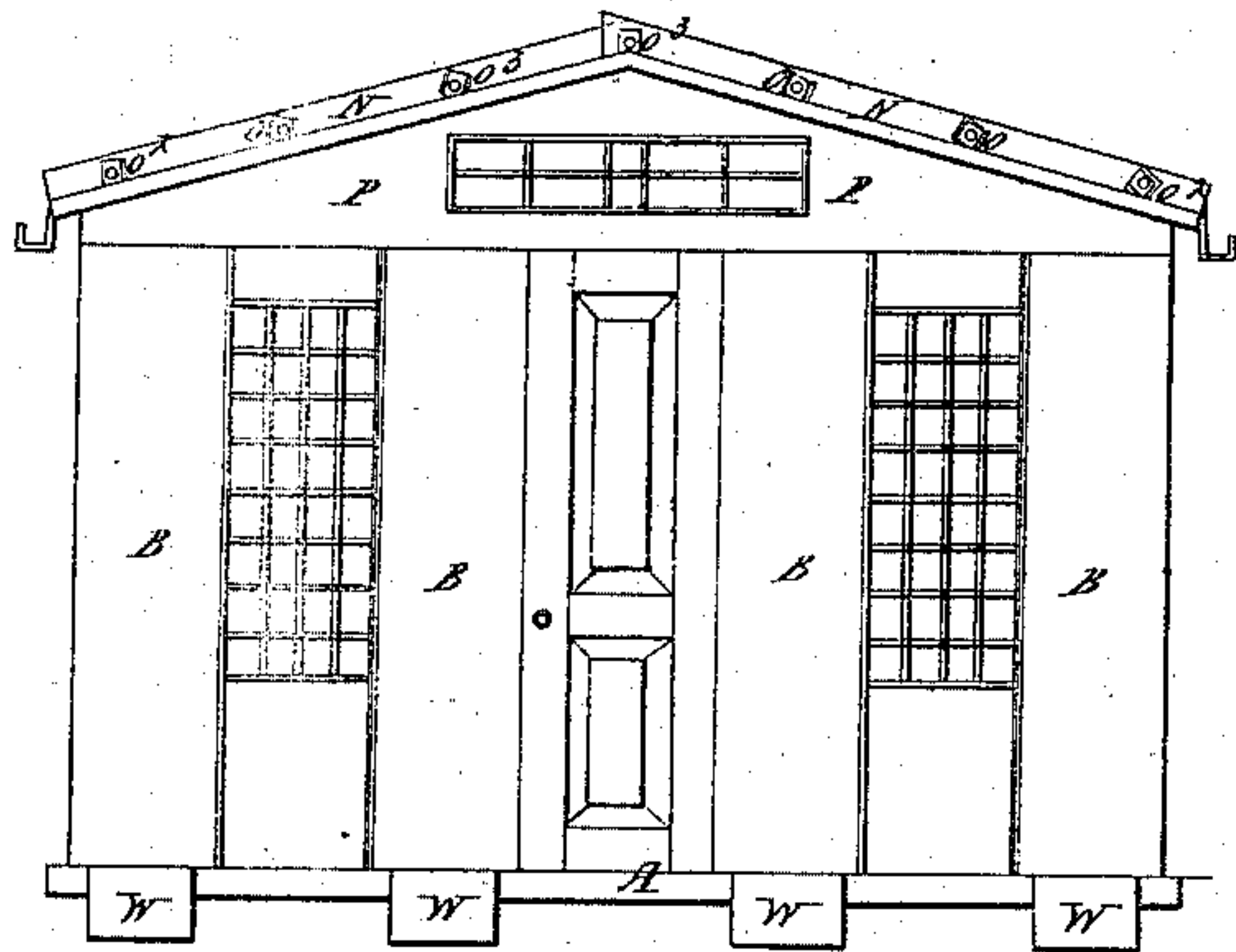


*S. Willard.*  
*Iron Structure.*

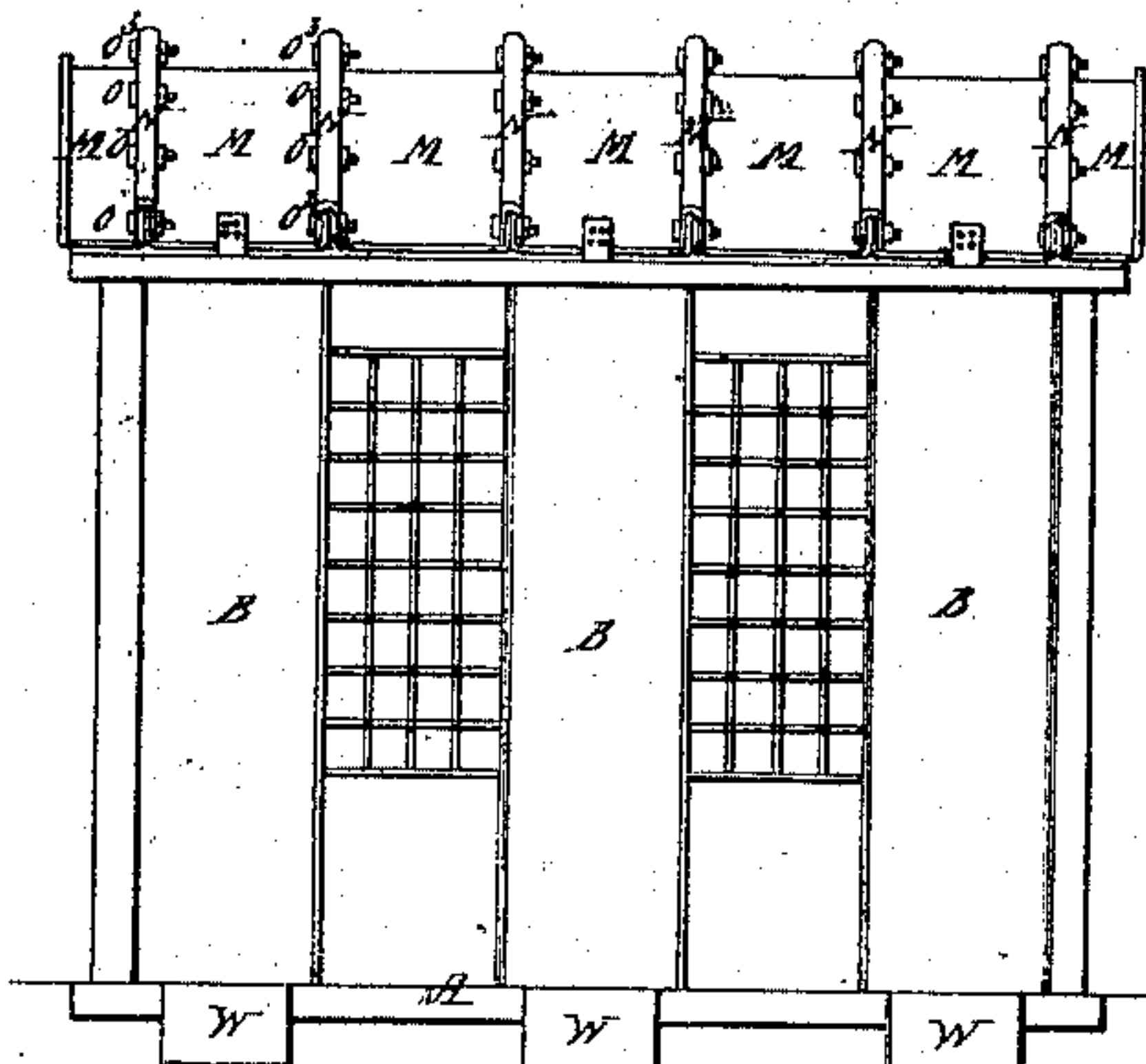
*Nº 7,993.*

*Patented Mar. 18, 1851.*

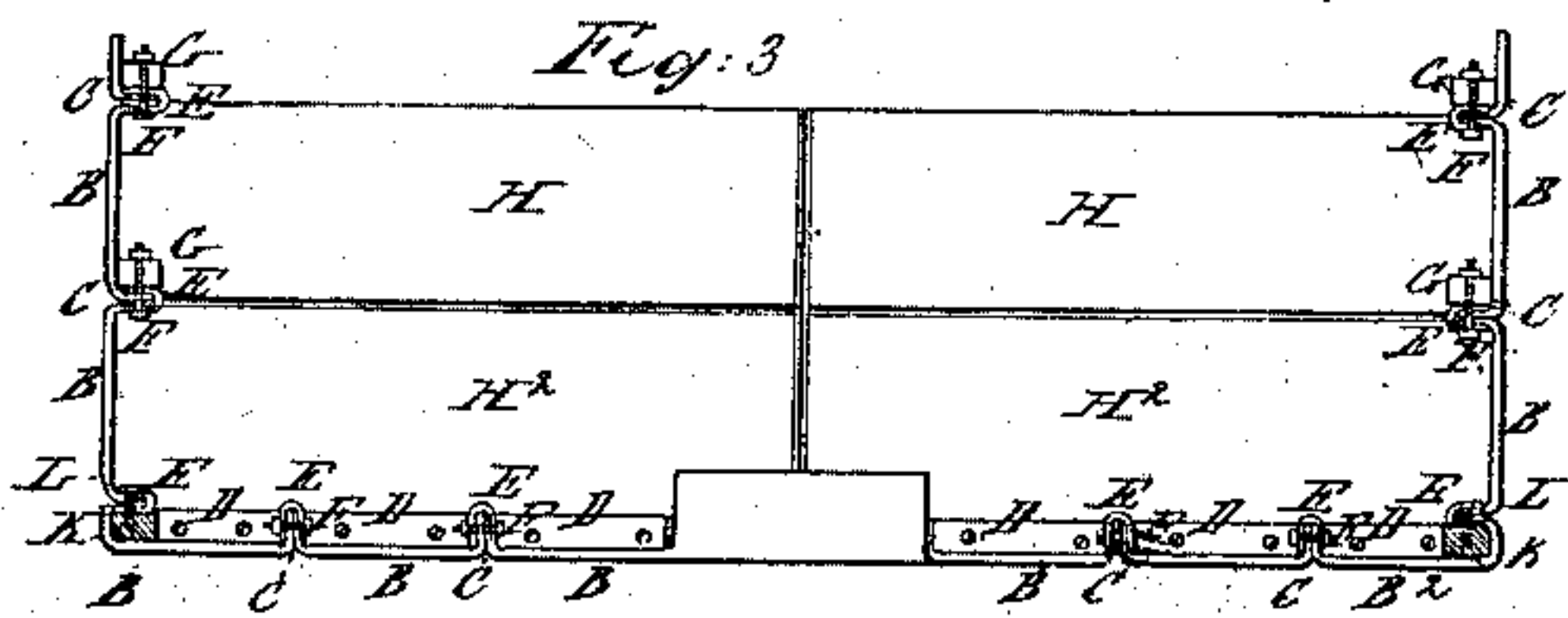
*Fig. 1*



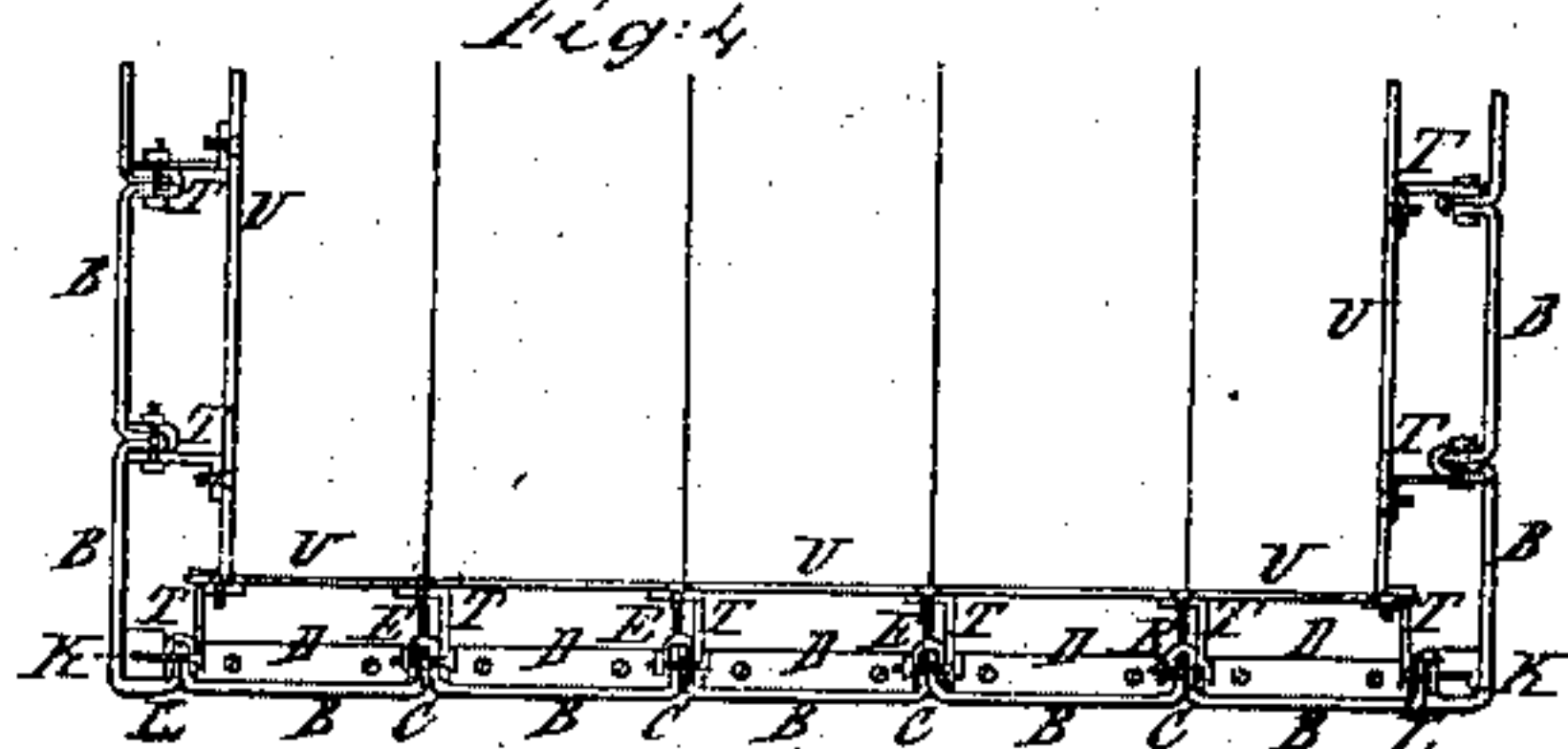
*Fig. 2*



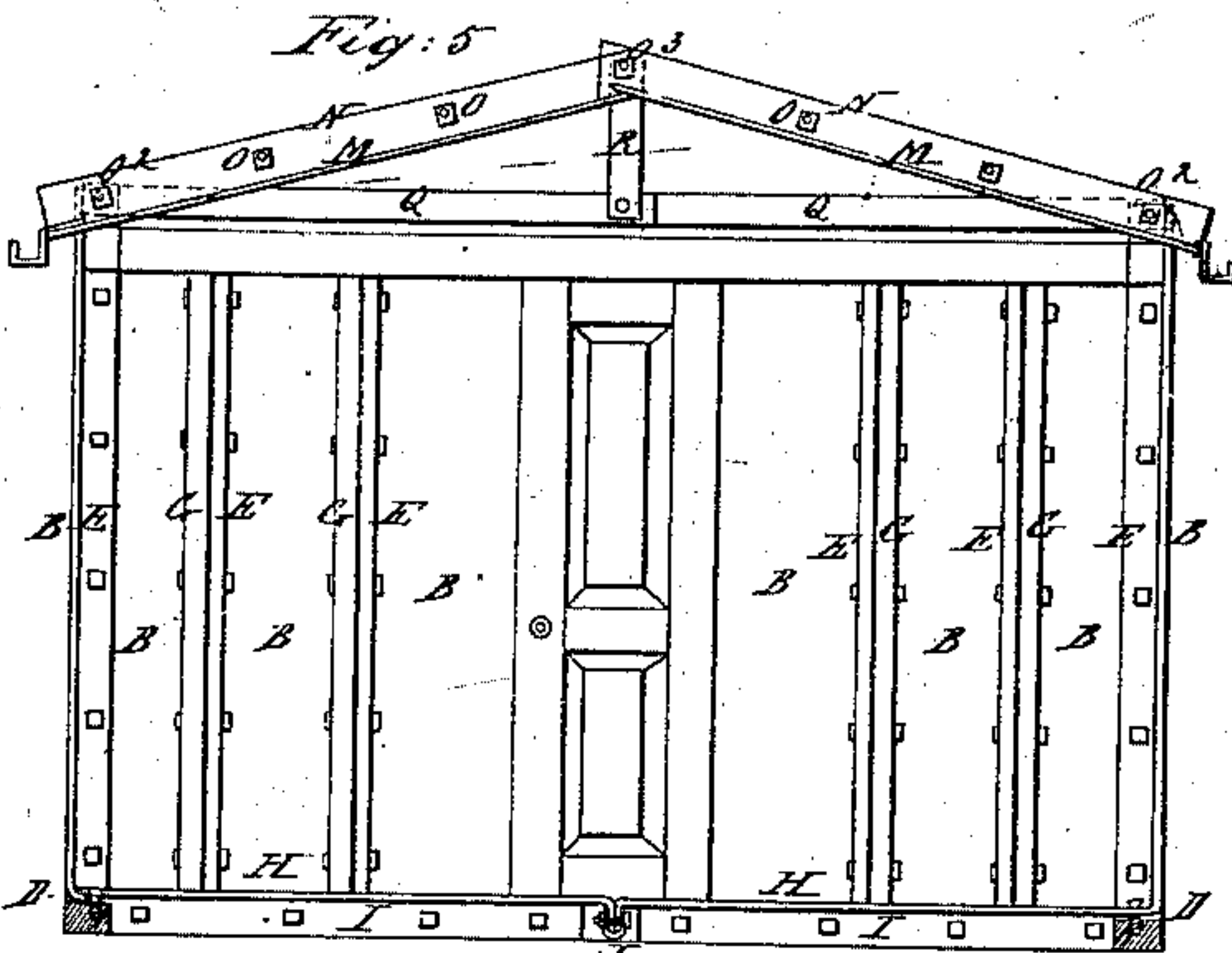
*Fig. 3*



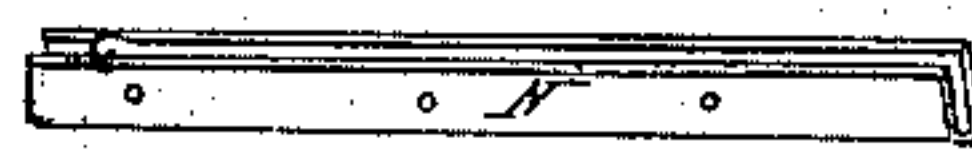
*Fig. 4*



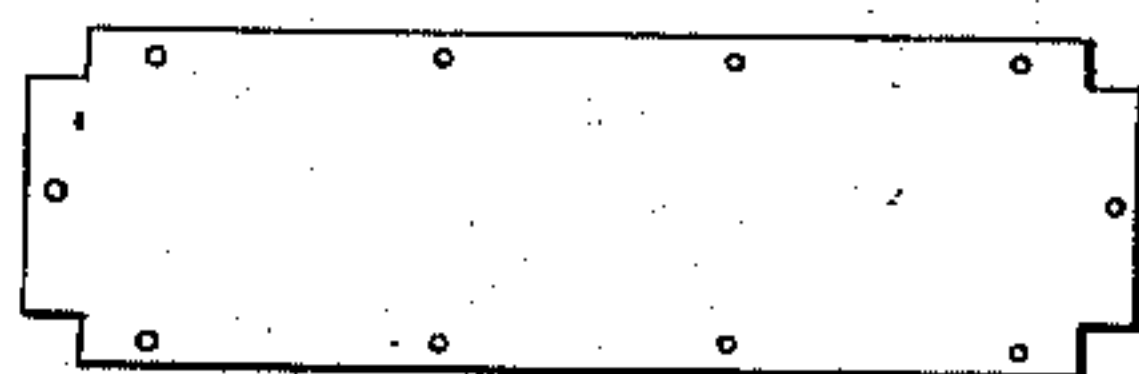
*Fig. 5*



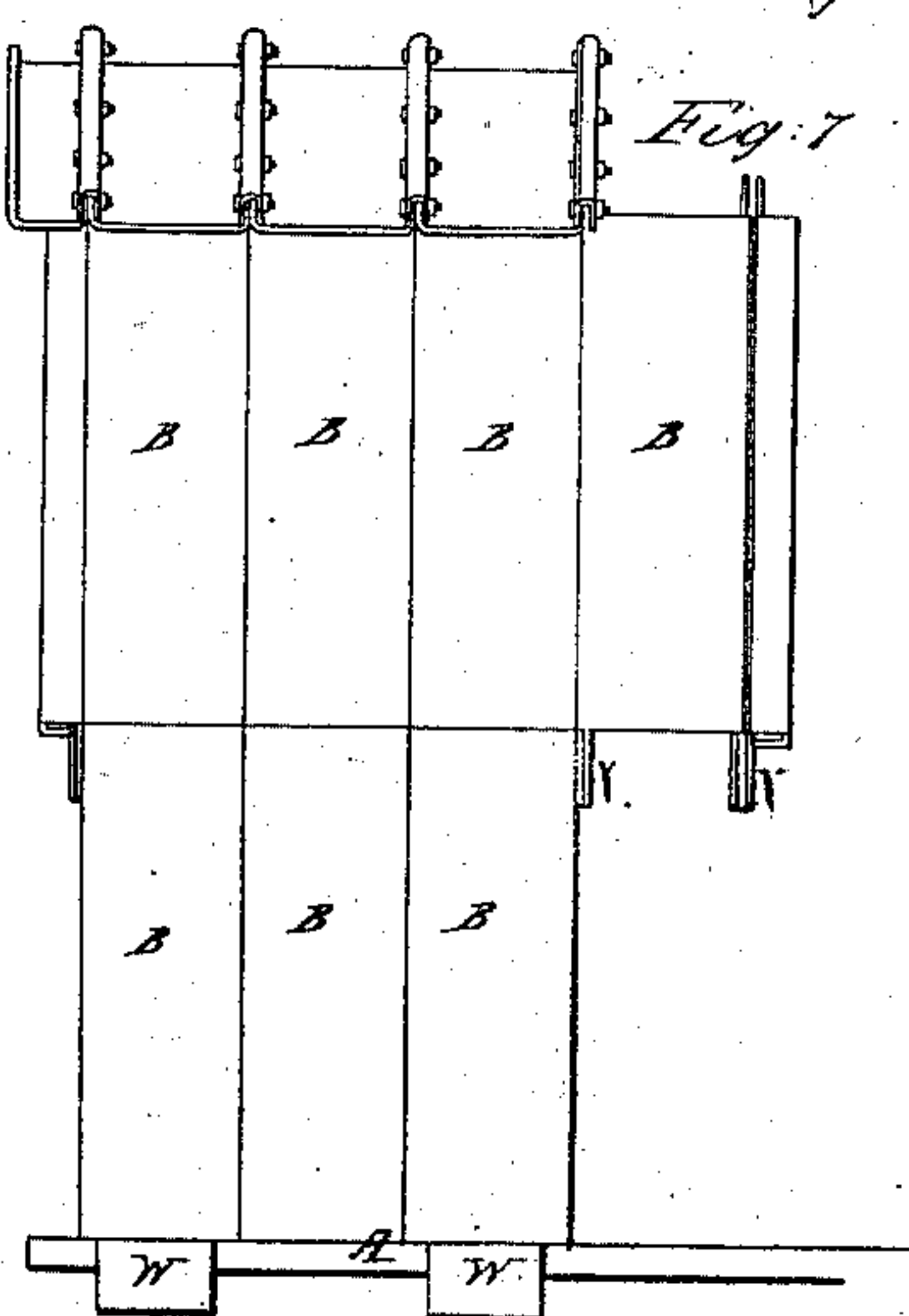
*Fig. 6*



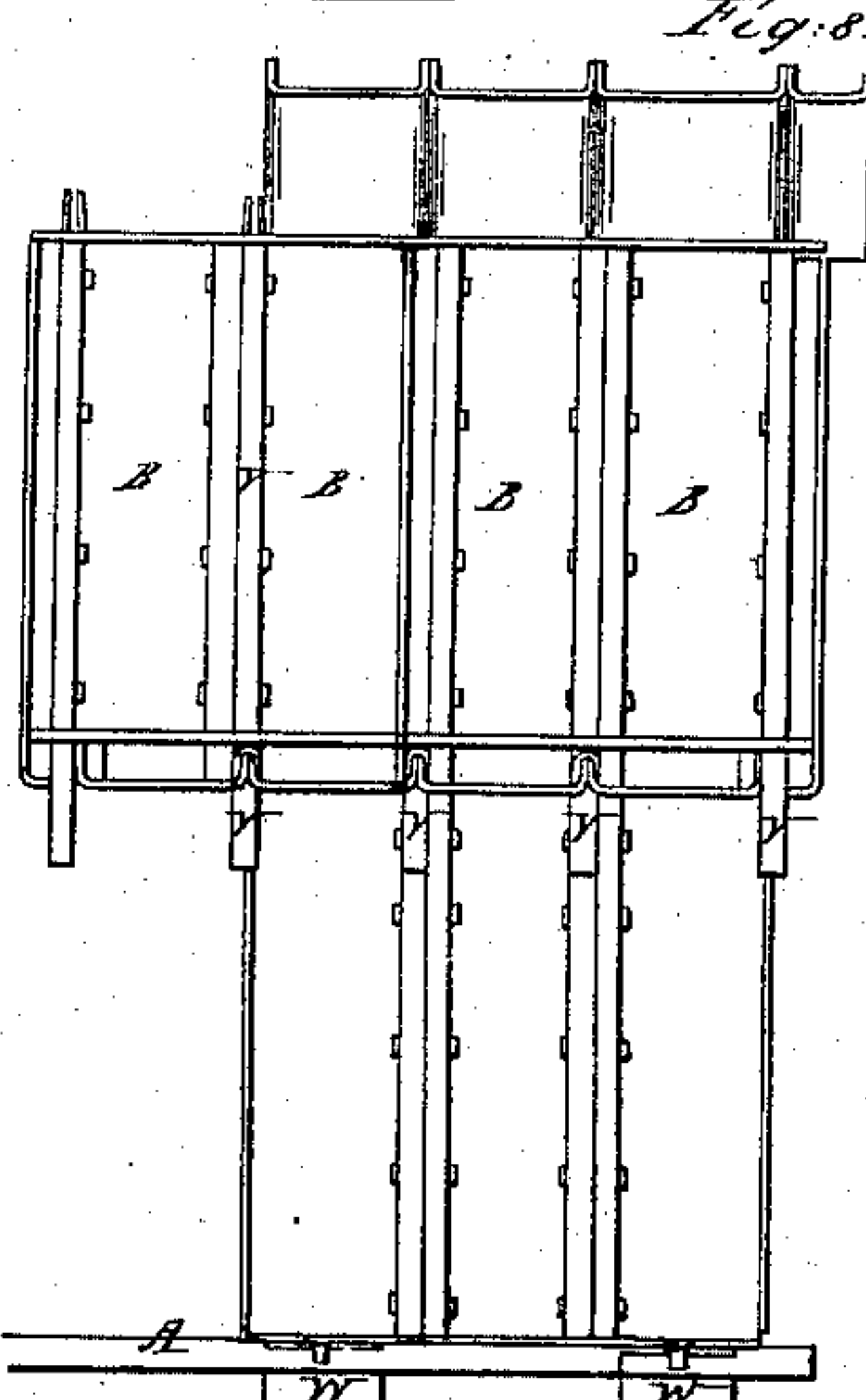
*Fig. 10*



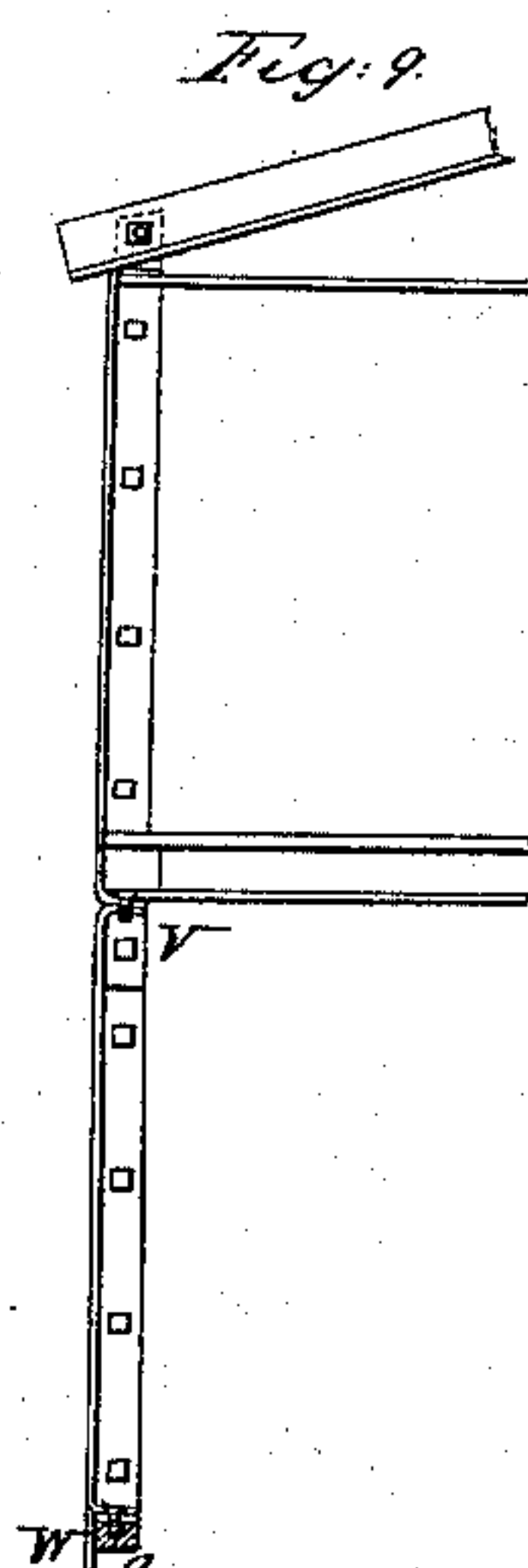
*Fig. 7*



*Fig. 8*



*Fig. 9*





# UNITED STATES PATENT OFFICE.

SIMON WILLARD, OF CINCINNATI, OHIO.

## CONSTRUCTION OF METALLIC BUILDINGS.

Specification of Letters Patent No. 7,993, dated March 18, 1851.

*To all whom it may concern:*

Be it known that I, SIMON WILLARD, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in the Manner of Constructing Metallic Buildings; and I do hereby declare the following to be a full and clear description thereof, reference being had to the annexed drawings, making part of this specification.

Figure 1 represents an end elevation of a one story building. Fig. 2 is an elevation of the side of ditto. Fig. 3 is a horizontal sectional view, showing the manner of connecting the vertical flanged plates which form the sides of the house. Fig. 4 is a horizontal sectional view, showing the lining or casing of the interior of the building, and its connection with the flanged sheets of iron which form the sides of the building. Fig. 5 is a vertical transverse section of the building. Fig. 6 is a perspective view of one of the flange binders. Fig. 7 represents an outside sectional elevation of a two story building, showing the manner of connecting the flanged sheets of the upper to the flanged sheets of the lower story, and also the manner of connecting the ceiling and roof with the flanged sheets of the upper story. Fig. 8 is an inside view of Fig. 7. Fig. 9 is a vertical section of ditto. Fig. 10 is a plan of one of the metallic sheets, which form the sides and flooring of the house, before being flanged.

Where the same letters of reference occur on the several figures they indicate the same parts.

The nature of my improvements consists in the manner of constructing metallic buildings so as to possess great strength, durability, security, economy, and be perfectly fire and water proof.

To enable others to construct buildings after my plan I shall proceed to describe its construction. The foundation of the building may be made in the usual manner; and provided with a horizontal frame A of longitudinal and transverse sills of the size and form of the intended building to which the flanged sheets are secured.

B are the sheets of iron which compose the sides of the building, being equal in length to the height of the side of the house. The vertical and lower edges of these plates are bent at right angles (when adapted for single story buildings) forming flanges C, D,

by which they are bolted to the foundation frame A, and to each other, the vertical flanges C when secured together form a vertical brace and impart strength to the sheets of iron which form the sides of the building: these flanges also serve to secure upright pieces and plates; they also act as vertical posts as well as buttresses and braces and enable the constructor to dispense with walls and framing—the sheets thus flanged and united serving as the frame and the siding. The flanges C, D, project inward: those at the base of the building are secured firmly to the foundation frame A—as seen in Figs. 3 and 5.

In order to increase the vertical strength of the sheets of iron, and to render their joints more secure and also to effectually exclude the air V shaped binders or saddle plates E are employed to embrace the flanges C from top to bottom being firmly confined by screw bolts F, which pass through the flanges C secured by nuts, and prevent the possibility of separating the sheets of iron from the outside; and when not covered by walls or lining the V shaped flange binders E are made to present a neat appearance from the room. The sides of the house may be further braced by upright studs G secured to the flange binders by the same screw bolts which confine the flanges as seen in Figs. 3 and 5. The floor is constructed on the same principle—the sheets of iron H being placed parallel to each other having their edges turned at right angles to form flanges and provided with V shaped flange binders I,—the inner ends of the sheets of iron H being flanged and provided with V shaped flange binders J, bolted with screw bolts and nuts;—while their outer ends are supported upon the flanges D of the vertical side sheets B, as seen in Fig. 5.

The corners of the building are formed in the following manner: The outer edges of the front and rear, corner sheets B<sup>2</sup> are bent around the upright posts K, and then parallel to the face of the sheet to form flanges L corresponding with those on the sheets of iron to which they are bolted, as seen in Fig. 3. Each corner sheet or plate B<sup>2</sup> is provided with upright posts K, secured by screw bolts passing through the binders, flanges, and into the posts by which the corners of the house are effectually braced and supported.

The roof is constructed of metallic sheets



M, extending from the eaves to the ridge of the building—their edges being turned at right angles upward forming flanges,—the ends of the metallic plates M, at the ridge of the roof on one side overlap those of the other side and thus form a tight joint while their lower ends project over the upper ends of the side plates and form the eaves as seen in Fig. 5, to which a gutter is secured in any suitable and proper manner. The flanges of these metallic plates M are provided with saddle plates or flange binders N resembling an inverted V which embrace the flanges and close the joints effectually against the weather. These flange binders N are secured firmly to the flanges of the metallic sheets M by screw bolts O, passing horizontally through the same at their ends and between their ends at suitable distances apart. The outside sheets of iron, or those next the gable ends seen in Fig. 2, are turned up at right angles to confine the water and prevent its passing over the pediments. The pediments P may be formed of sheets of iron and provided with oval or other shaped openings which serve as windows. The roof is braced and sustained in the following manner; the flange binders E at the sides of the building are made to project upward and fit between the flanges of the metallic sheets M of the roof through which the confining screw bolts O<sup>2</sup> pass and by which a strong connection of the vertical flange binders E, with those of the roof, is formed—being secured from spreading by tie plates. Q, Q, are horizontal tie plates or bars having their outer ends secured between the upper ends of the vertical flange binders E, and also between the flange binders of the roof by means of confining screw bolts, and extend to the center of the building and lap each other and connect to the ends of vertical suspension bars R by screw bolts S, the upper ends of said suspension bars R being secured between the ends of the flange binders N by confining screw bolts, O<sup>3</sup>. Thus it will be seen that by the connection of the vertical flange binders E, and flanged sheets of iron M of the roof and binders N by means of strong screw bolts passing horizontally through the same, and the firm connection of the binders N at the ridge of the roof—with the horizontal tie plates or bars Q, Q and vertical suspension and connecting bars R the roof will be rendered strong and durable, and the sides be prevented from spreading.

Fig. 4—represents a section—showing the manner of lining the inside of the house with sheet iron or other material. This is done by means of bent plates or bars T bolted to the flange binders, and projecting

therefrom and turned at right angles to which the lining V is secured, thus forming a chamber between the flanged sheets of iron B and lining V and giving to the inside of the room a neat appearance.

Figs. 7, 8 and 9 show sectional views of a building constructed with two stories of iron sheets flanged.

The essential feature of a two story building differing from a one story building consists mainly in the manner of connecting them together. This is effected by extending the flange binders V of the upper story below the same a sufficient distance to embrace and be bolted firmly to the flanges of the sheets of iron of the lower story, and thus form a strong and durable connection by means of screw bolts and nuts, of the upper and lower story.

Fig. 10 represents a plan of one of the sheets of iron which form the sides of the building—the corners having been notched and the holes for the screw bolts which secure the flange binders punched by a machine for that purpose, after which it is flanged in the same machine adapted for punching and thus all the plates are punched and flanged alike,—the flange binders being also in the same manner punched and bent in the form of a V to embrace and confine the flanges of the metallic sheets.

In order to protect my metallic building from the effects of lightning there is secured at the base of the four sides of the building right angled plates W, attached to the lower flanges of the side metallic sheets B, and projecting down into the earth—thus forming an effectual electrical conductor.

Having thus described the nature of my improvements in the construction of metallic buildings, what I claim as new and of my own invention and desire to secure by Letters Patent, is—

1. Carrying up the vertical U shaped flange binders between the flanges of the roof plates, to which they are attached, thus supporting the roof, and binding it firmly to the building.

2. I also claim such binders attached in such a manner in connection with the tie plates or rods Q, attached at the same spot between the flanges—and by the same bolts, and this I claim whether the suspension bars R be employed or not.

In testimony whereof I have hereunto signed my name before two subscribing witnesses:

SIMON WILLARD.

Witnesses:

WM. P. ELLIOT,  
NATHANIEL M. CLARK.