(No Model.) 2 Sheets—Sheet 1.

B. J. LA MOTHE.

METALLIC BUILDING.

No. 431,364. Patented July 1, 1890.

Fig. 14.

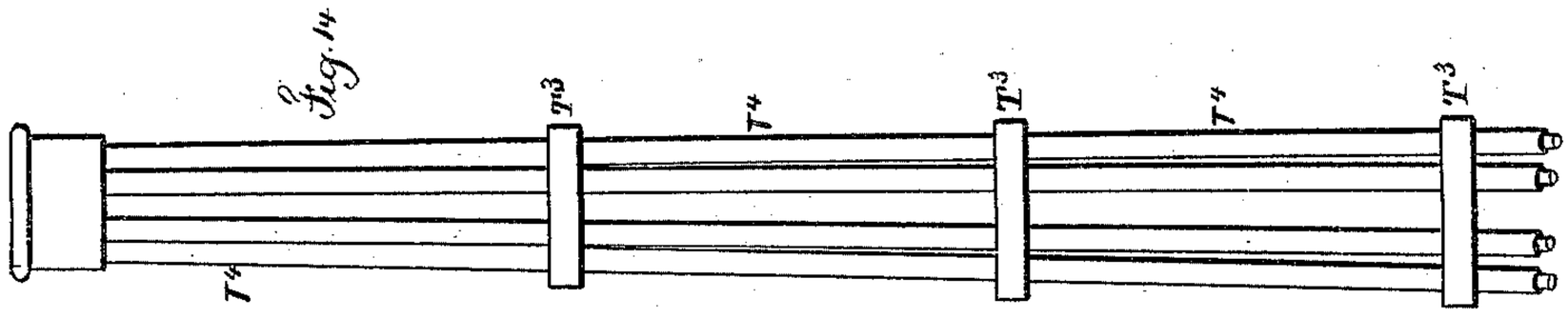


Fig. 4.

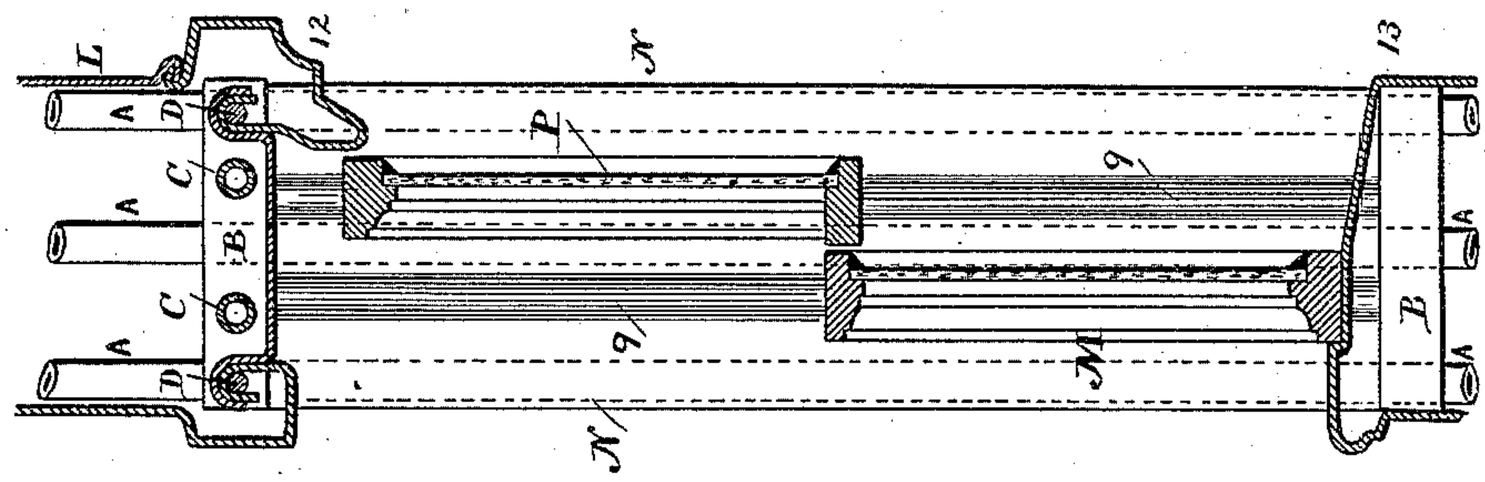


Fig. 13.

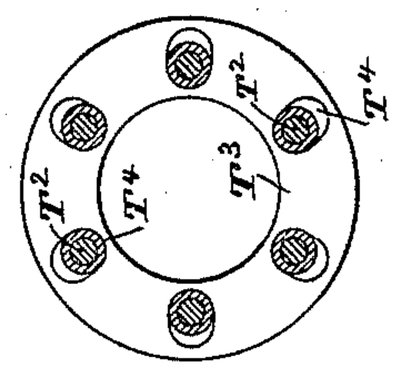


Fig. 3.

Witnesses
Chas. H. Smith
J. Stair

Inventor
Bernard J. La Mothe
per Lemuel W. Serrell
Atty

(No Model.) 2 Sheets—Sheet 2.

B. J. LA MOTHE.

METALLIC BUILDING.

No. 431,364. Patented July 1, 1890.

Fig. 1.

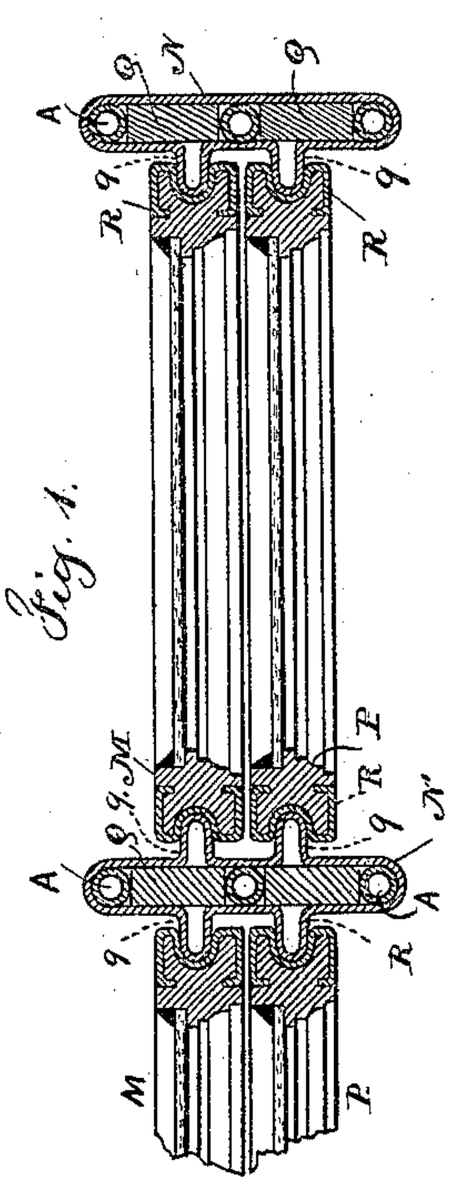


Fig. 2.

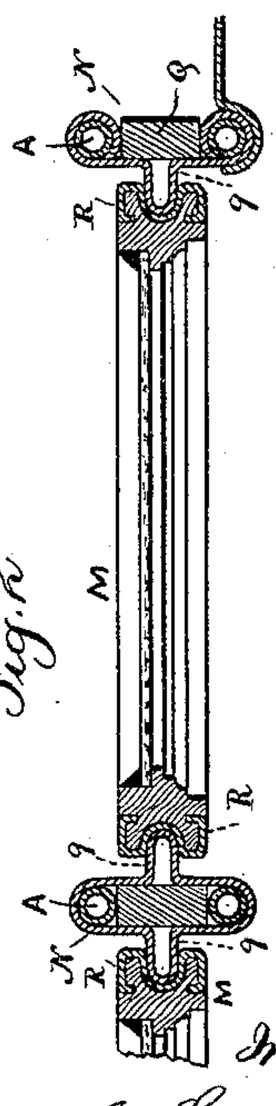


Fig. 5.

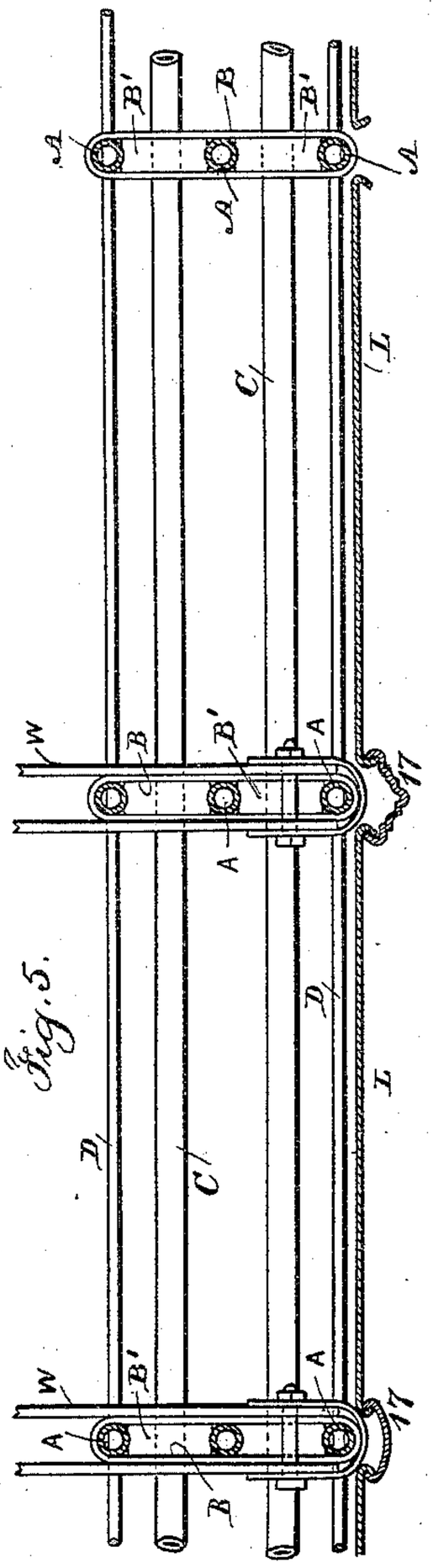


Fig. 8.

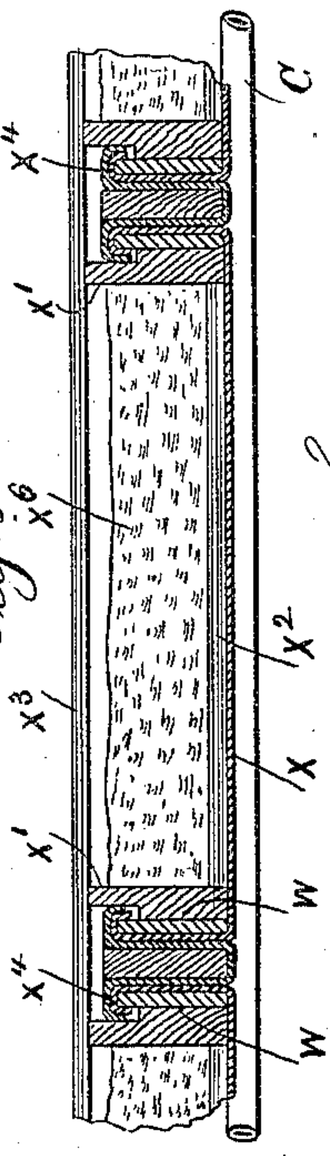


Fig. 9.

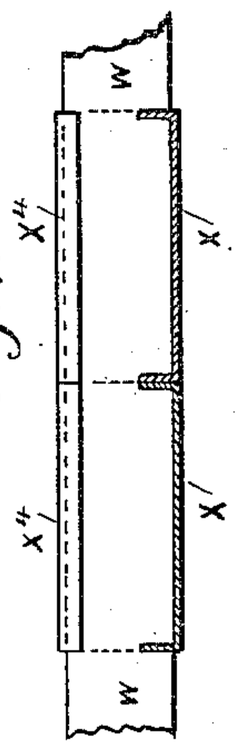


Fig. 6

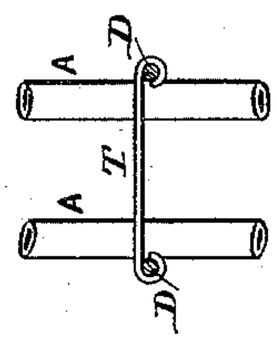


Fig. 7.

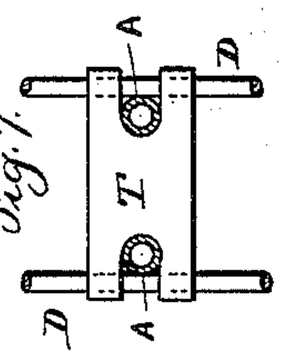


Fig. 10.

Fig. 11.

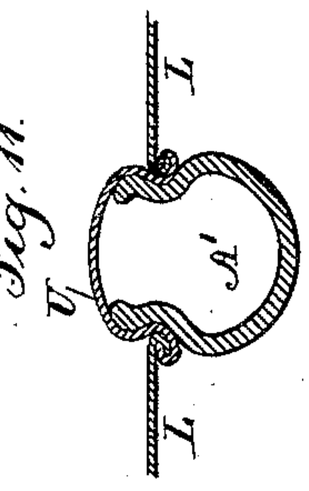
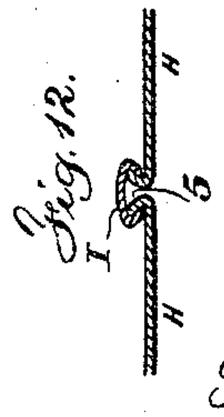


Fig. 12.



Witnesses
Chas. H. Smith
J. Stail

Inventor.
Bernard J. La Mothe
per Lemuel W. Serrell atty

UNITED STATES PATENT OFFICE.

BERNARD J. LA MOTHE, OF NEW YORK, N. Y.

METALLIC BUILDING.

SPECIFICATION forming part of Letters Patent No. 431,364, dated July 1, 1890.

Application filed March 12, 1890. Serial No. 343,600. (No model.)

To all whom it may concern:

Be it known that I, BERNARD J. LA MOTHE, a citizen of the United States, residing in the city and State of New York, have invented an Improvement in Metallic Buildings, of which the following is a specification.

The object of this invention is to render public and private buildings of all characters lighter and stronger than those heretofore constructed; and with this object in view I provide for supporting the structure with tubular columns of wrought iron or steel and tying the respective parts together by metallic rods, and the exterior of the building is inclosed by metallic sheets supported by longitudinal or transverse connections, and at the windows I make use of sheet-metal frames for supporting the sashes in such a manner that the expansion and contraction of the metal will not obstruct the movement of the sash, neither will it render the sash so loose that it will fall of its own weight.

In the drawings, Figures 1 and 2 are horizontal sections representing portions of a structure and of the window or door casing. Fig. 3 is a vertical section at the junction of the side wall and roof. Fig. 4 is a similar view through the window-sashes. Fig. 5 is a sectional plan view of the covering-plates and tubular columns. Fig. 6 is a vertical section, and Fig. 7 is a plan view, of the connection between the horizontal tie-rods and the vertical columns. Fig. 8 is a section of the floor transversely of the beams. Fig. 9 is a section of the metal plates at right angles to Fig. 8. Figs. 10 and 11 are sections of the iron columns and covering-plates. Fig. 12 is a section of the roof-plates longitudinally; Fig. 13 is a sectional plan, and Fig. 14 a partial elevation, of an internal column or support.

The walls of the building are composed of ranges of vertical tubes A A and according to the height of the building, so that there will be two, three, or more of these tubes grouped together and united by the tie-bands B, surrounding the groups of tubes, and within which tie-bands and between the respective columns are space-blocks B′, Fig. 5, and it is preferable to pass the tie-bands around the groups of tubes, or to pass the tubes through the tie-bands and then to drive in between the respective tubes the space-blocks, in order that the tubes, the tie-bands, and the space-blocks may be firmly connected together, and these tie-bands and space-blocks are to be provided at every floor and usually at the tops and bottoms of the windows and doors.

The horizontal tubes C are passed through the space-blocks and tie-bands and between the tubes A, and these horizontal tubes C are adapted to receive the beams and other supports for the floors, and the tie-bars D, which are preferably of steel, are passed through the tie-bands and through the tubes A at the proper places, for not only preventing the tie-bands slipping on the tubes, but also for connecting the structure and for receiving the sheet-metal covering at the exterior or interior of the building, or both, as hereinafter described.

The tubes A at the junction of the side walls and roof are bent inwardly and form arch-girders, as shown in Fig. 3, the tie-bands, space-blocks, and tie-bars being employed, similarly to those upon the side walls, for the purpose of connecting the respective girders to each other and for connecting the tubes into the groups forming the girders, and to stiffen the arch I make use of the cord-bars F at the base of the arch, extending from the clip-piece E upon one wall to a similar clip-piece on the other wall, and these cord-bars are connected to the arch-girder at intervals by the brace-loops G, and it is preferable to make the cord-bars F of steel rods, passing through tubes 3, the ends of which tubes abut against the clip-pieces E and brace-loops G, respectively. The loops G may be filled with space-blocks or left open, as may be desired.

The structure is to be covered with metallic sheets of suitable size and material. Usually these sheets will be of galvanized iron, and in forming the roof the sheets H are made with interlocking seams 4, running, preferably, longitudinally of the roof, and the edges of these sheets are turned up, as illustrated in Fig. 12, and a covering-strip I with downward returned edges is made use of, the same being lapped over the bent edges 5 of the sheets H, so as not only to connect the sheets together, but to effectually exclude moisture, and at the same time the metal will spring sufficiently to allow for variations in the size due to expansion and contraction.

The face sheets L are bent with a downwardly-projecting lip 6, around which the lower edge of the roof-plate H is hooked, as represented in Fig. 3, and the upper edge of such face sheet L is bent around to hook over one of the horizontal tubes C or tie-rods D, and the horizontal seams or joints between one face sheet and another are made at suitable places, as represented in Fig. 3, and in consequence of the sheet being folded to form a downwardly-projecting or hooking edge beneath which the lower edge of the upper sheet passes the union of the respective sheets is made very complete and the entrance of water is effectually prevented, and by this construction the upper edge of each sheet is left free to be hooked over and tightly closed around one of the tie-bars D or horizontal tubes C.

In the construction of window-frames I make use of sheet metal bent up, as seen at N, Figs. 1 and 2, to pass around and inclose entirely or partially the outer vertical columns A A of each group, adjacent to which a door or window is to be applied, and the sheet metal is made with one or two vertical corrugations 9 9 to form the slides for the window-sashes or the jamb for a door. The sheet metal forming the frame is bent up so that the parts are parallel and form reliable slides for the window-sashes M P, the edges of such sashes being grooved for the reception of the ribs 9, and in consequence of these ribs 9 being bent up in the sheet metal there is more or less spring in such sheet metal, and it will yield to any slight inequalities in the sash as such sash is moved up or down, and by making the groove in the edge of the sash-frame to fit sufficiently tight upon the rib of the window-frame there will be sufficient friction for holding the sash at any point to which it may be moved, and it is preferable to insert within the sheet-metal window-frames filling-pieces of wood, as shown at Q, so as to support the sheet metal of the frame N, especially at those portions of the sheet metal that are nearly flat. The sashes themselves are to be of any proper size or character; but I prefer to make the same of wood, having upon the vertical edges a sheathing of sheet metal, as shown at R, the edges of the sheet metal being inserted into channels or saw-cuts in the wood of the sash, and such sheathing passing around the vertical edges of the sash and forming the surfaces for the grooved portions of the sash that come into contact with the ribs upon the window-frame.

In Fig. 4 a lintel 12 of sheet metal is shown as above the sashes and extending from the inner lining of the building to the outer plates L. This and the sill 13 of sheet metal below the sashes are connected at their ends with the tie-bands B or to the tie-bars D.

Where a door is applied in place of a window, the sheet-metal frame N is extended down to the floor, and the door can close against the rib 9 and the hinges of the door will be secured to the filling-pieces Q, the screws passing through the sheet metal of the frame N. Where there are two widows close together, the frame N can be made double, with the projections 9 at each side of the tubes A; but where there is a sheet-metal covering between one window and the next it is not necessary to have two sets of ribs 9, but the portion of the sheet-metal frame N that is opposite to the ribs 9 may be flat and the edges of sheet metal may be wrapped around the inner and outer columns A A, as seen in Fig. 2.

In Fig. 5 I have represented an ornamental covering or molding 17 as uniting the vertical edges of the face sheets L at the columns A A, the edges of the face-sheets L being turned outwardly to form the lips over which the returned edges of the molding-strips 17 are slipped.

In some portions of the building the tie-bars D will pass through the columns A at the tie-bands B; but in order to preserve the parallelism of the tie-bars D where only two tubes A are made use of such tie-bars D will pass outside of the tubes A, as seen in Figs. 6 and 7, and to clamp such tie-bars to the outer edges of these tubes A, I make use of the sheet-metal clips T, in the ends of which are notches that receive the tubes A A, and the projecting portions at the ends of these clip-pieces are passed around and lap under the tie-bars D, so as to draw them tightly against the edges of the tubes A, and these clips T may be applied adjacent to the tie-bands B, or wherever most convenient.

The iron floor-beams W are to be of any desired depth and sectional shape and of the required strength, and they rest at their ends on the horizontal tubes C, and may be bolted or tied to the tubular columns A by straps, as seen in Fig. 5, and the troughs of sheet metal X are adapted to hook at their upper edges X^4 over the top edges of the bearers W, and within the troughs are planks X′, set up edgewise, with cross-pieces X^2 upon the bottoms of the troughs to keep the planks X′ at the proper distances apart and to support the cement or concrete at X^6 while the same is in a soft condition, so that the weight will not sag down the bottom of the trough.

The wooden flooring X^3 can be nailed to the top edges of the planks X′. The cement at X^6 renders the floor substantially fire-proof and deadens noise.

Having described the devices made use of in the different portions of the metallic building and the manner in which they are to be associated together, I remark that the sizes and proportions of the parts and the positions of the windows and doors will vary in different buildings; but the foregoing description will enable the architect or constructer to adapt the present improvements to the building that is to be erected.

In Figs. 10 and 11 I have represented by horizontal sections tubular columns A′, that

may be made use of at the doorways or other portions of the structure where the face sheets are joined to the columns. In these cases the face sheets L have lips bent upon their edges, and these are interlocked with the bent edges of the sheet-metal cases U, partially or wholly surrounding the iron tubes A′, as seen in Fig. 10; or if the iron column A′ is not a complete tube, as shown in Fig. 11, the edges thereof can be corrugated for the reception of the sheet-metal covering U, the edges of the face sheets L interlocking with the edges of such covering-plates U, as represented.

The beams being tied at their ends to the upright tubes and the various parts of the structure being firmly connected, the tensile strength of the metal is availed of to as great an extent as possible, and the floors aid in holding the walls in place, and the stiffness of the tubes and the tension of the rods connecting the various parts of the structure serve to hold the entire building in its proper shape, one portion helping to support the other.

In cases where inside columns are required I make them of groups of pipes or rods—four or more in a group, as shown at T^2—and arranged in a circle and passing through metal rings T^3, which rings serve to support the floors or roof at the various places, and the rings are of successively smaller size, so that the column is tapering from the base upwardly, and the rings are held firmly by friction and will not slip downwardly over the diverging rods or tubes, and in addition exterior tubes are used, as seen at T^4, and of a length to correspond with the distance between the rings, and these tubes are around the tubes or bars that pass through the rings to support such rings in the most reliable manner.

I claim as my invention—

1. The combination, in a metallic building, of the tubular columns A, tie-bands B, space-blocks B′ between the tie-bands and the columns, the tie-bars D, passing through the tie-bands and through the columns A, and the face sheets L, hooked upon and secured to the tie-bars D, substantially as set forth.

2. The combination, in the metallic building, of the metal tube or columns A in groups, the tie-bands passing around the groups of tubes, the space-blocks between the tie-bands and the tubes, the tubes A being bent at their upper portions and extending across the building to form the roof-girders, the chord-bars F, and brace-loops G, substantially as set forth.

3. The combination, in a metallic building, with the tubes A and the tie-band B and space-blocks B′, of the sheet-metal window-frames N, having ribs on their inner faces, and the sashes having grooves upon their edges fitting the ribs, substantially as set forth.

4. The combination, with the tubes A, of the sheet-metal window-frames N, having ribs bent up in the sheet metal and forming slides for the window-sashes, and the wood filling between the columns or tubes and within the sheet-metal frames, substantially as set forth.

5. The combination, in a metallic building, of the tubes A, tie-bands B, space-blocks B′, with the face sheets L, having their edges turned over to form lips, and the sheet metal covering the columns or tubes and interlocked at its edges with the lips upon the edges of the face sheets, substantially as set forth.

6. The combination, in a metallic building, with the beams W, of the sheet-metal troughs with their upper edges hooked over the top edges of the beams and cement or similar material in the troughs, substantially as set forth.

7. The combination, in a metallic building, with the beams W, of the sheet-metal troughs between the beams, the planks X′ edgewise within the troughs, the cross-pieces, the cement or similar material in the troughs, and the floor fastened to the upper edges of the planks, substantially as specified.

Signed by me this 7th day of March, 1890.

B. J. LA MOTHE.

Witnesses:
GEO. T. PINCKNEY,
HAROLD SERRELL.