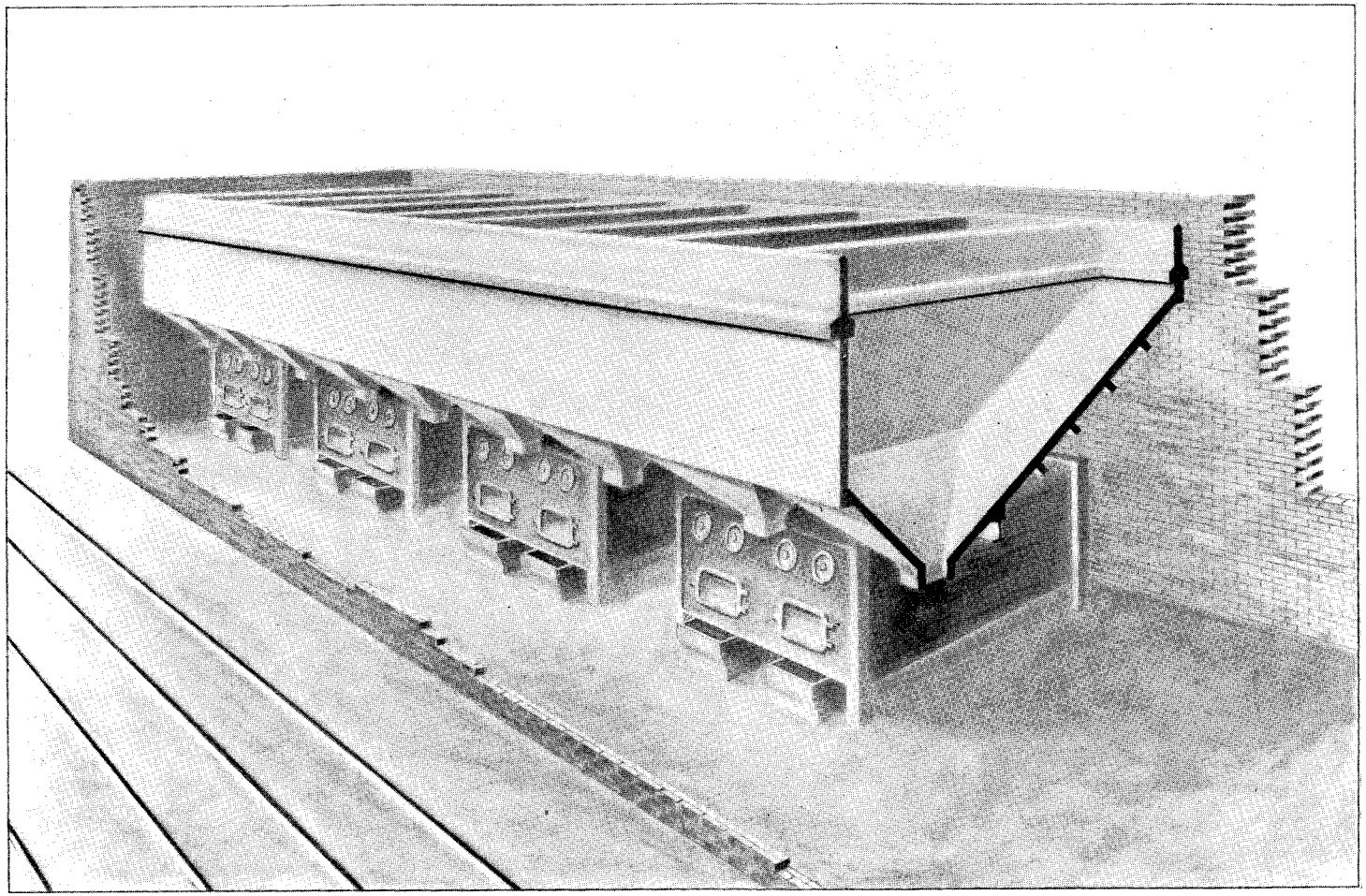
Fig. 3.

This is the principle of our construction which we call ferro concrete, as it consists of concrete reënforced with iron.

On four walls of a room we can build the floor of the upper story, that is a slab of concrete about four inches thick, reënforced by two series of round bars of steel crossing each other. We thus obtain a fire-proof and indestructible floor.

This can be said even after the concrete has been reënforced with steel, because this metal is perfectly embedded in concrete and therefore absolutely protected against any atmospherical action and against an intense heat. It is bound by the cement to the concrete mass and adheres to it. These are facts that twenty years of experience have proved true, and which are acknowledged by the best engineers of the world.

The ferro concrete work is not limited to the construction of a slab supported on four walls; two walls are sufficient to carry a concrete floor, without beam, if they are not too distant, but if the span of the slab is over ten feet, it would be

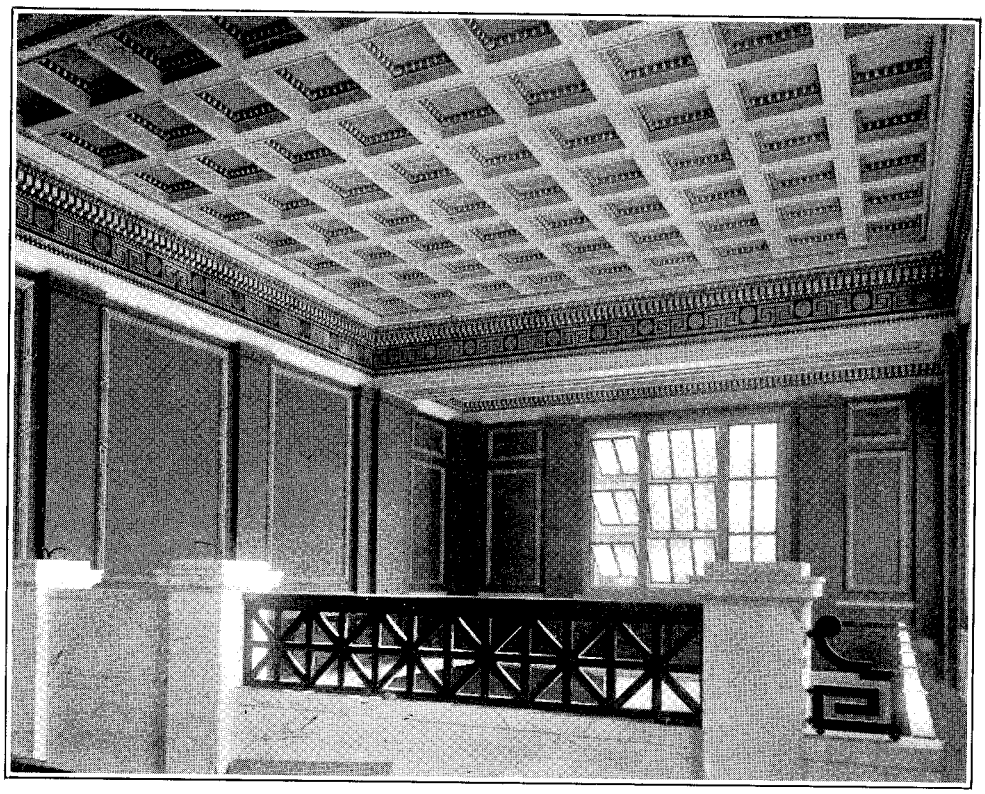


Ferro Concrete Coal Pockets of the New Trumbull Street Pumping Station at Washington, D. C. Henry Brauns, Architect. These nine coal pockets have a capacity of 1000 tons and are the first of the kind built in the United States.

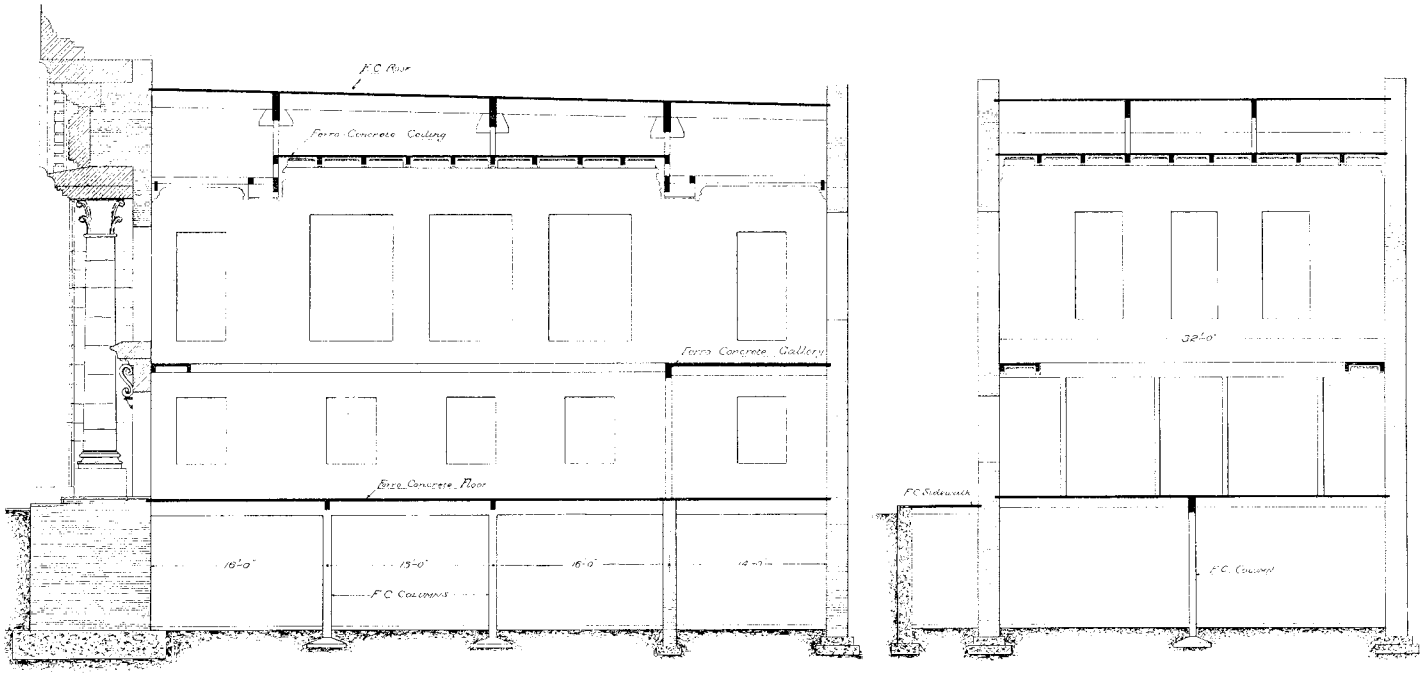
necessarily thick, heavy and expensive and it is better to stiffen the slab by means of ribs 6 or 8 feet apart, which are reënforced with heavy bars.

We thus obtain the usual form of floors with visible beams projecting from the ceiling, as is shown by various illustrations in this pamphlet.

Foundations, columns, arches, roofs, reservoirs, etc., are built on the same principle of concrete reënforcement, and the following is a list of the principal constructions made by "The Baltimore Ferro Concrete Company."



Concrete false ceiling of Howard National Bank, Baltimore, Md. (See also page 7.)



Howard National Bank, Baltimore, Md. J. Evans Sperry, Architect. John Waters, Builder. First floor and sidewalk, stairways, galleries, roof and ceiling of ferro concrete. This Bank is one of the most fireproof buildings in the city, on account of the concrete roof and concrete ceiling.

LIST OF THE PRINCIPAL FERRO CONCRETE CONSTRUCTIONS MADE BY THE BALTIMORE FERRO CONCRETE CO. IN 1903.

Coal pockets, 1000-ton capacity, Trumbull Street Pumping Station, District of Columbia. Henry Brauns, Architect.

Cistern, 15,000-gallon capacity, at Chattolanee, Md., in Mr. Orrick's property. Parker & Thomas, Architects.

Stairways in Washington, D. C., 9 flights in Merchant Storage and Transfer Co., E Street, N. W.

Floor of the conservatory, residence of Mr. Douglas Gordon, Baltimore, Md. Parker & Thomas, Architects.

Reservoir in ground, capacity 50,000 gallons, Curtis Bay, Md., owner, Brooklyn & Curtis Bay Light & Water Co. Henry Adams, Engineer.

Columns and two floors at St. Martin's Parish Hall, Washington, D. C. A. O. von Herbulis, Architect.

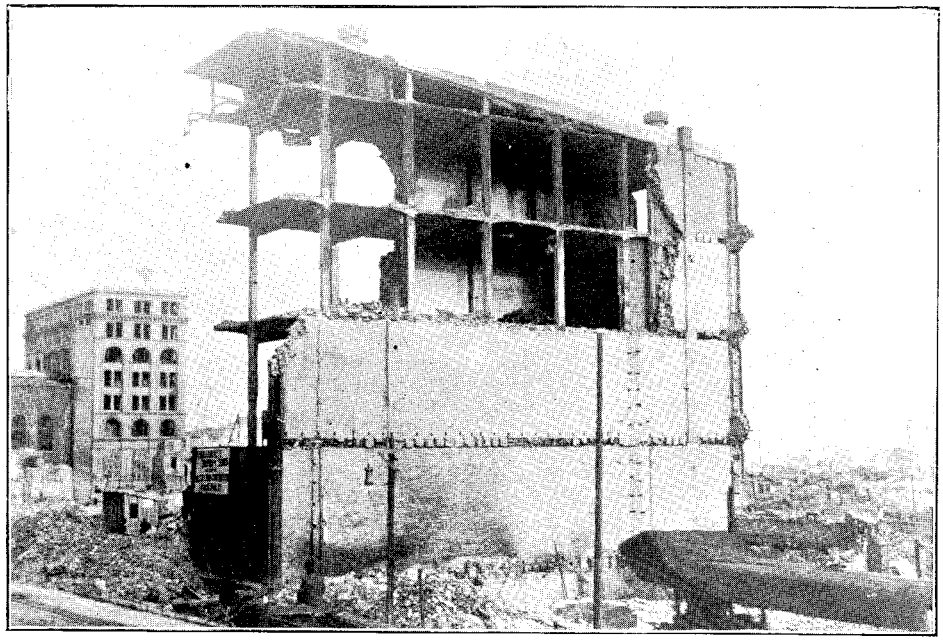
Sidewalk over vault at Knabe Bldg., Baltimore, Md. Parker & Thomas, Architects.

Foundations, columns, floors and retaining wall at International Trust Co. Bank Bldg., Baltimore, Md. Parker & Thomas, Architects.

First floor at 2d Methodist Church, Rhode Island Avenue, Washington, D. C. Denson, Architect.

Foundations of Catholic Church, West Falls, Va. A. O. von Herbulis, Architect.

First floor, framing and retaining wall at Hotel Junker, Baltimore, Md. H. Cassell, Architect.



Annex Building of U. S. Fidelity and Guaranty Co., 111 E. German Street, Baltimore, Md. Floors, columns and roof in ferro concrete. View taken after the Baltimore Fire.

Storage Warehouse of American Security and Trust Co., Washington, D. C. J. H. Hill, Architect. Six floors and the roof in ferro concrete. Total surface, 24,500 sq. ft. View taken during the construction.

Floor of piazza and stairway, residence of Mr. Hutzler, Baltimore, Md. Baldwin & Pennington, Architects.

Sidewalk over vault, foundations of columns, 3000-gallon tank, Mills Bldg. at Washington, D. C. Parker & Thomas, Architects. Geo. A. Fuller Co., Contractors.

Rosenfeld Shirt Factory, 38 S. Paca Street, Baltimore, Md., foundations, floors, columns and stairways. Parker & Thomas, Architects.

Floor over boiler room, Rippel Bldg., Baltimore, Md.

Floors of storage warehouse, American Security & Trust Co., Washington, D. C. J. H. Hill, Architect.

Floors in Marist Seminary Bldg., Catholic University, Washington, D. C. A. O. von Herbulis, Architect.

Reservoir, 50,000-gallon capacity, Bagby Furniture Co., Baltimore, Md.

Floors and roof of Maryland House of Correction at Bridewell, Md. Baldwin & Pennington, Architects. John Waters, Contractor.

Floors and roof of Marine Engineering Bldg., U. S. Naval Academy, Annapolis, Md. Ernest Flagg, Architect. Noel Construction Co., General Contractors.

Sidewalk over vault, Baltimore American Bldg., Baltimore, Md.

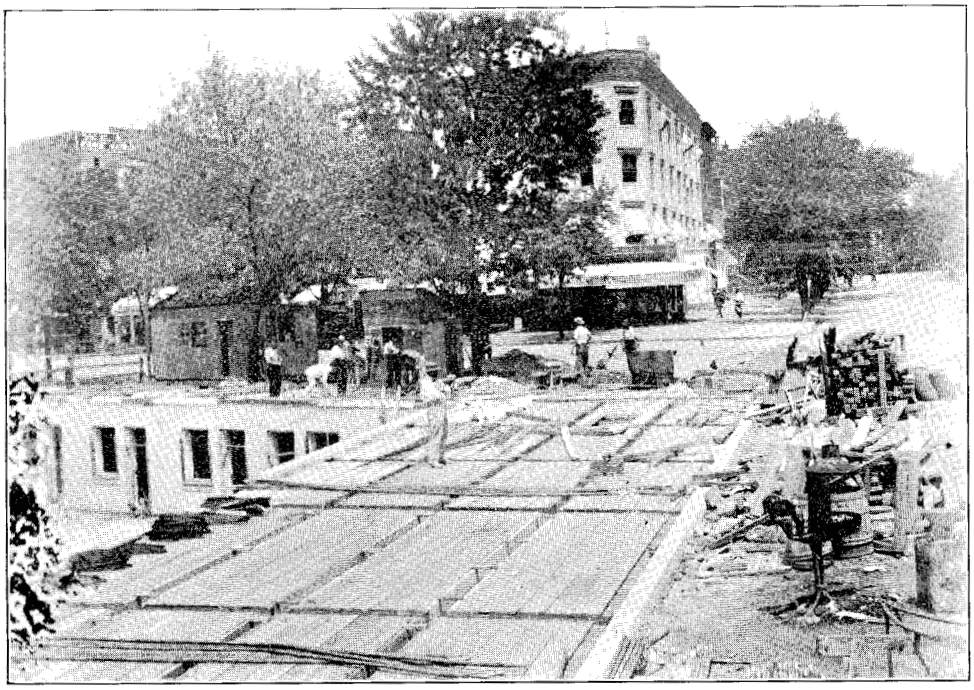
Floors and roof of Howard National Bank, Baltimore, Md. John Evans Sperry, Architect. John Waters, Builder.

Columns, floors and roof of a warehouse for Annapolis Storage and Transfer Co., at Annapolis, Md. Philipp B. Cooper, Architect.

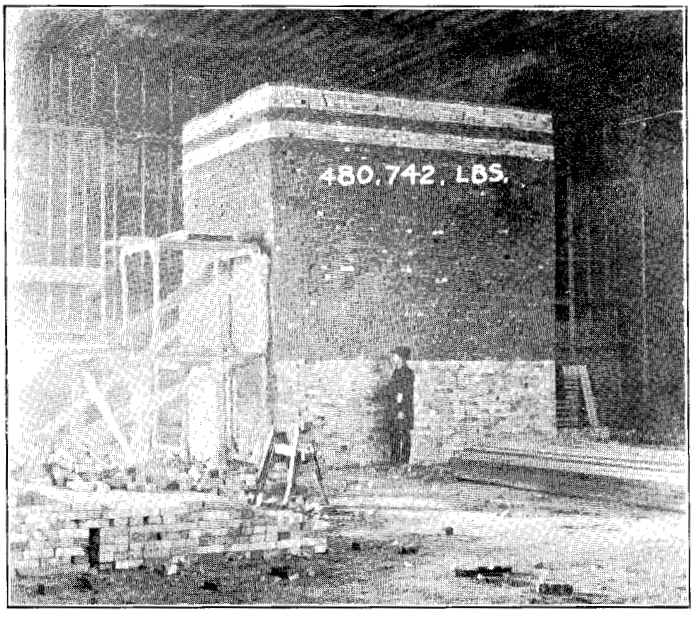
Slabs for ventilating purposes in Primary School Bldg., City of Baltimore, Md.

Columns, floors and roof in storage warehouse for U. S. Fidelity & Guaranty Co., German Street, Baltimore, Md. Parker & Thomas, Architects.

Dry Kiln, Bagby Furniture Co., Baltimore, Md.



Sidewalk over Vault at Mill's Building, Pennsylvania Avenue and 17th Street, N. W., Washington, D. C. Parker & Thomas, Architects. View showing wood centering.



Columns and Floor of Ice Storage at Heurich Brewing Co., Washington D. C. Appleton P. Clark, Architect. This floor is to carry 20 feet of ice, say, about 1200 lbs. per sq. ft. The picture shows the test made by the Building Inspector of the District of Columbia. The actual load applied per sq. ft. is 2400 pounds.

Columns, floors, roofs, stairways and partitions in the new plant of the J. L. Mott Iron Works at Trenton, N. J. A. G. Thomson, Architect.

Repair Shop Bldg. of Baltimore & Annapolis Short Line R. R., Annapolis, Md. Philipp B. Cooper, Architect.

Foundations of church St. Mary Star of the Sea, Old Point Comfort, Va. A. O. von Herbulis, Architect.

Floors and stairways at College Immaculate Conception, Brookland, D. C. A. O. von Herbulis, Architect.

Wine warehouse at Berkley, Va. Garrett & Co., Owners.

Foundations, floors and retaining walls in Transformer Station, McClellan's Alley, Baltimore, Md., United Electric Light & Power Co. Parker & Thomas, Architects. John Waters, Contractor.

Columns, floors and roof of Officers' Mess Bldg., U. S. Naval Academy, Annapolis, Md. Ernest Flagg, Architect. Noel Construction Co., Contractors.

Columns and floor of ice storage for Heurich Brewing Co., Washington, D. C. Appleton P. Clarke, Jr., Architect.

Chapel Bldg. of U. S. Naval Academy, Annapolis, Md. Ernest Flagg, Architect. Noel Construction Co., Contractors.

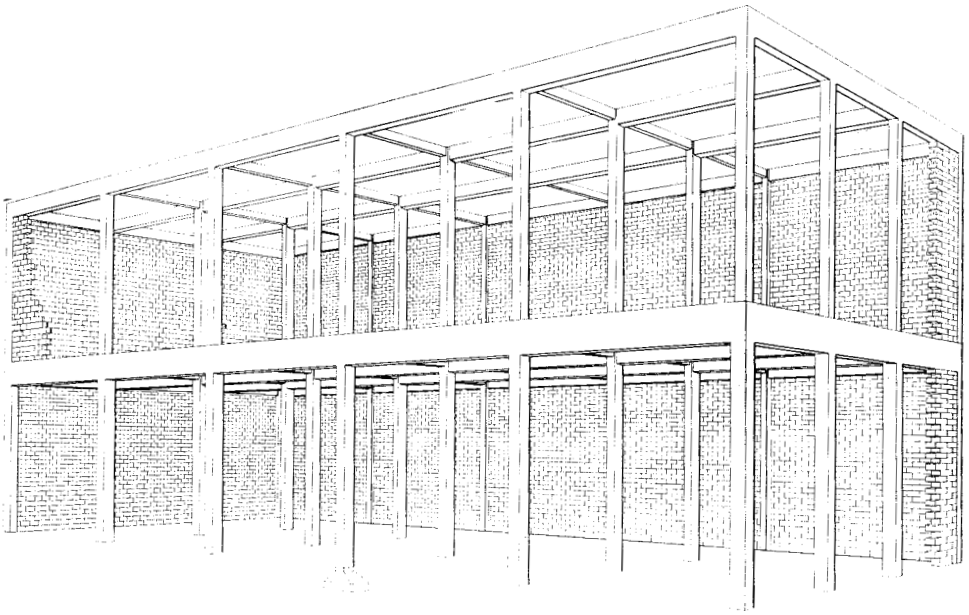
Columns, floors and roof of Atlanta Terminal Station, Atlanta, Ga. Thornton Maryc, Architect. Gude & Walker, Contractors.

Approaches of Atlanta Terminal Station, Atlanta, Ga. Retaining wall, baggage driveway, midway, foundations of the train shed. Atlanta Terminal Company. W. H. Harrison, Chief Engineer.

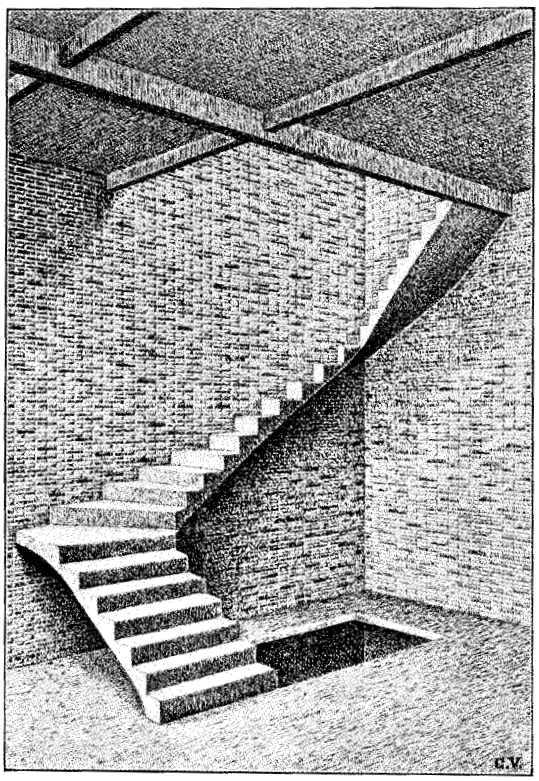
Ash Bins, 200-ton capacity, Pratt Street United Light & Power Co. Power House. A. Keilholtz, Chief Engineer.

Foundations, columns, floors and roof of Philipsburgh Bldg., Yonkers, N. Y. Owner, Mrs. Eva S. Cochran. G. Howard Chamberlin, Architect.

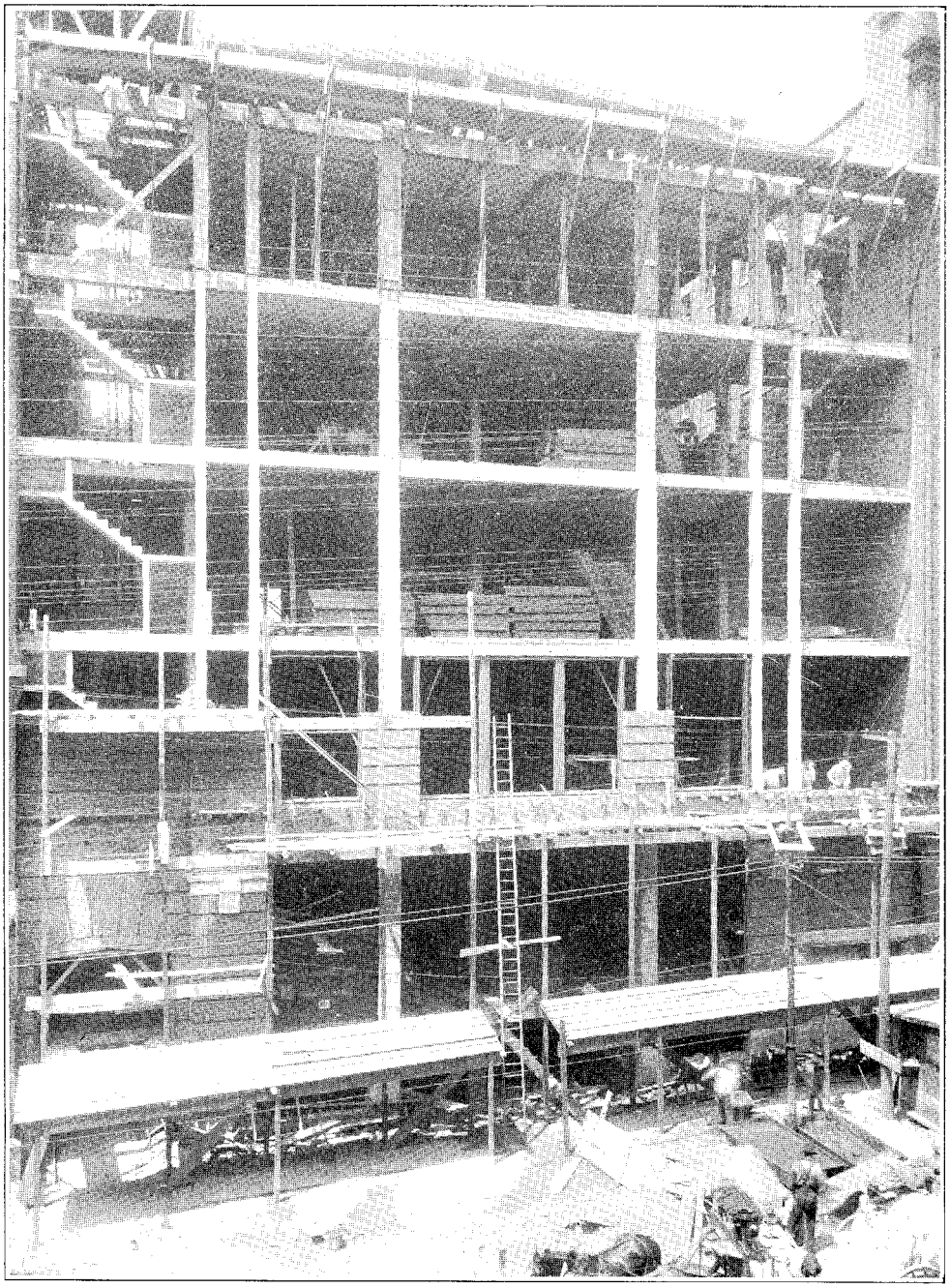
University of Ottawa (Canada). A. O. von Herbulis, Architect. Peter Lyall & Sons, General Contractors.



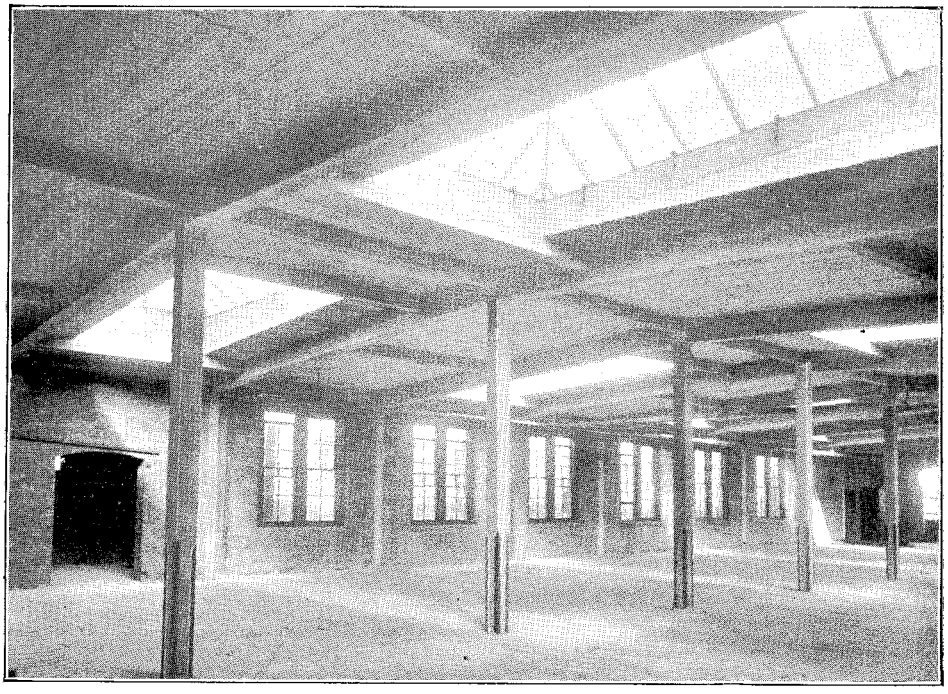
Storage Warehouse for Annapolis Storage & Transfer Co. at Annapolis, Md.
Philipp B. Cooper, Architect.



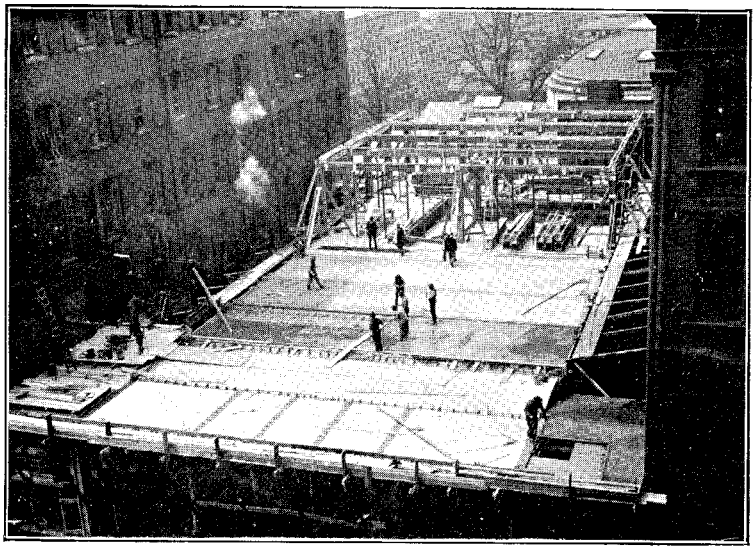
Winding stairway at Merchant Storage & Transfer Co., E Street, N. W., Washington, D. C.



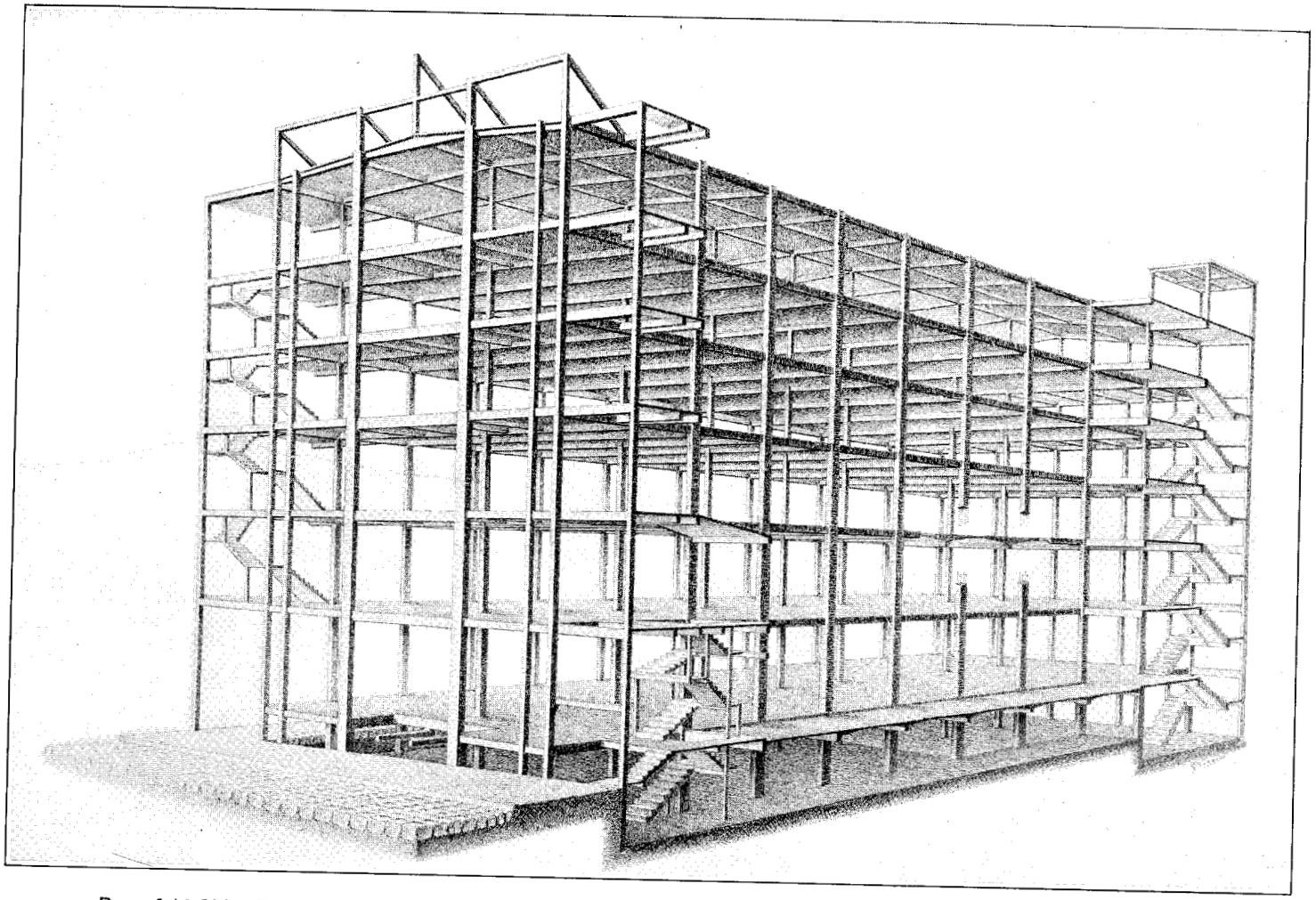
Rosenfeld Shirt Factory, 38 S. Paca Street, Baltimore, Md. Donnell Estate. Parker & Thomas, Architects. This building is a monolithic skeleton of concrete, the columns and beams carrying the brick walls which are 13 inches thick from top to first floor. The building is 130 ft. x 53 ft and 100 feet high with 6 floors and two concrete stairways. The foundations also are of ferro concrete (see pages 15, 16, 17 and 37).



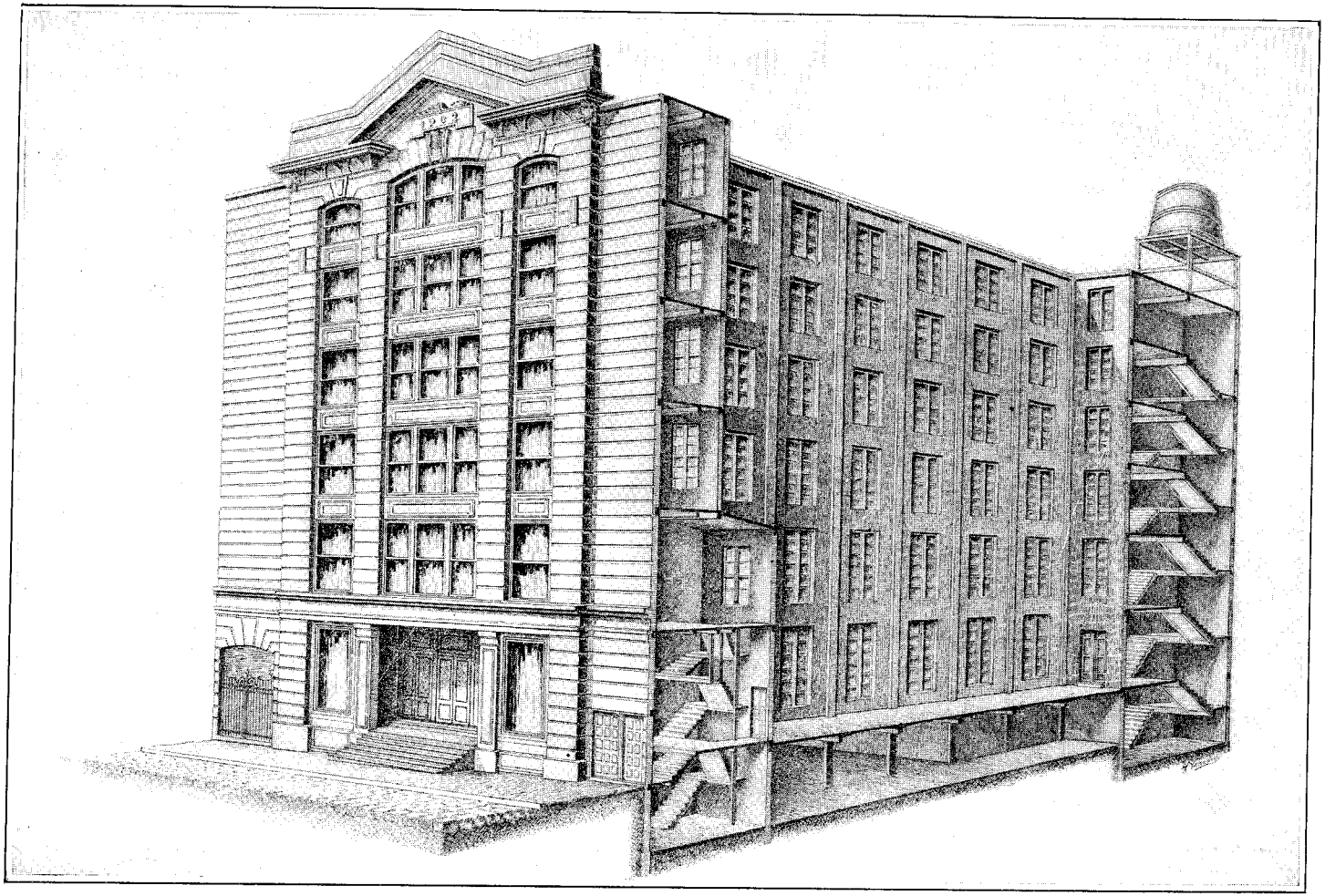
Rosenfeld Shirt Factory, Baltimore, Md. Concrete floor and roof (see also page 14).



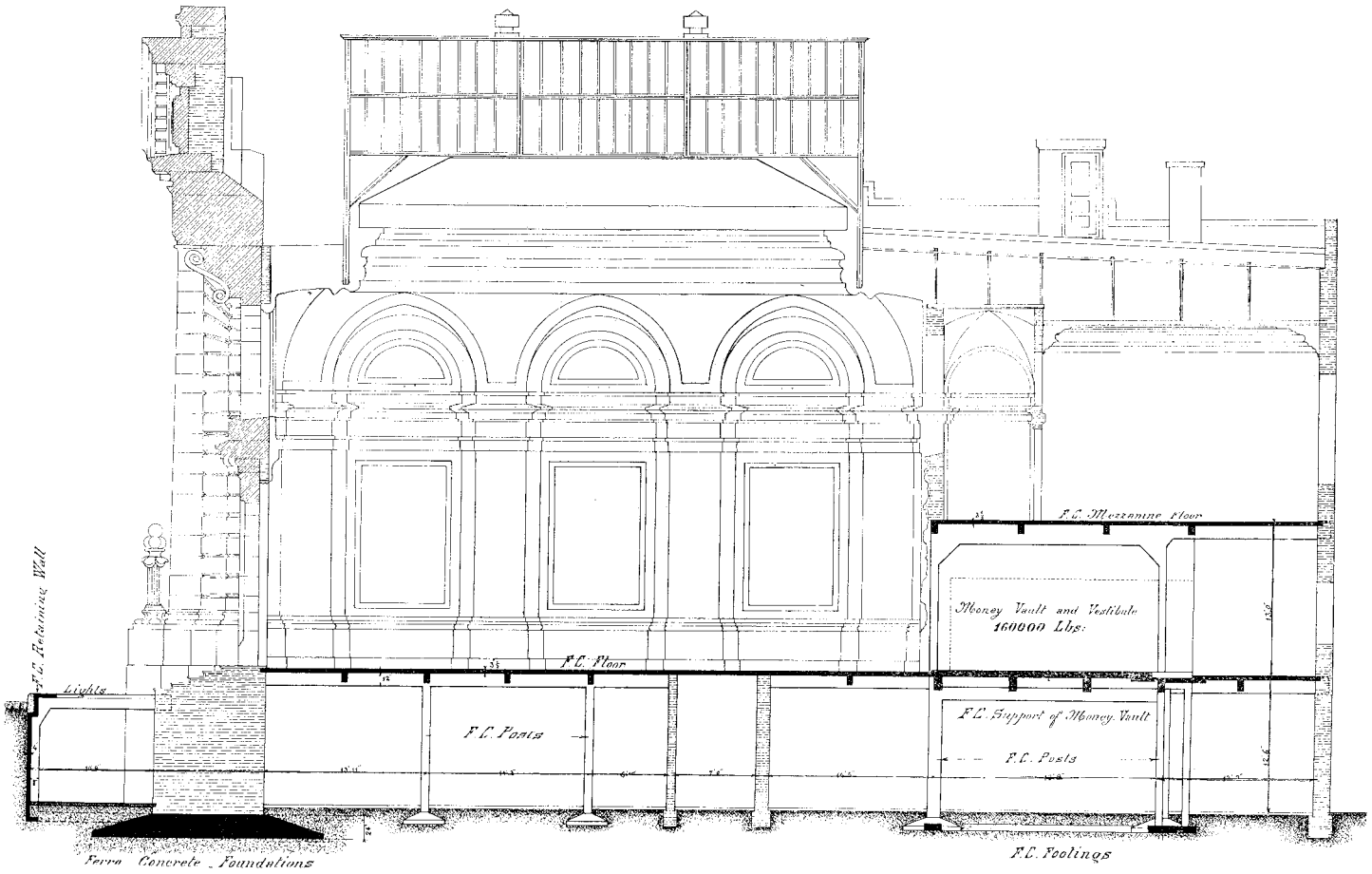
Rosenfeld Shirt Factory, Baltimore, Md. Concreting of the third floor. (See also page 14.)



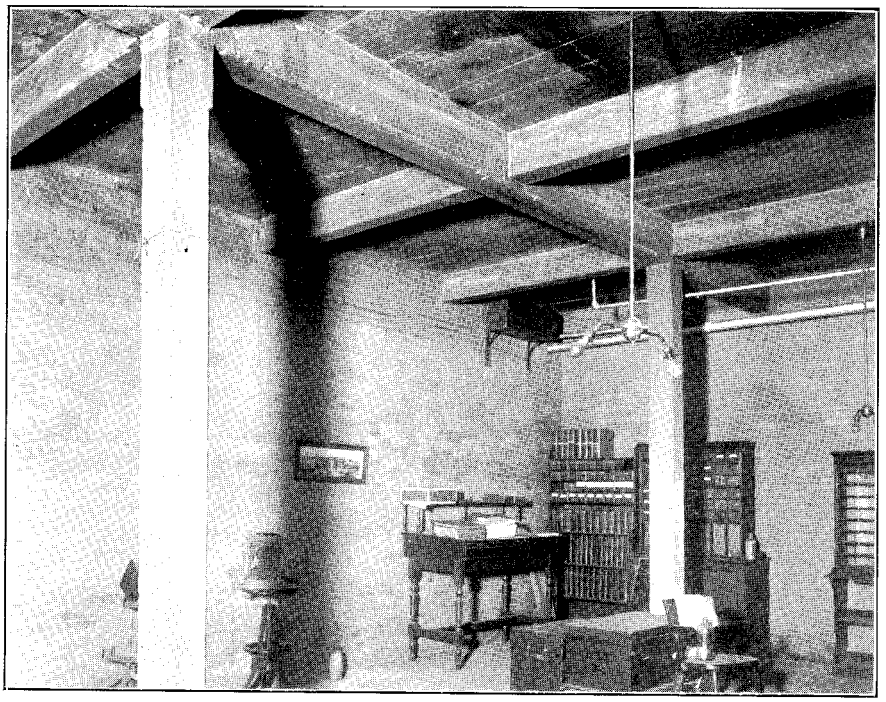
Rosenfeld Shirt Factory, 38 S. Paca Street. View of our ferro concrete work before the construction of the walls.
(See also pages 14 and 17.)

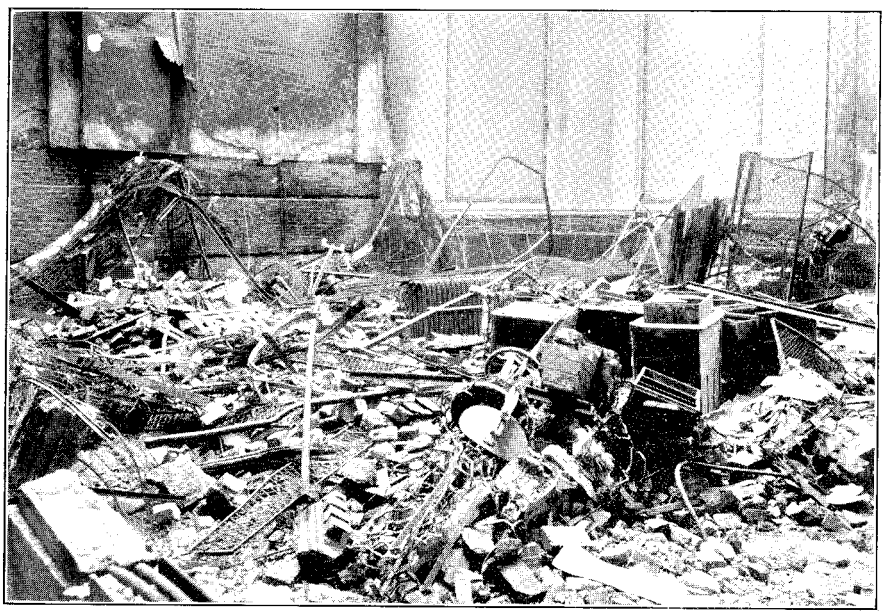


Rosenfeld Shirt Factory. Parker & Thomas, Architects. View of the building after the construction of the walls.
(See also pages 14 and 16.)

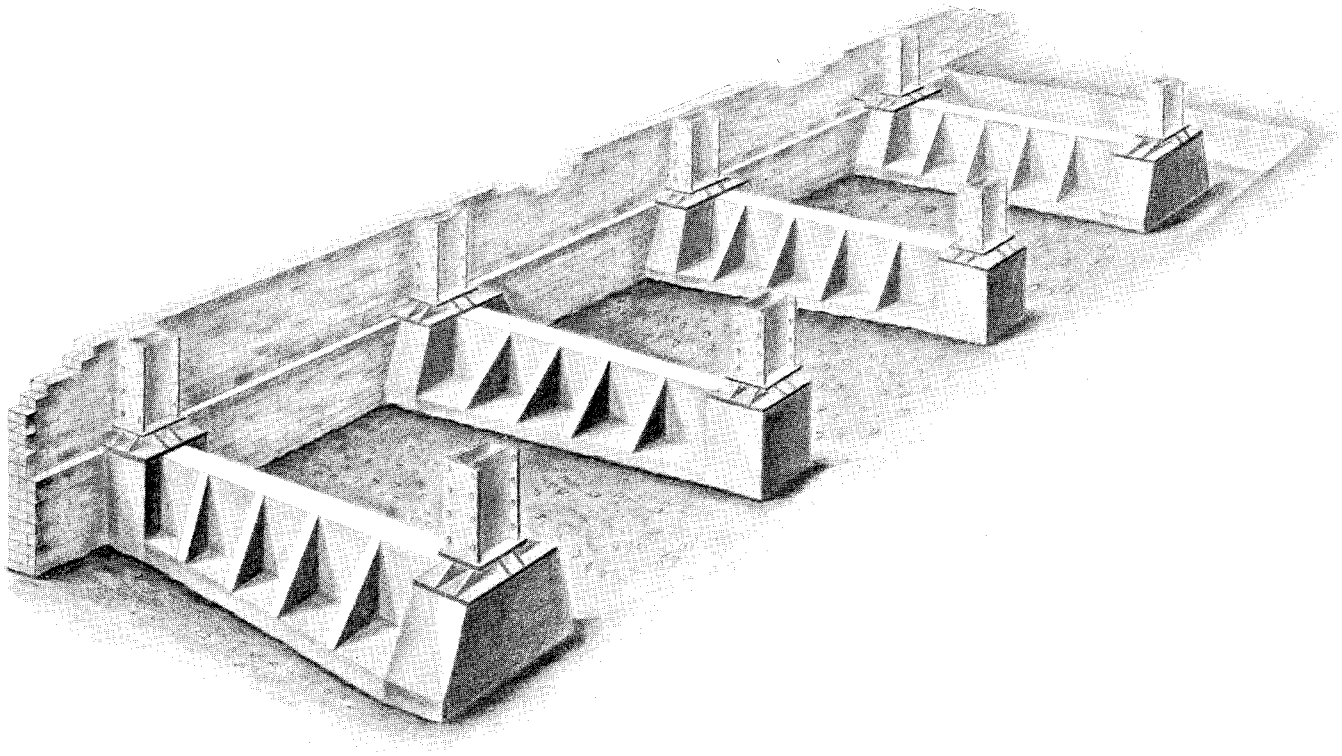


Bank Building of the International Trust Co., Baltimore, Md. Parker & Thomas, Architects. Foundations of main wall, floors and retaining wall of ferro concrete.

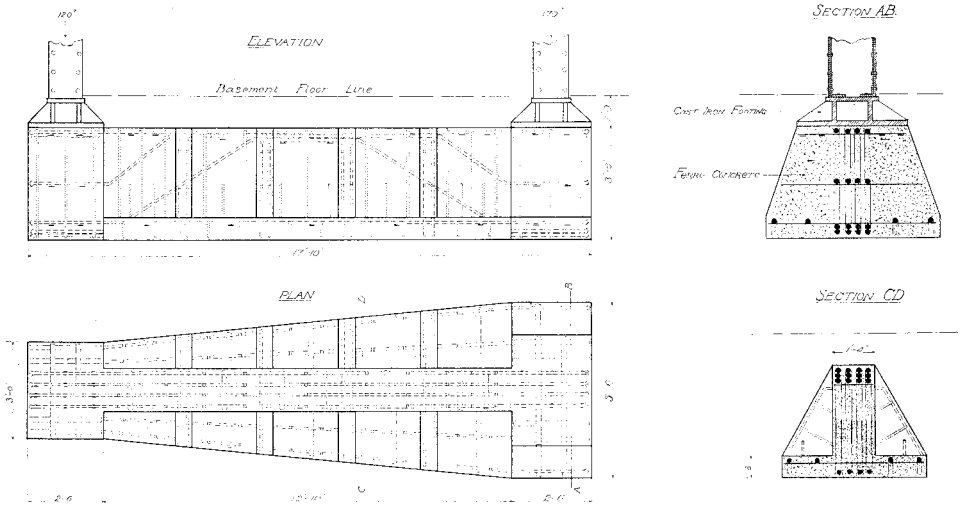




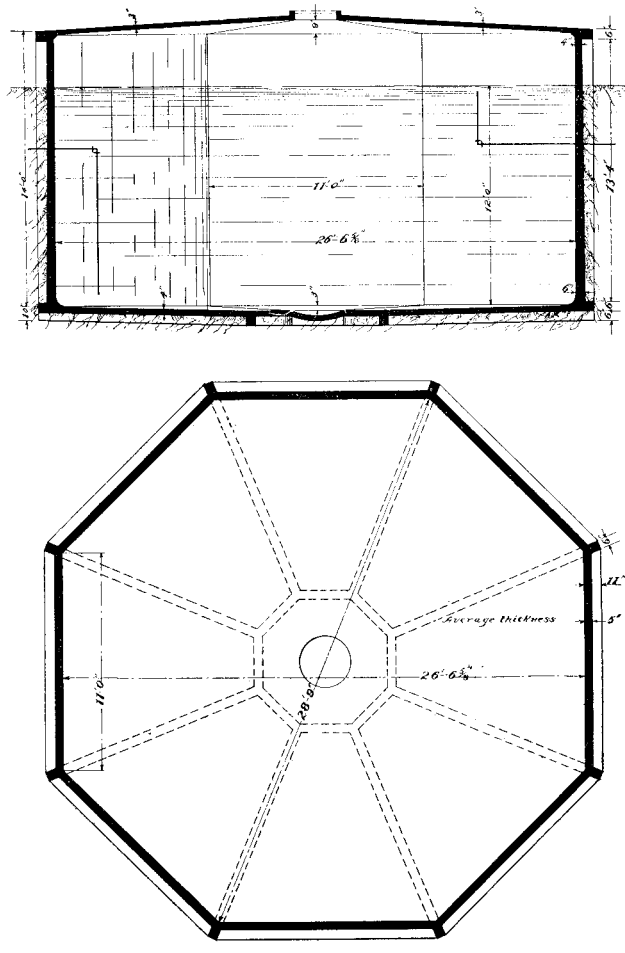
Bank Building of the International Trust Co. of Baltimore (see page 18). During the great Baltimore Fire, the wall of the adjoining property fell through the skylight on the main floor. The above pictures, taken just after the fire show the wreck on the floor and the perfect condition of the floor. View taken beneath.



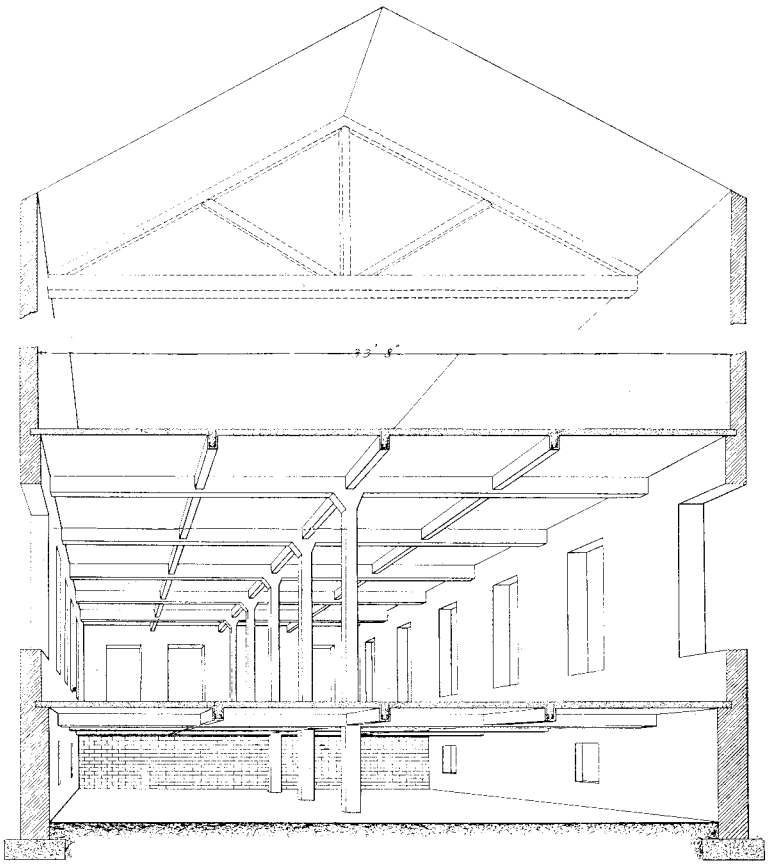
Special foundations of columns at the Mill's Bldg., Washington, D. C. Parker & Thomas, Architects. George A. Fuller, Contractor (see also page 21). These foundations distribute equally on the ground the load carried on two columns of the building, one of them being only 15 inches distant from the party line.



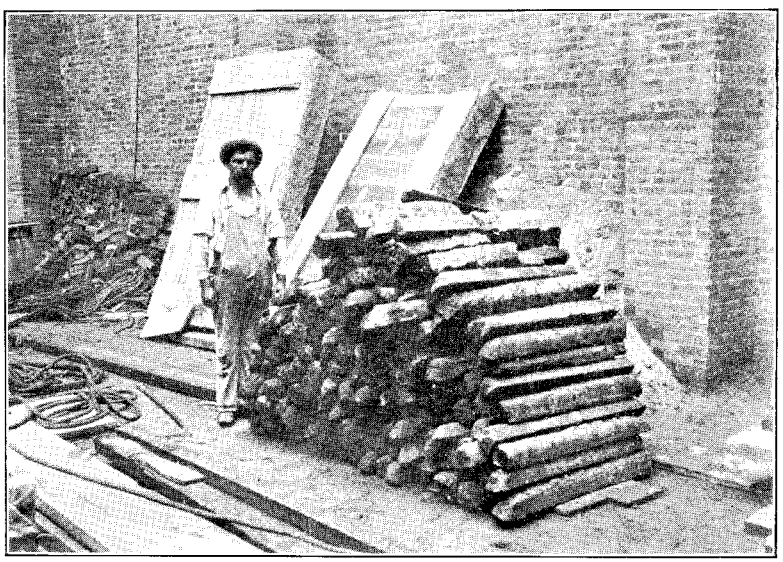
Special foundations of columns at the Mill's Bldg., Washington, D. C.



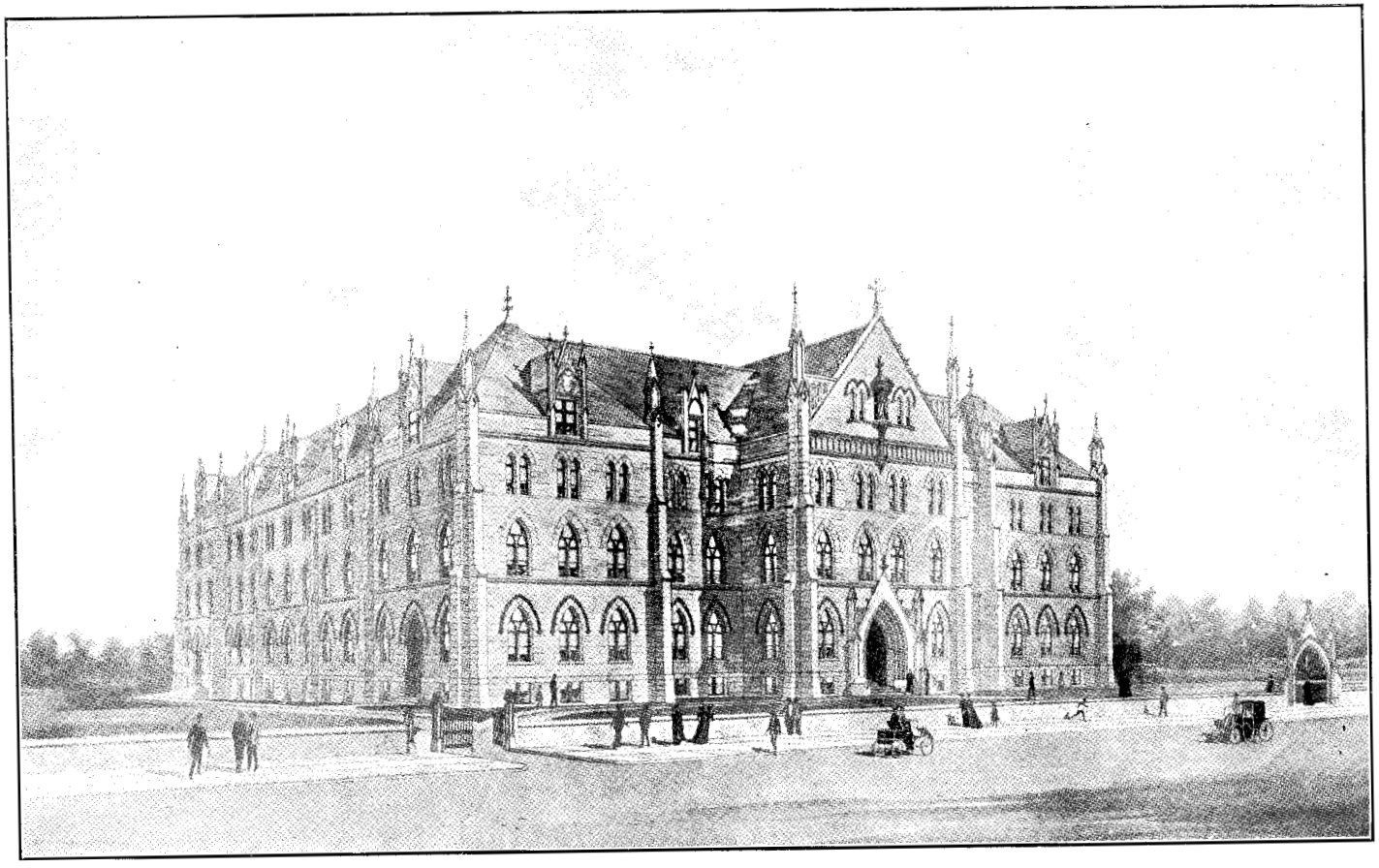
50,000 Gallon Reservoir at Curtis Bay, Md. Owner, Brooklyn & Curtis Bay Light and Water Co. Henry Adams, Consulting Engineer.



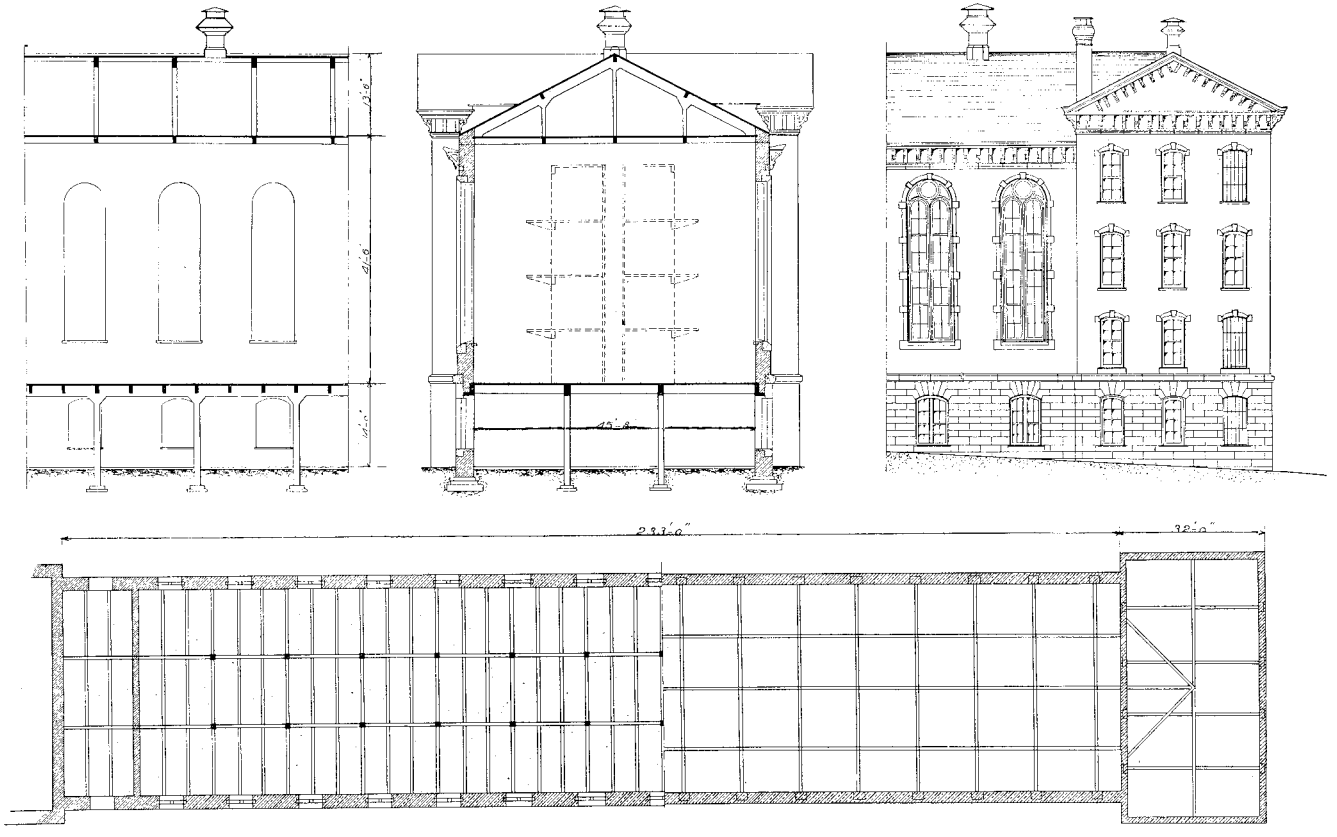
St. Martin's Parish Hall, Washington, D. C. Floors and columns in ferro concrete, the first built in United States. A. O. von Herbulis, Architect.



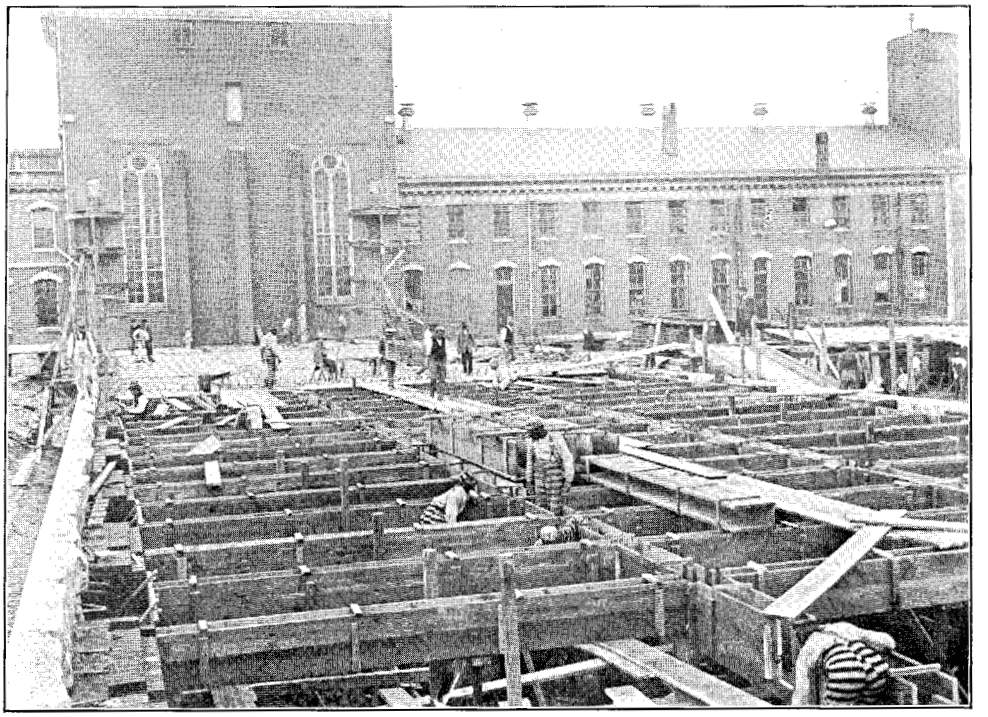
Floor of the Transformer Station of McClellan's Alley, Baltimore, Md. United Electric Light and Power Co. Parker & Thomas, Architects. John Waters, Contractor. Test on the first floor.

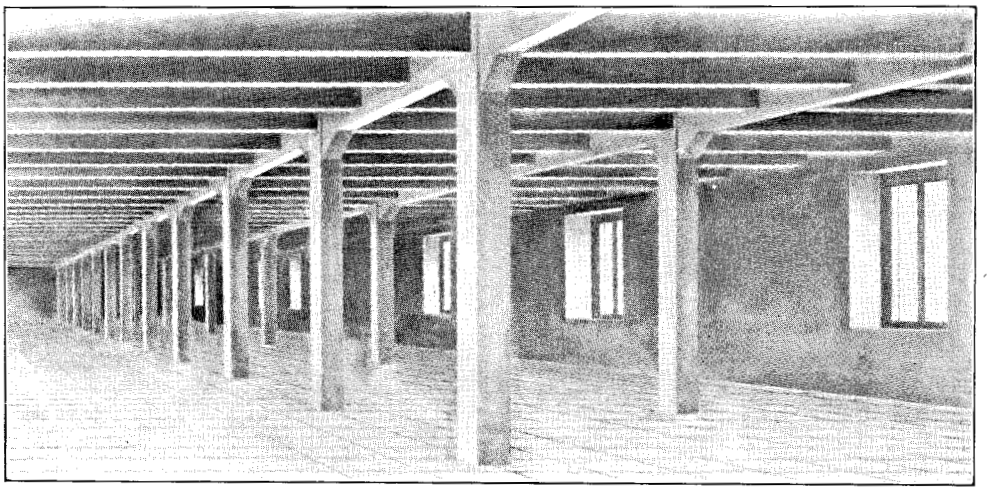


College of Immaculate Conception, Brookland, D. C. A. O. von Herbulis, Architect. Four floors and one ceiling in ferro concrete. Four stairways. In this building are three rooms 40 x 41 without any column in the center (see also page 38).

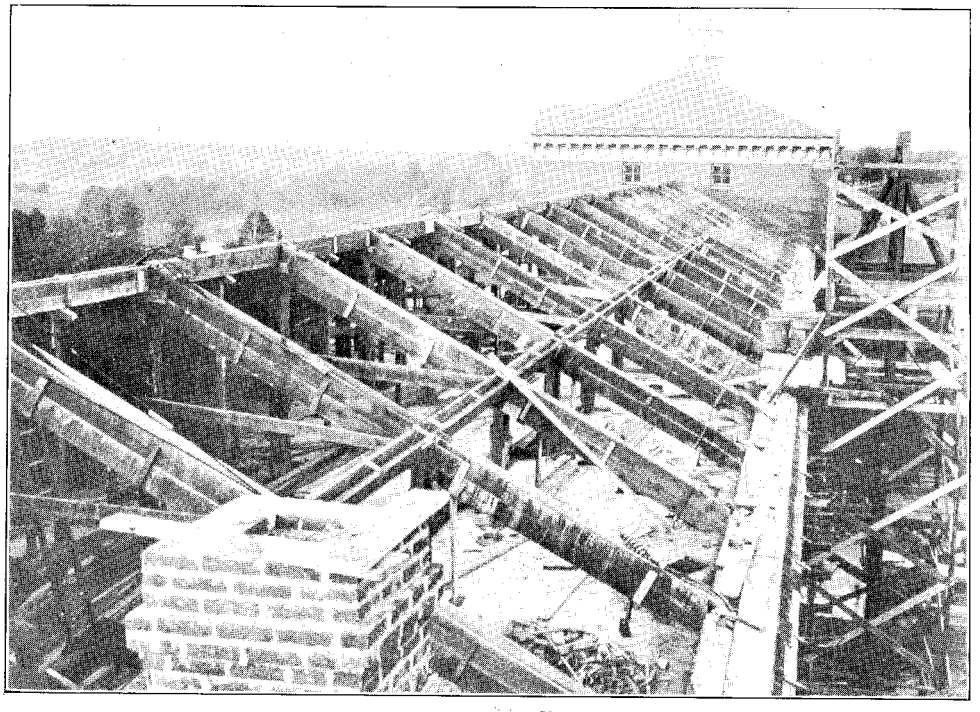


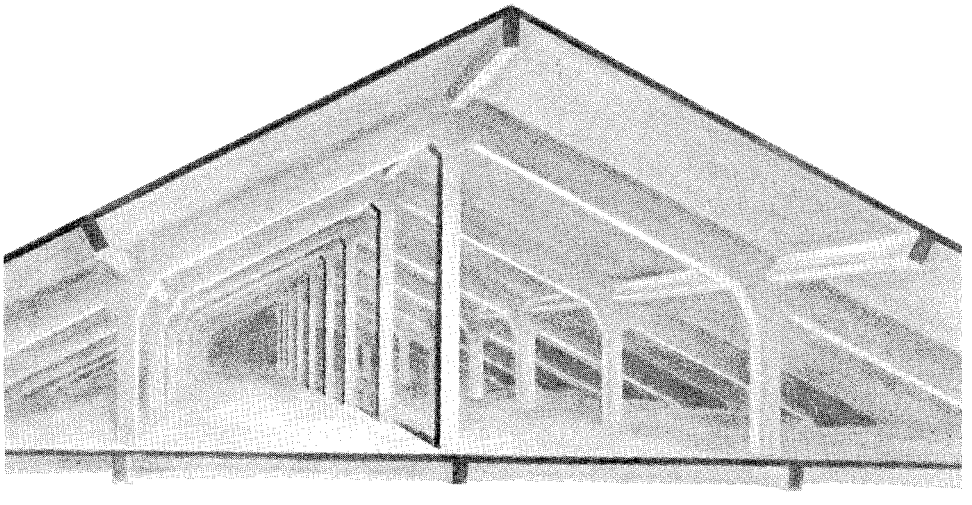
Annex to the House of Correction of Maryland, Bridewell, Md. Baldwin & Pennington, Architects. John Waters, Contractor. The first floor (see page 25) is to carry four tiers of cells. The concrete trussed roof (see page 26), 45 feet in span, is the first of that kind built in United States.



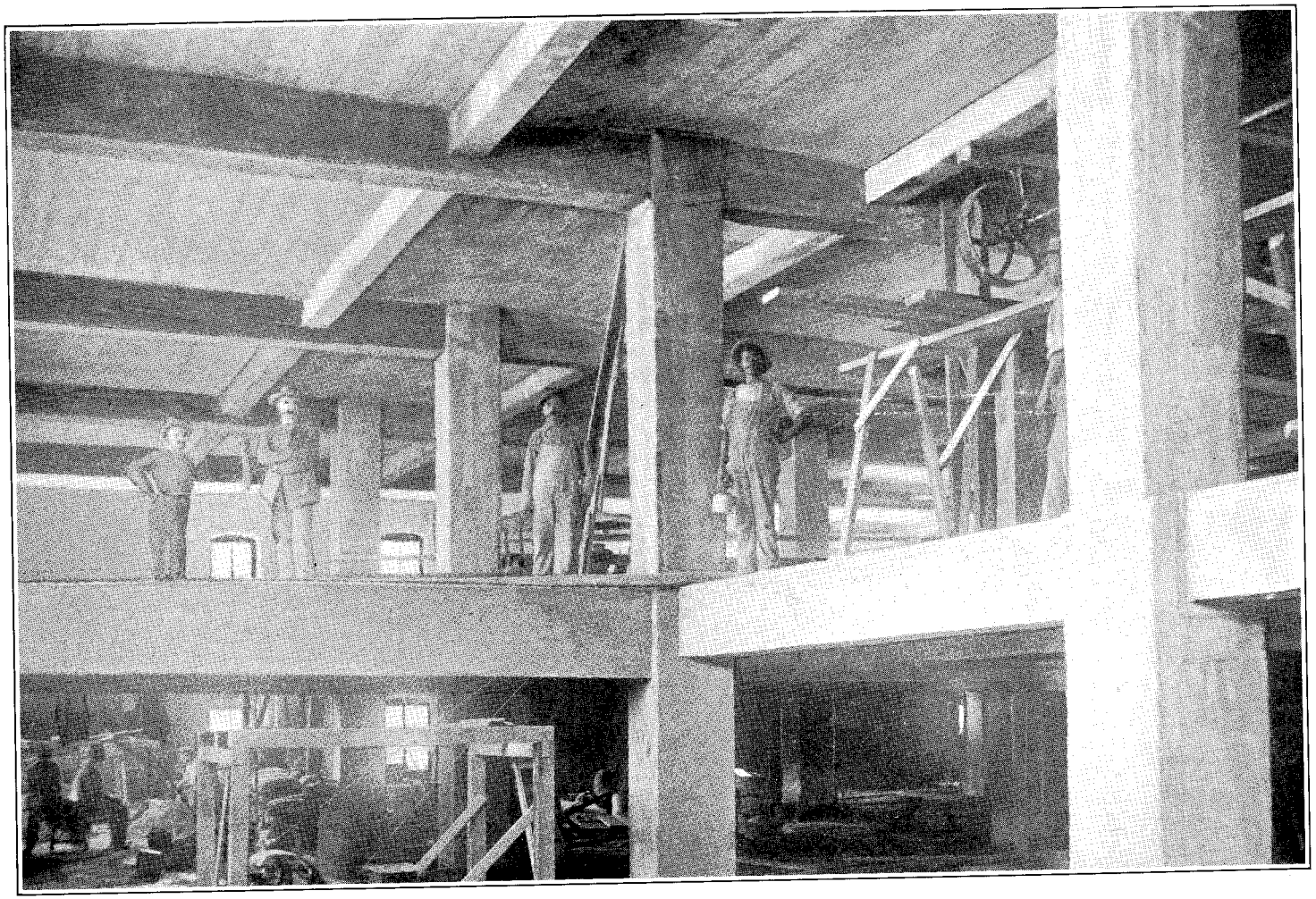


Annex to the House of Correction of Maryland, Bridewell, Md. (See page 24.) Construction of the first floor and view from beneath.

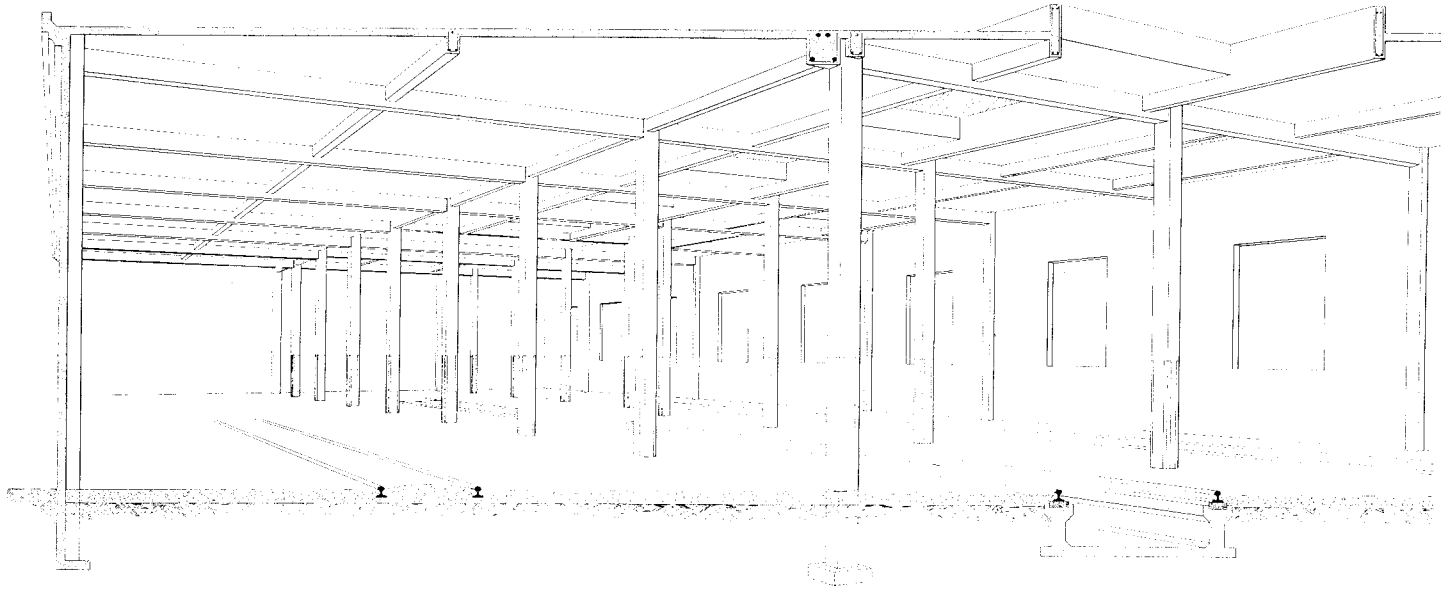




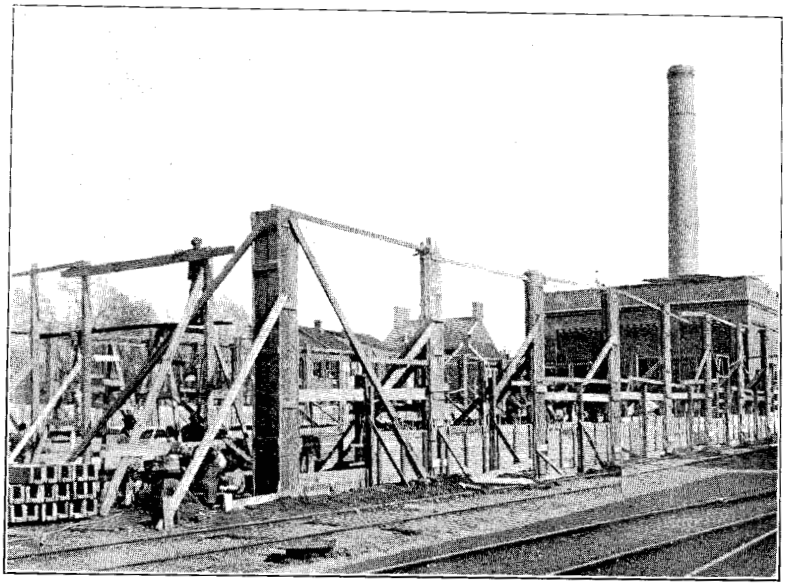
Annex to Maryland House of Correction, Bridewell, Md. (See page 24.) Construction of the concrete trussed roof and view of inside.



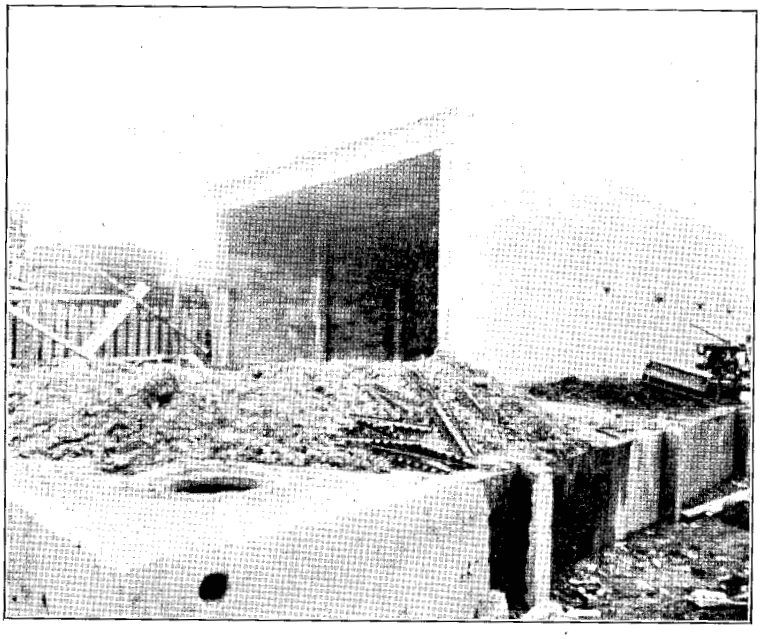
Columns and Floors of Wine Warehouse, Berkley, Va. Garrett & Co., Owners. 60,000 square feet of floors carrying casks, 20 feet in diameter (see also page 40).



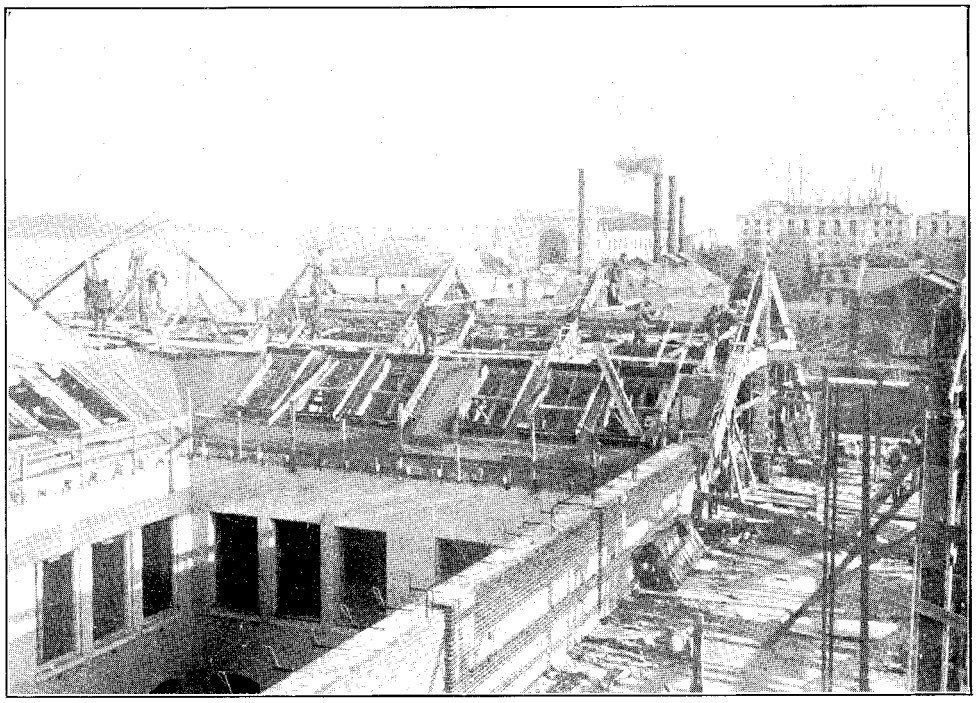
Repair Shop Building at Annapolis, Md. for Baltimore and Annapolis Short Line R. R. Co. Philipp Cooper, Architect. Walls, columns and roof in ferro concrete (see page 29).



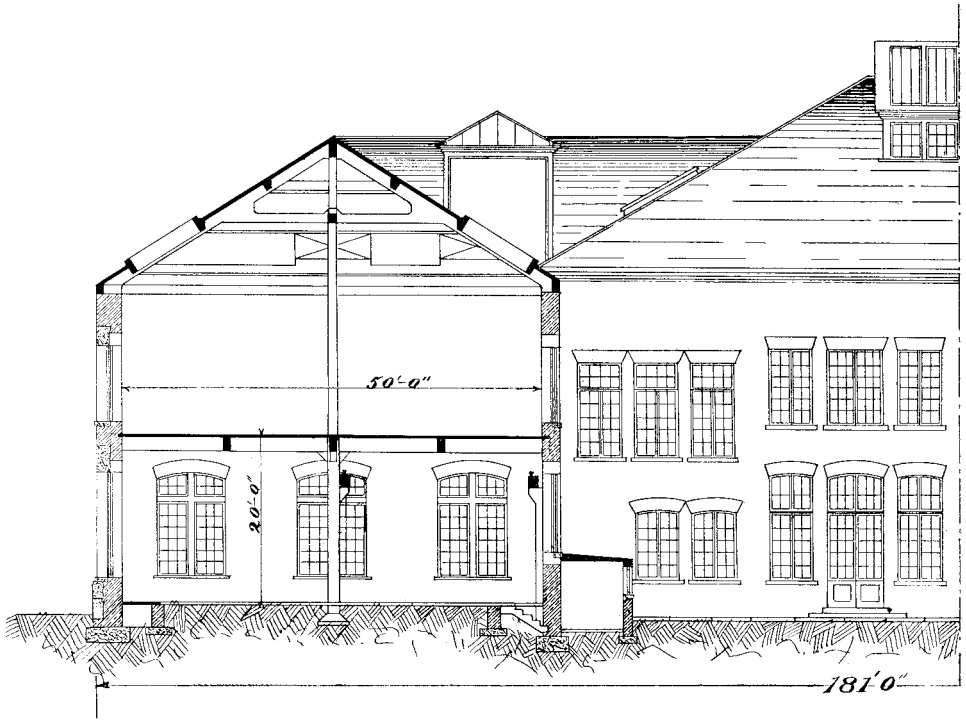
Repair Shop Building, Annapolis, Md. (See page 28.) Construction of columns and walls.



50,000 Gallon Reservoir and Dry Kiln for Bagby Furniture Co., Baltimore, Md.

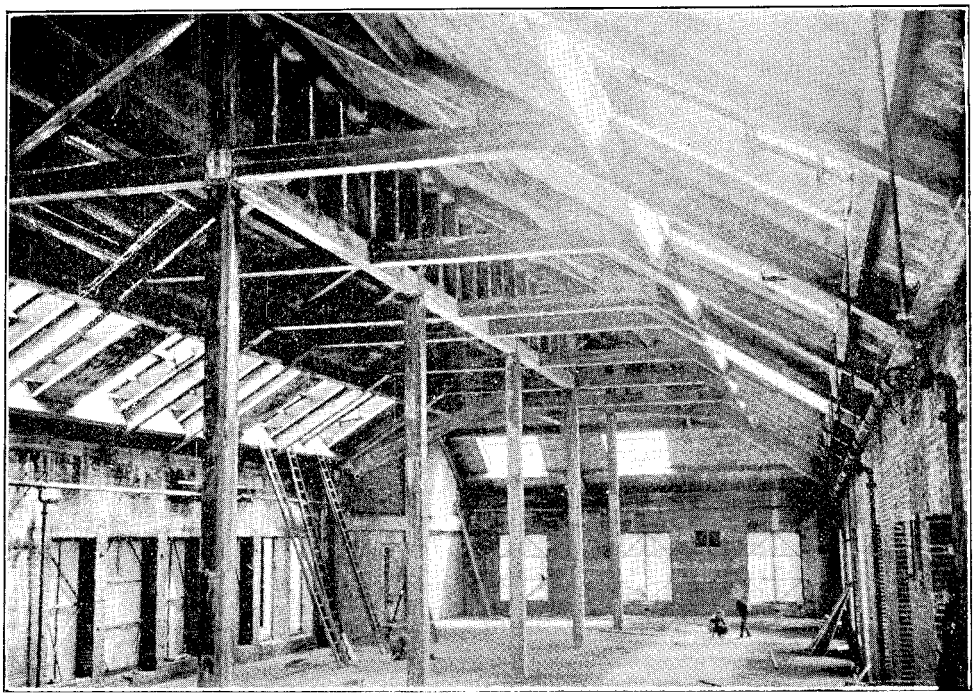


Construction of the concrete roof of the Marine Engineering Bldg.

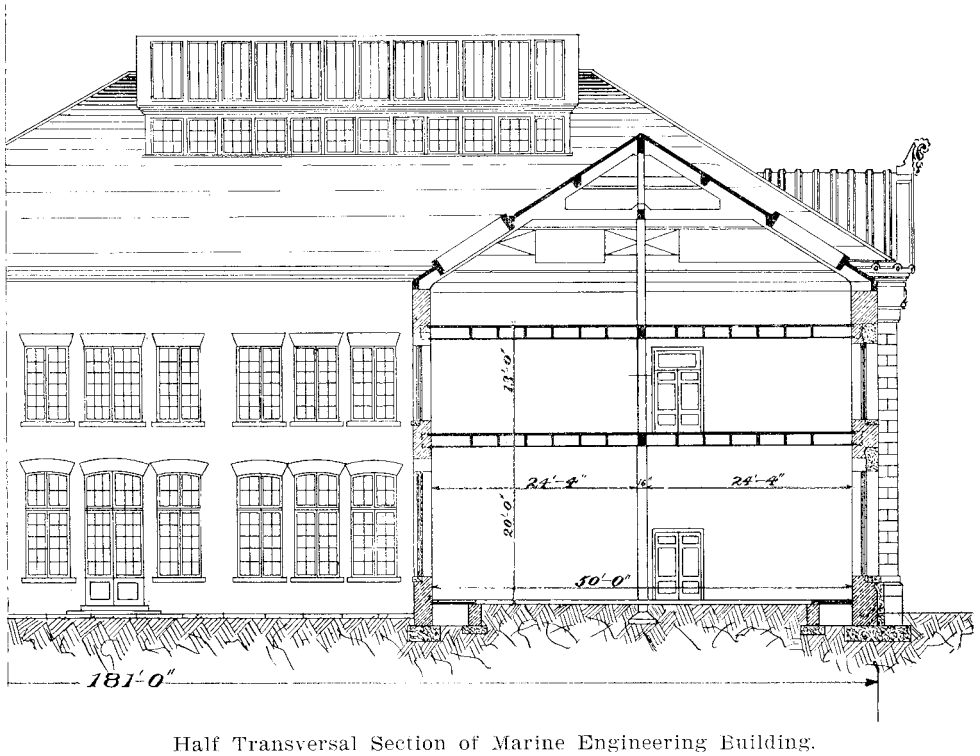


Half Transversal Section of Marine Engineering Building.

U. S. Naval Academy, Annapolis, Md. Marine Engineering Bldg. Ernest Flagg, Architect. Noel Construction Co., General Contractors. Columns, floors and roof in ferro concrete.

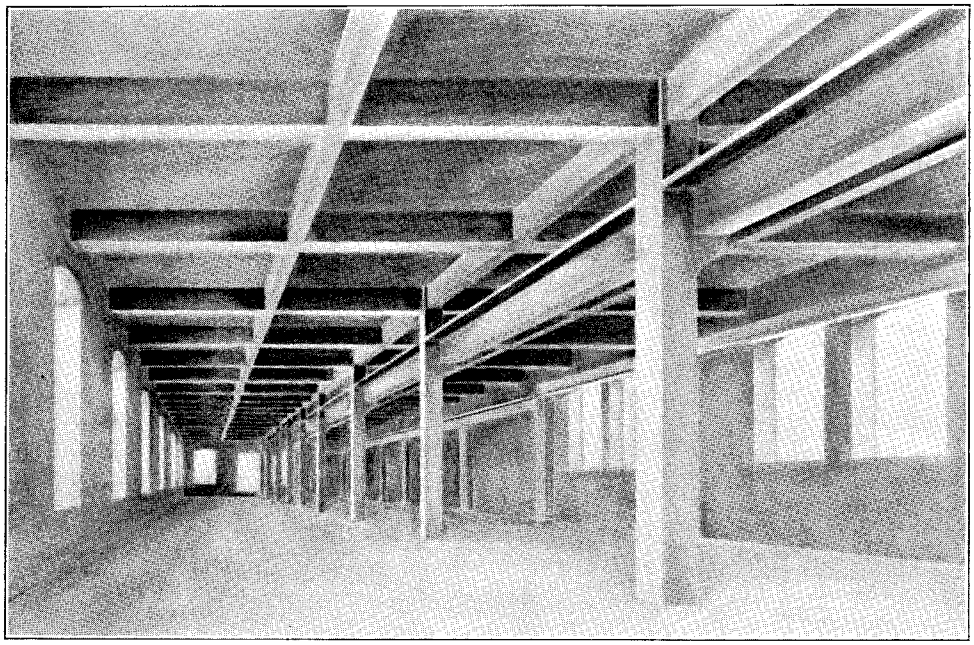


View of the roof construction of the Marine Engineering Bldg.

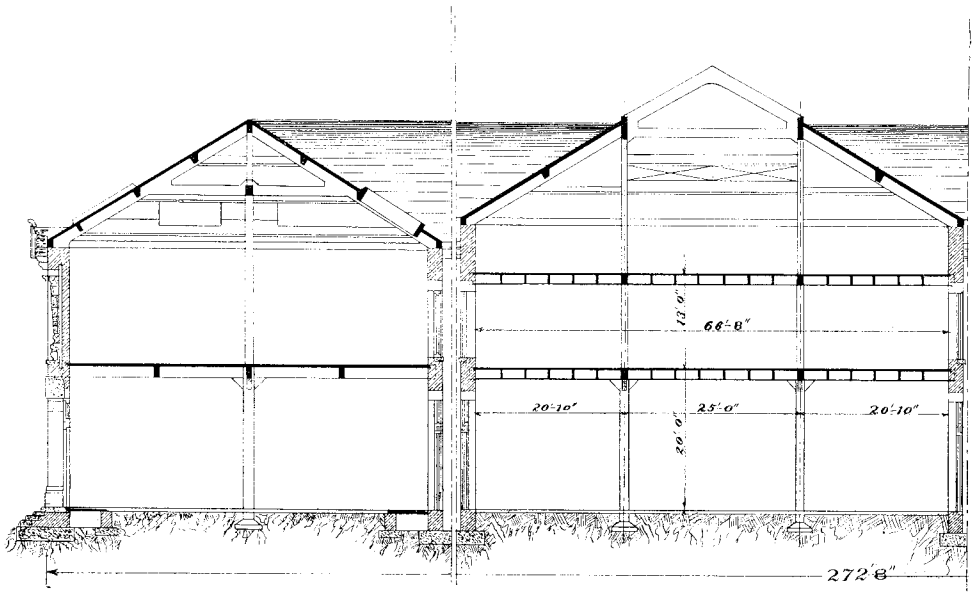


Half Transversal Section of Marine Engineering Building.

U. S. Naval Academy, Annapolis, Md. Marine Engineering Bldg. Ernest Flagg, Architect. Noel Construction Co., General Contractors. Columns, floors and roof in ferro concrete.

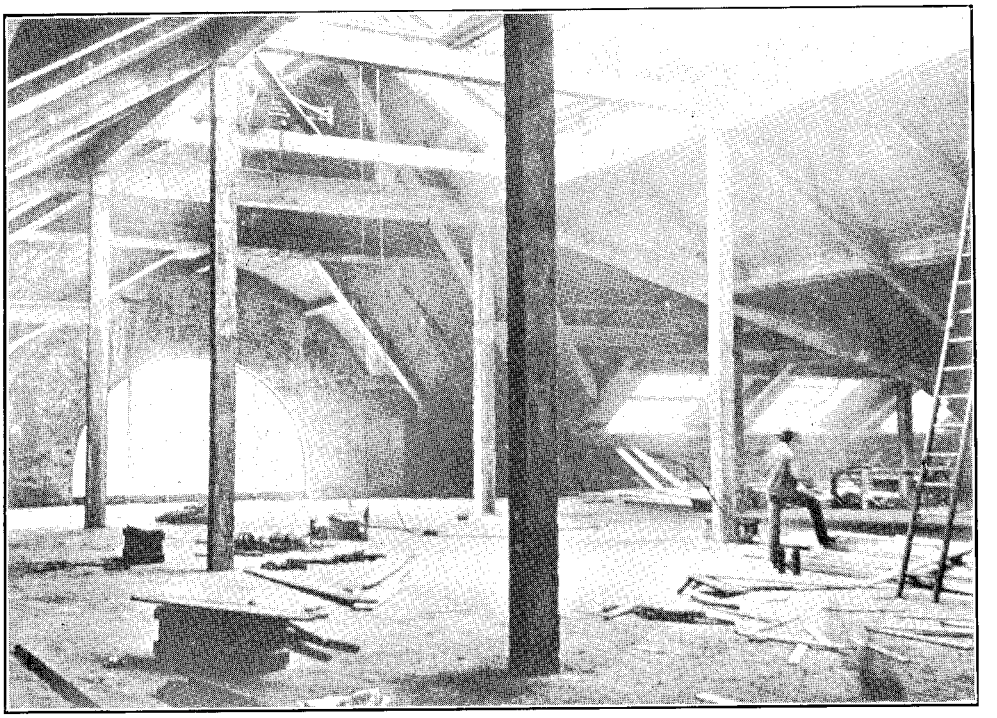


Second floor construction of Marine Engineering Bldg. showing the traveling crane beam on columns.

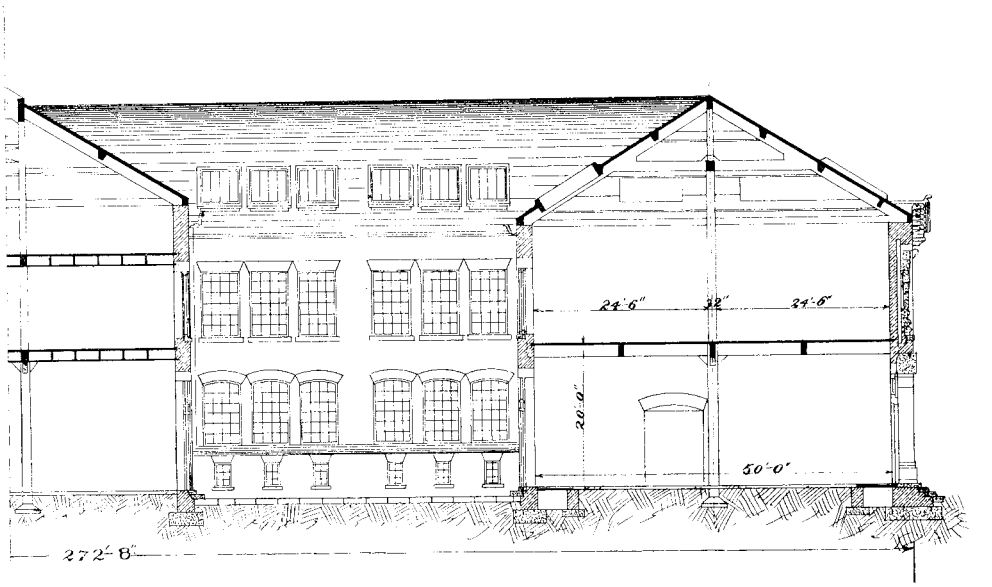


Half Longitudinal Section of Marine Engineering Building.

U. S. Naval Academy, Annapolis, Md. Marine Engineering Bldg. Ernest Flagg, Architect. Noel Construction Co., General Contractors. Columns, floors and roof in ferro concrete.

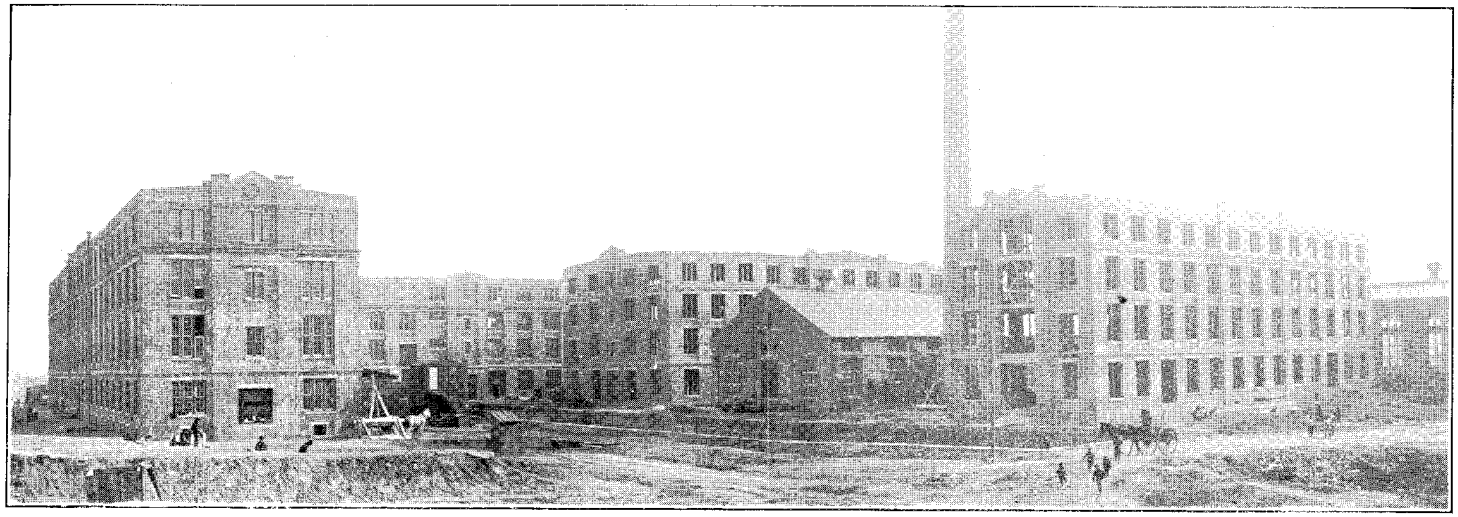


View of roof construction of the Marine Engineering Building.

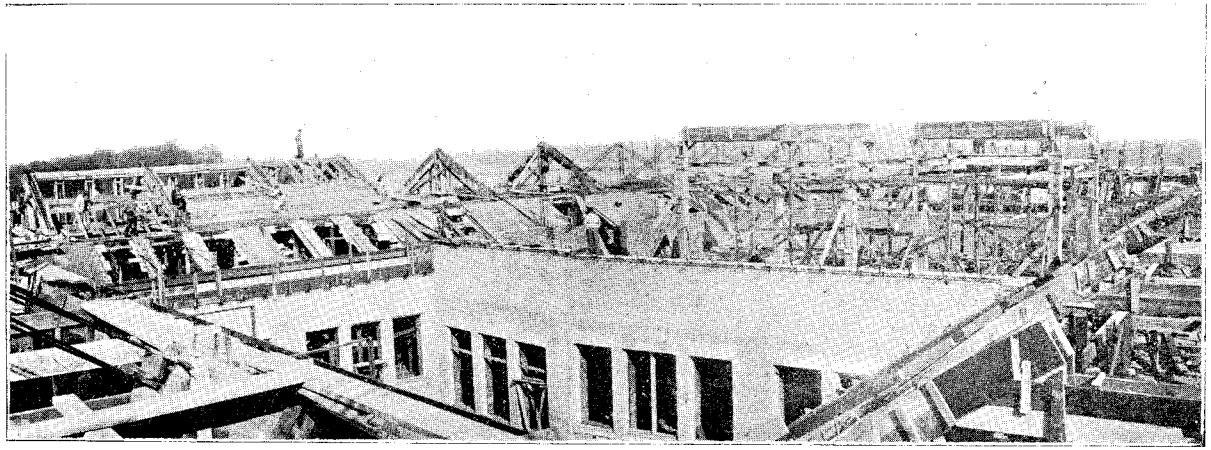


Half Longitudinal Section of Marine Engineering Building.

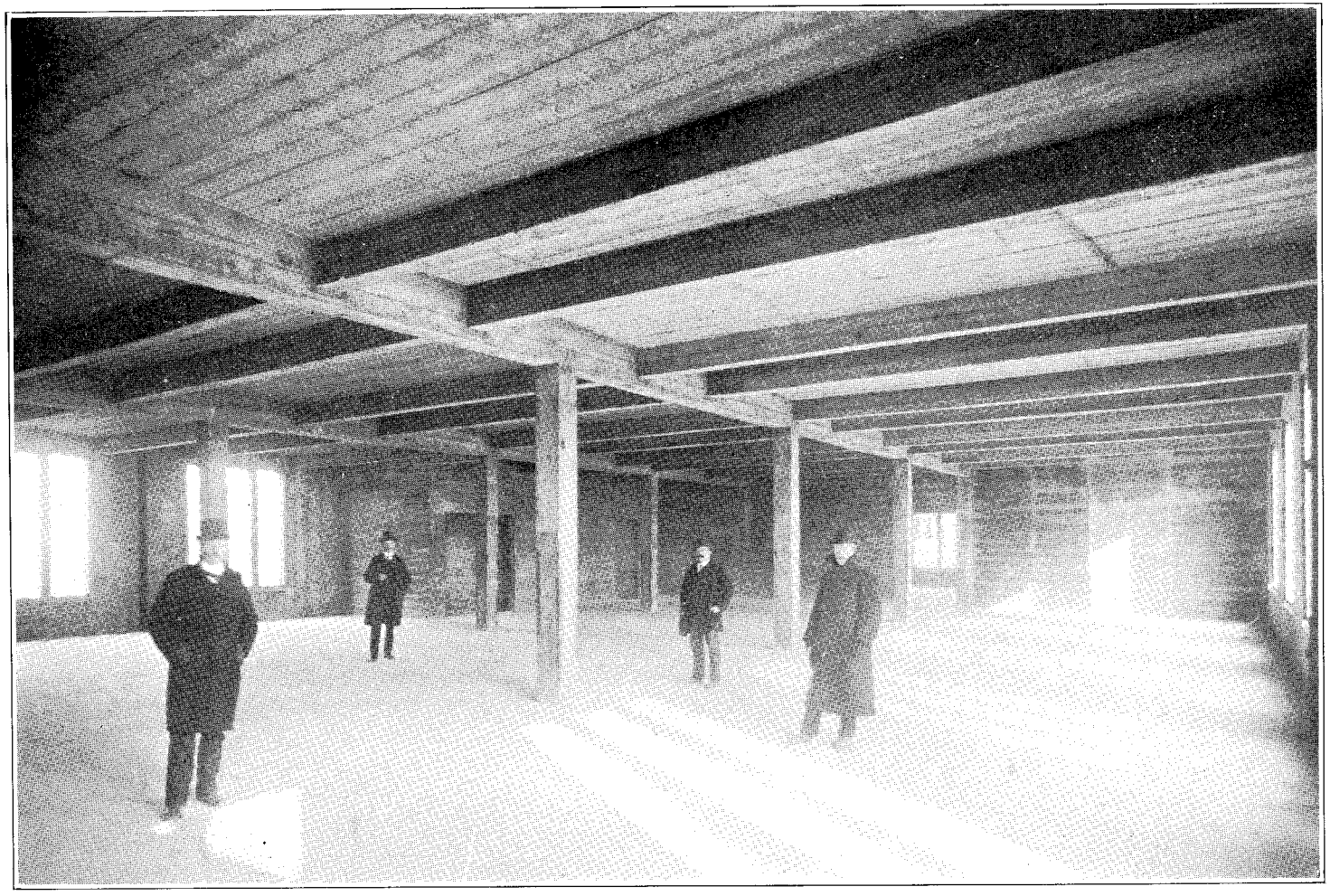
U. S. Naval Academy, Annapolis, Md. Marine Engineering Bldg. Ernest Flagg, Architect. Noel Construction Co., General Contractors. Columns, floors and roof in ferro concrete.



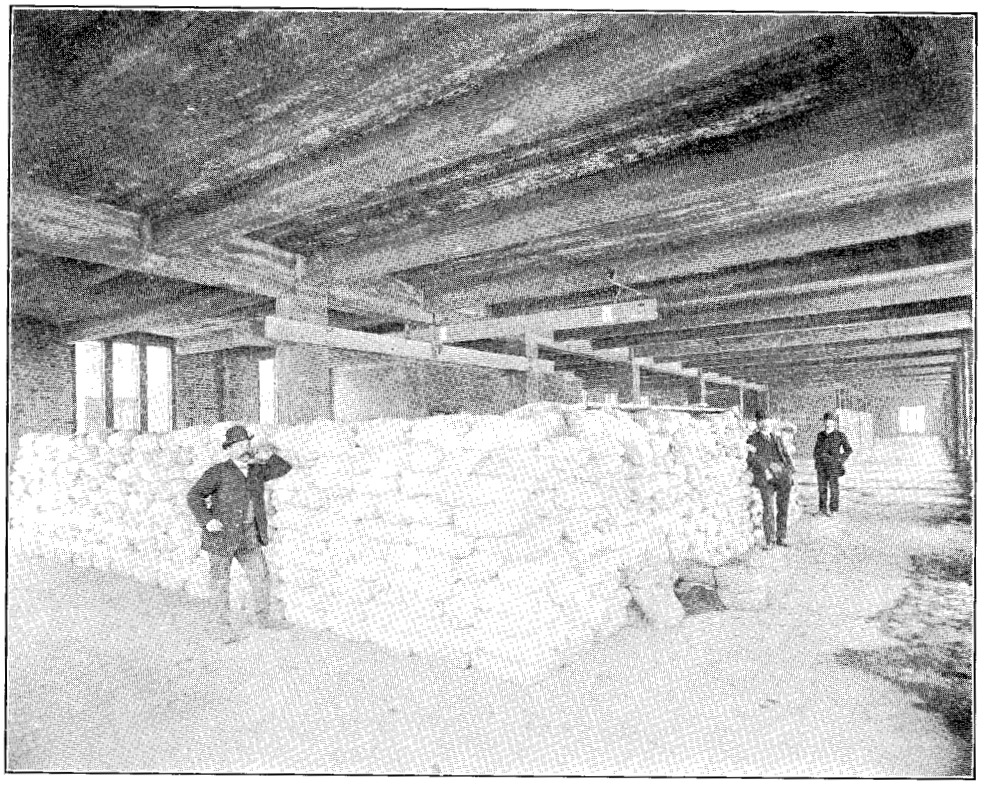
General View of the New Plant of The J. L. Mott Iron Works at Trenton, N. J. A. G. Thomson, Architect. 4 buildings, 157,363 square feet of ferro concrete floors on columns, 40,738 square feet of concrete roofs, 40,316 square feet of partitions, 1811 lineal feet of stair treads, 5374 lineal feet of lintels or sills.



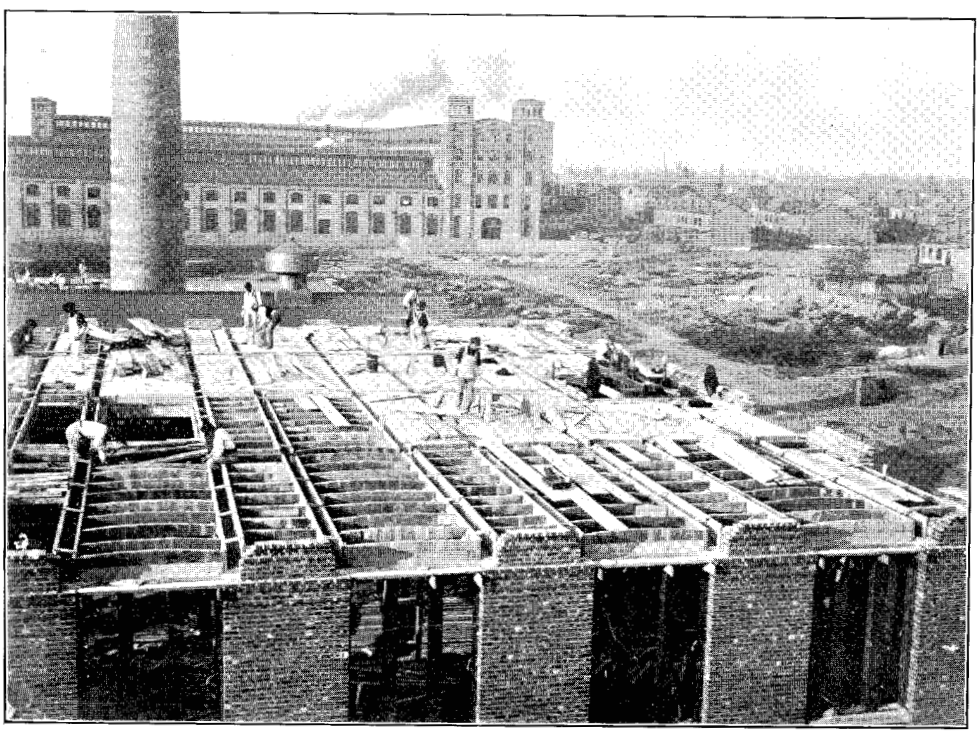
Construction of Roof of the Marine Engineering Bldg. at U. S. Naval Academy, Annapolis, Md. (See pages 30, 31, 32.)



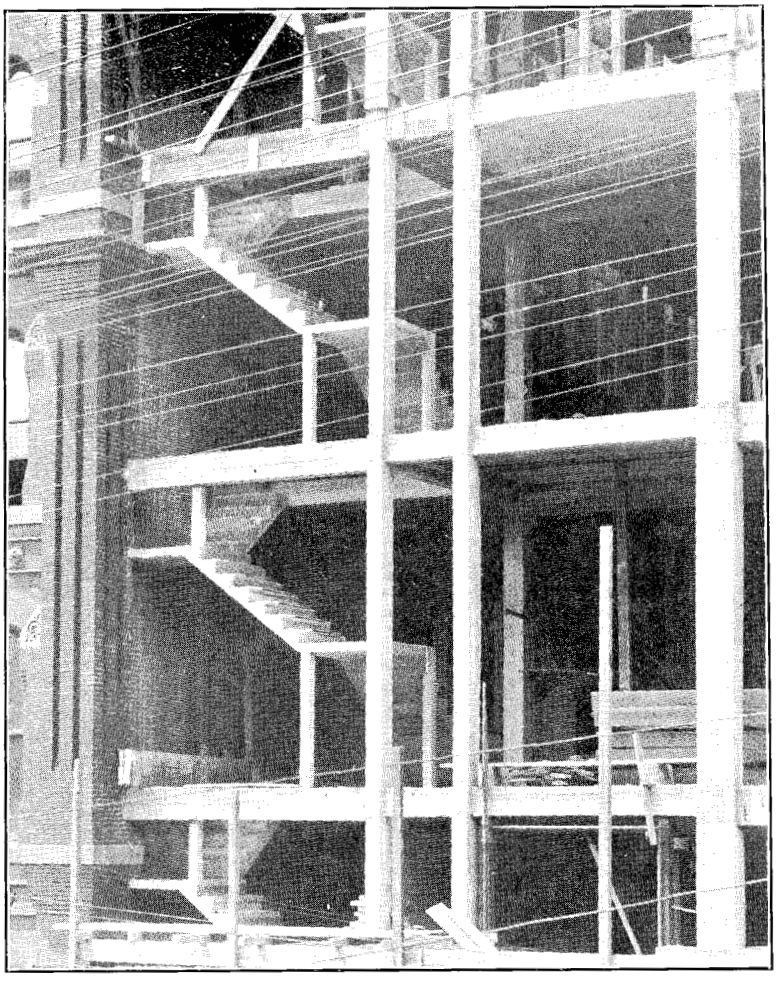
The J. L. Mott Iron Works. New Plant at Trenton, N. J. A. G. Thomson, Architect. Third floor of the Enameling Shop.
(See page 34.)



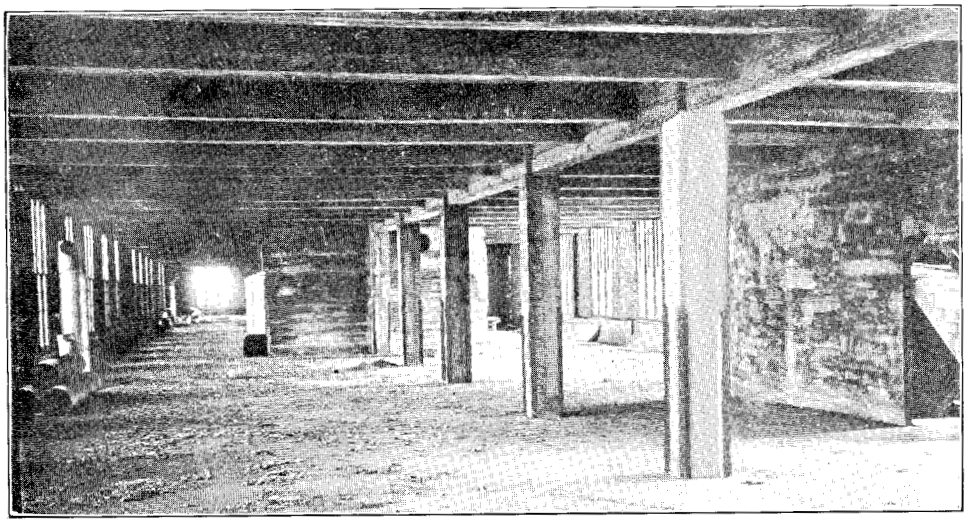
The J. L. Mott Iron Works. New Plant at Trenton, N. J. (See page 34.) Test made on the second floor of the Brass Shop, surface 30 ft. x 30 ft. loaded with 500 lbs. per square foot making a total load of 225 tons.



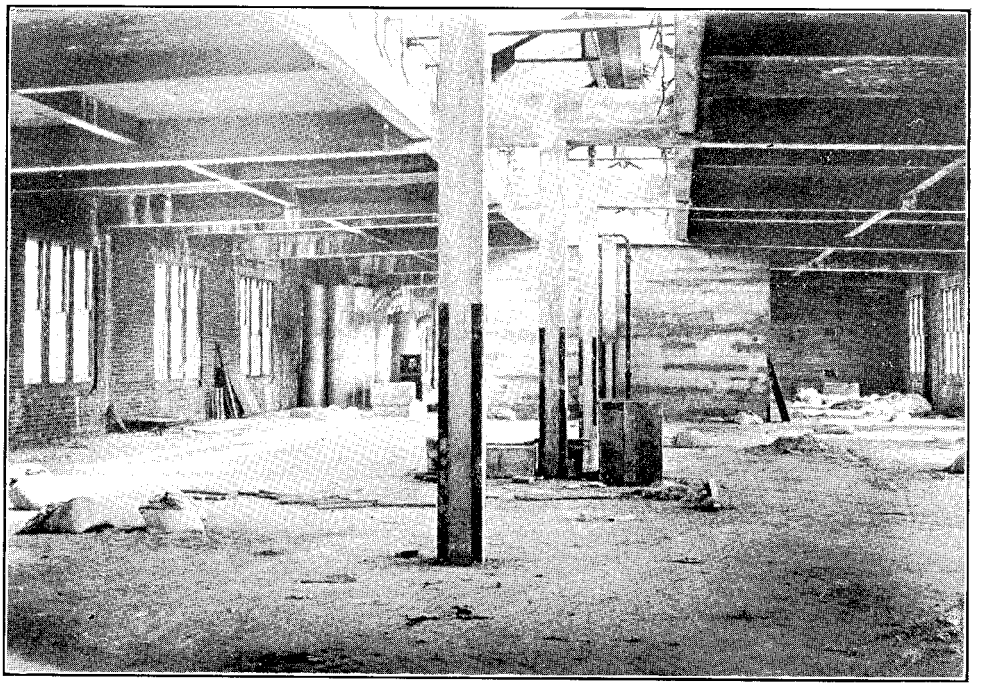
The J. L. Mott Iron Works. New Plant at Trenton, N. J. (See page 34.) Construction of the third floor of the Mounting Shop.



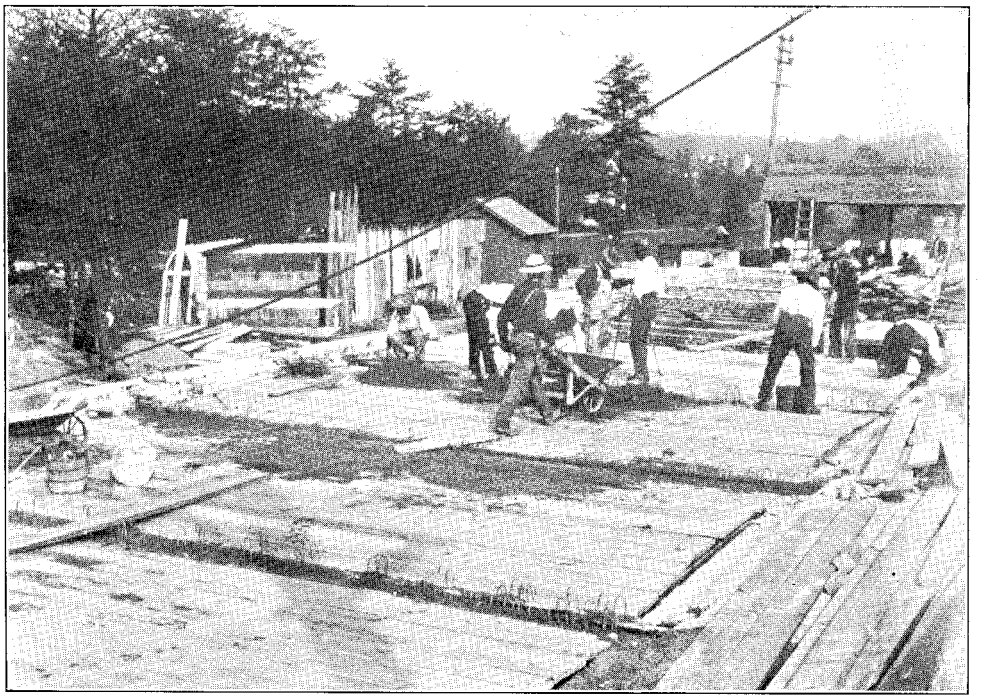
Rosenfeld Shirt Factory (see page 14). Construction of front stairways.



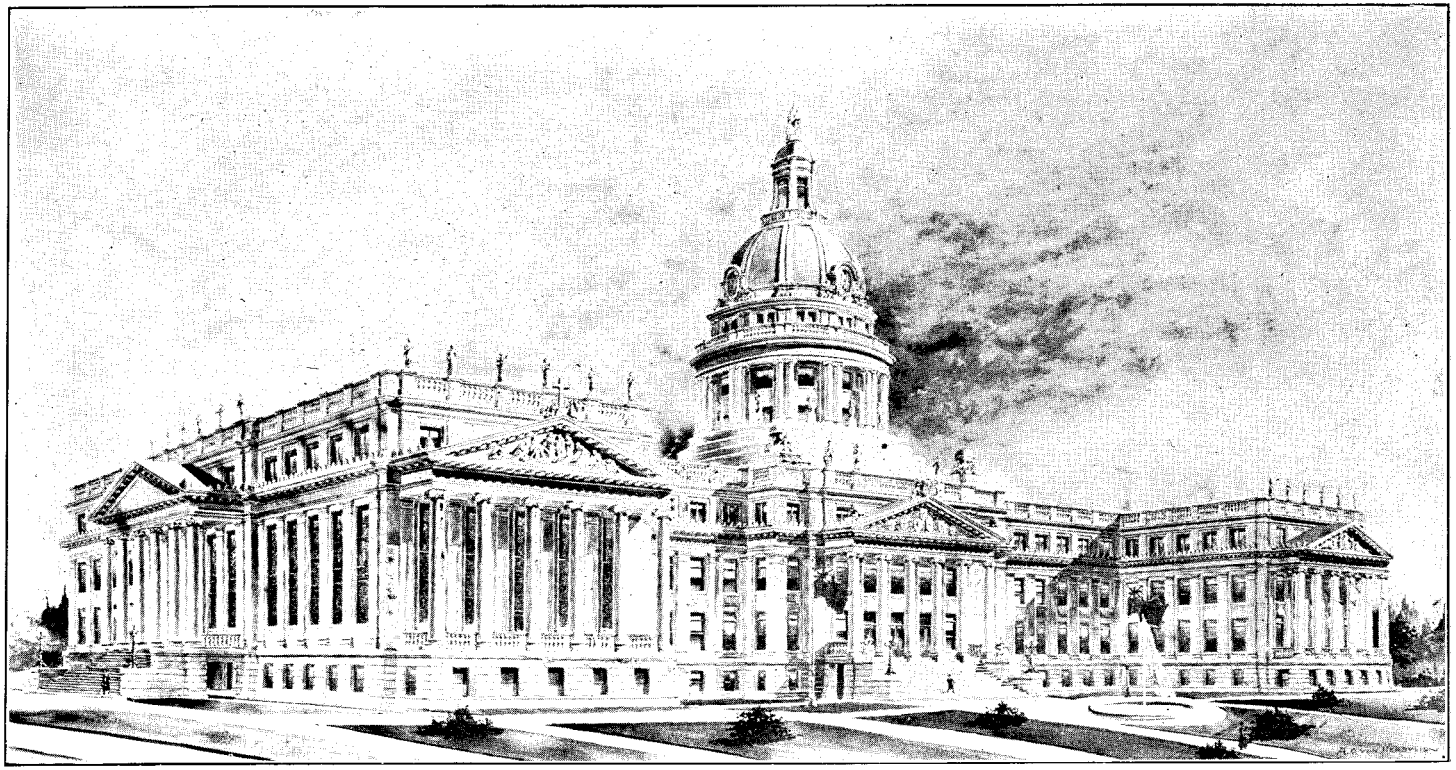
The J. L. Mott Iron Works. New Plant at Trenton, N. J. Third floor of the Brass Shop (see page 34).



The J. L. Mott Iron Works. New Plant at Trenton, N. J. (See page 34.) Roof and skylight of the Brass Shop.

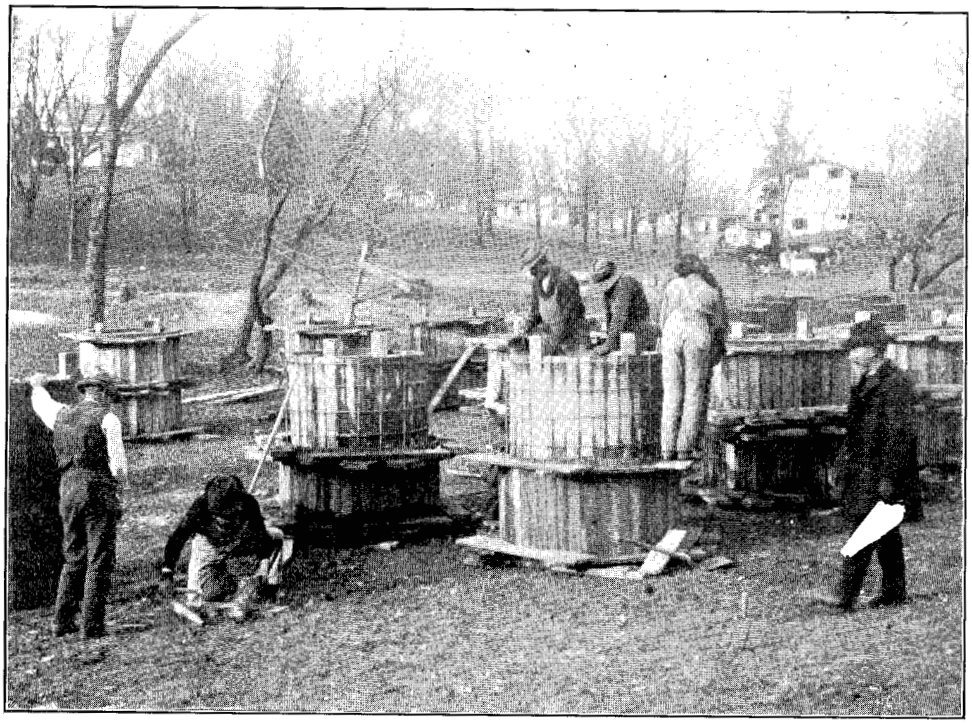


College Immaculate Conception (see page 23). Construction of arched floor.

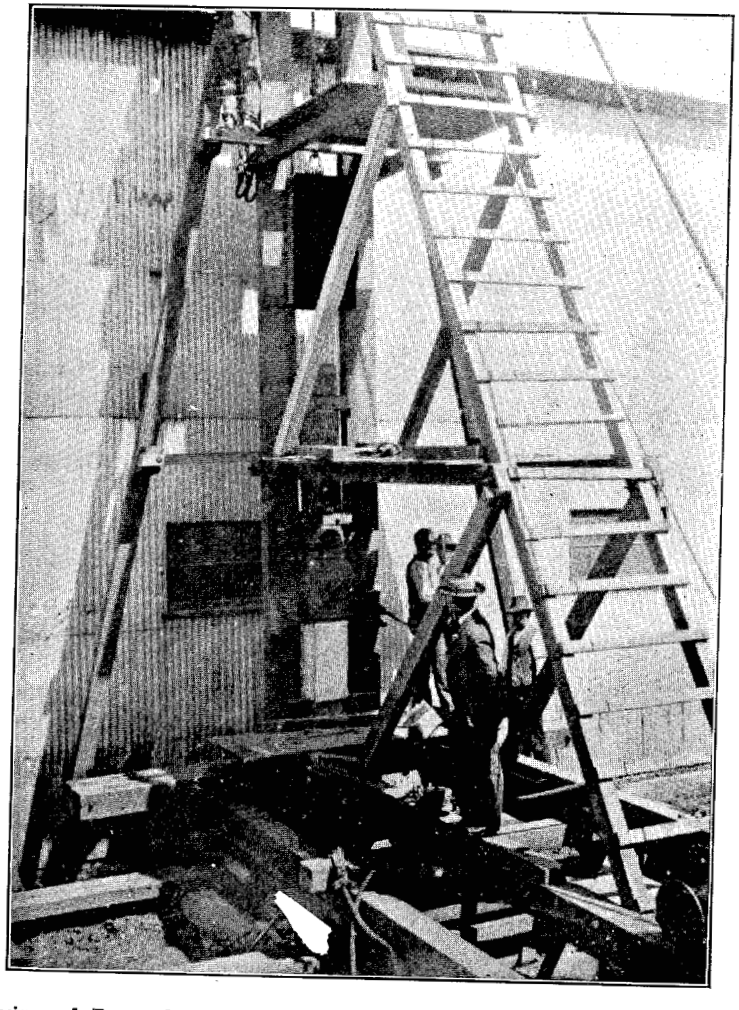


University of Ottawa, Canada. A. O. von Herbulis, Architect. Columns, floors and dome in ferro concrete (in course of erection).

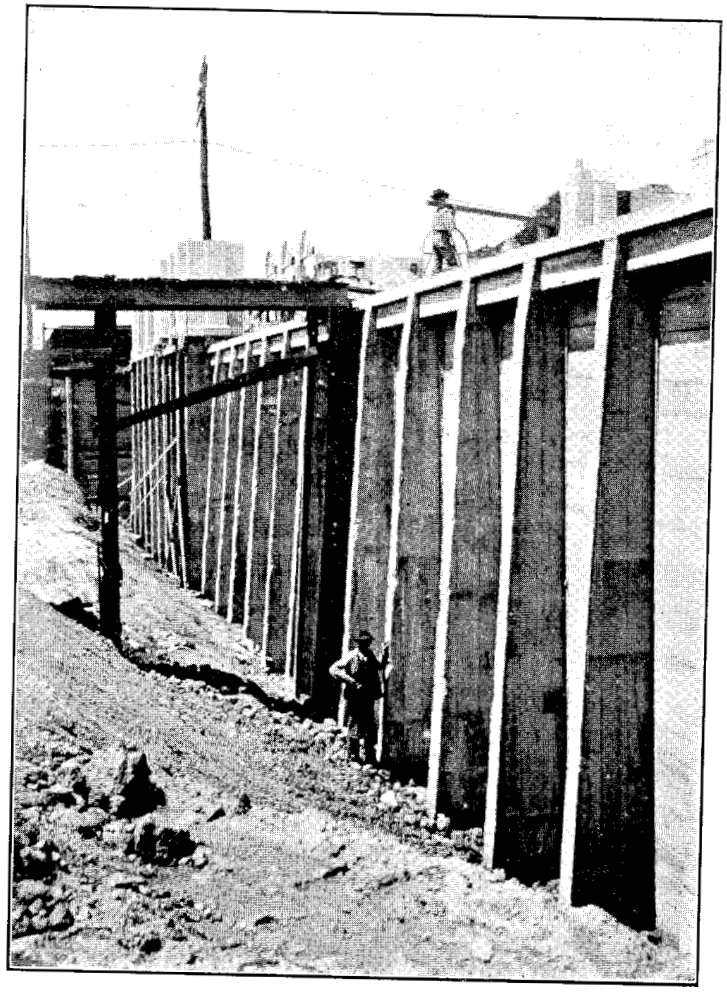
Wine Warehouse at Berkley, Va. (See page 27.) Construction of a floor.



Manufacturing Ferro Concrete **Sewer Conduits.**

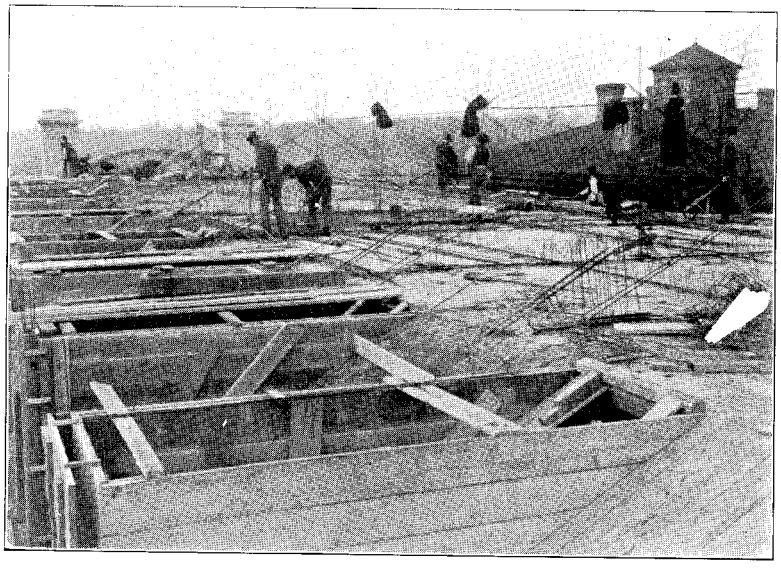


Driving of Ferro Concrete piles for foundations at Atlanta, Ga. The piles are driven with a monkey of 3500 pounds, dropping 9 feet.

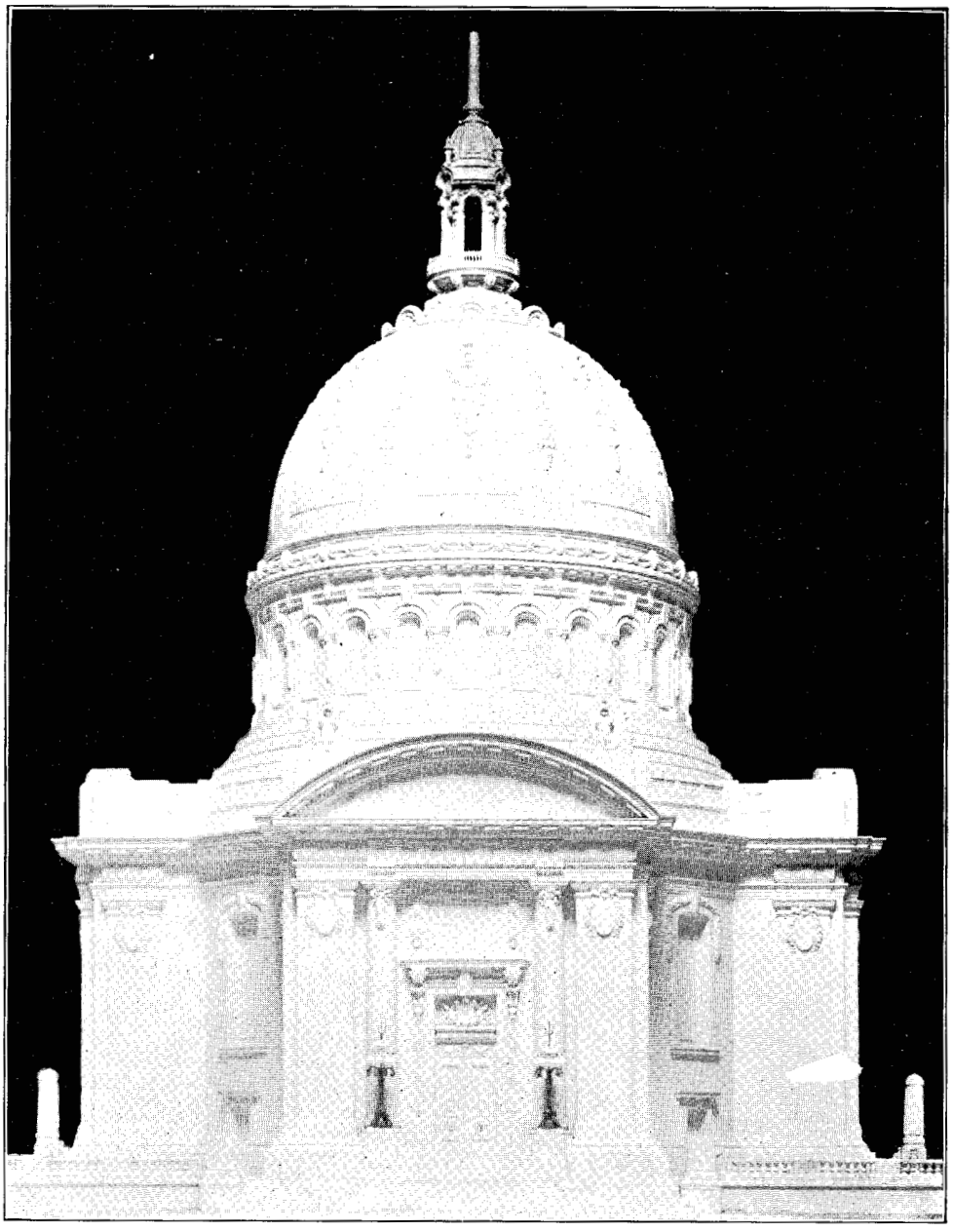


Retaining Wall of the Piazza, Atlanta, Ga., Atlanta Terminal Co. Walter Harrison, Chief Engineer. The wall carries also the carriage driveway in ferro concrete.

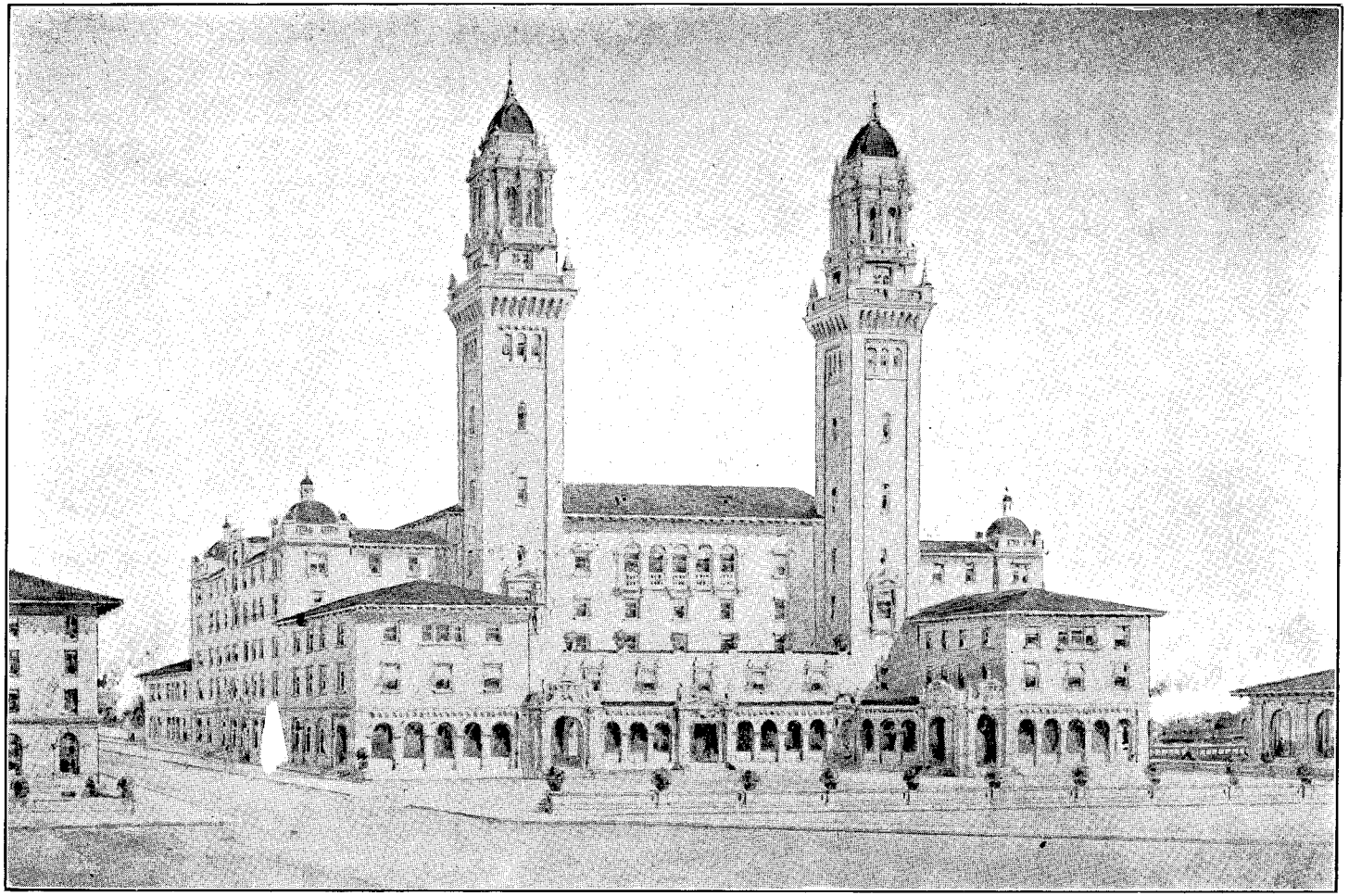
Marist Seminary at Catholic University, Washington, D. C. A. O. von Herbulis, Architect. Floors and stairways in ferro concrete.



Officers Mess Building, U. S. Naval Academy, Annapolis, Md. Ernest Flagg, Architect. Noel Construction Co., General Contractors. Floors, columns and roof in ferro concrete.



Chapel Building of U. S. Naval Academy, Annapolis, Md. Ernest Flagg, Architect. Noel Construction Co., General Contractors (in course of erection).



Atlanta Terminal Station, Atlanta Terminal Co. Thornton Marye, Architect. Gude & Walker, General Contractors. Columns, floors and roof of ferro concrete (in course of erection).