P. M. WEGE.

METAL STRUCTURE.

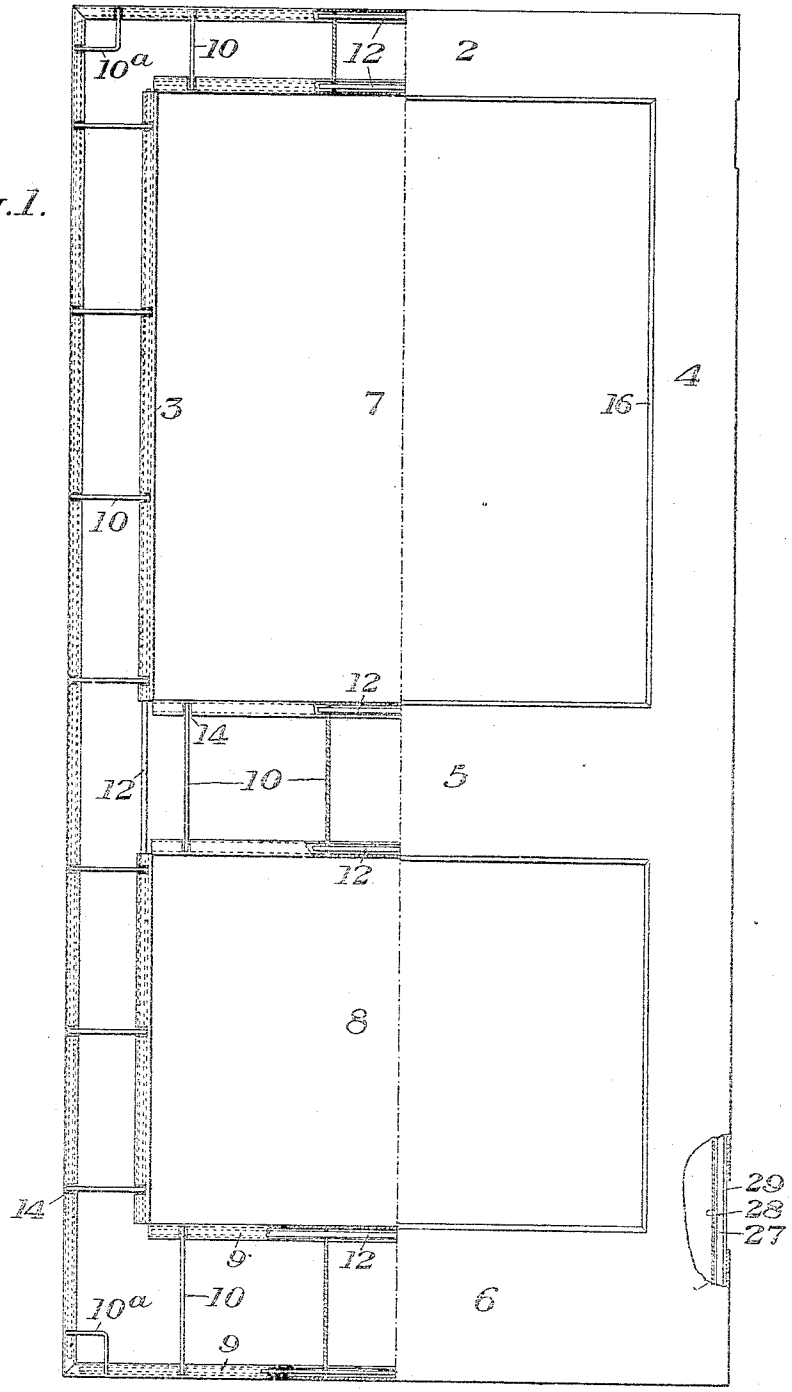
APPLICATION FILED MAR. 11, 1908.

956,556.

Patented May 3, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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W. W. Swartz

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Peter M. Wege,

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4 SHEETS—SHEET 2.

Fig. 2.

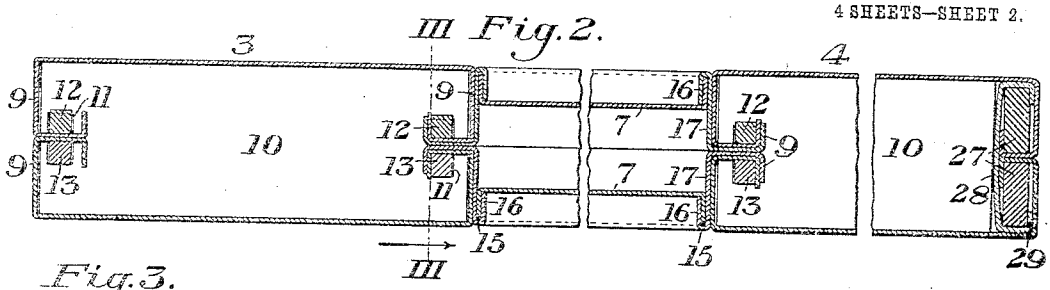


Fig. 3.

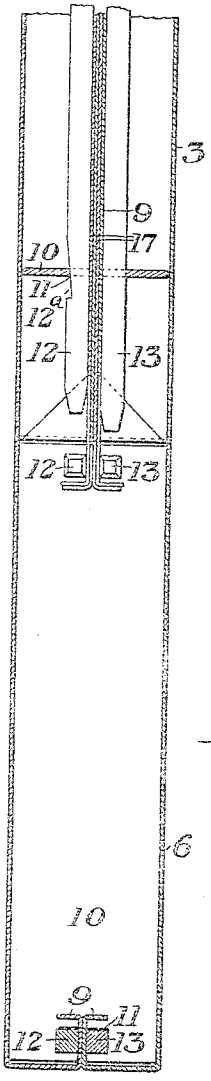


Fig. 4.

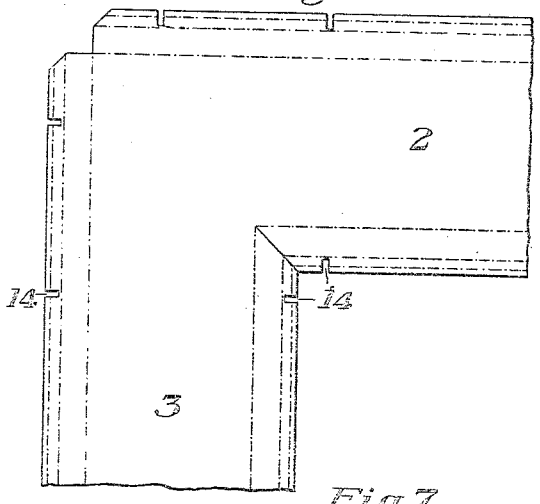


Fig. 5.

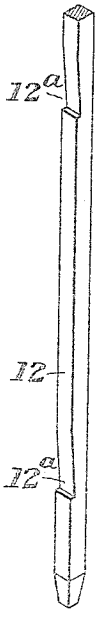


Fig. 6.

Fig. 7.

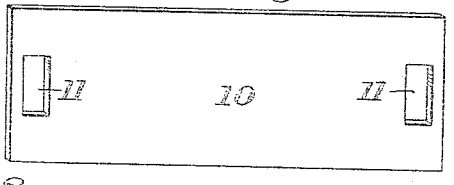


Fig. 8.

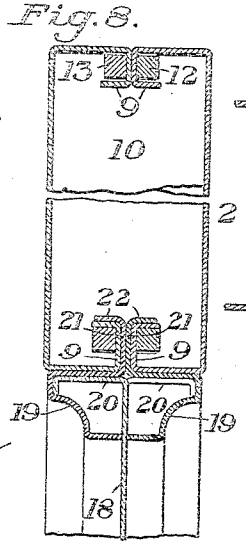
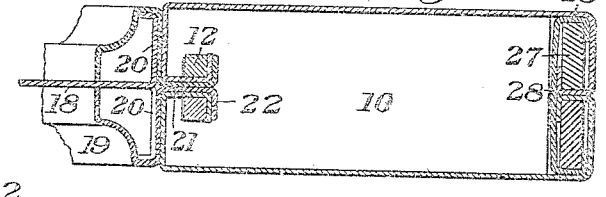


Fig. 9.



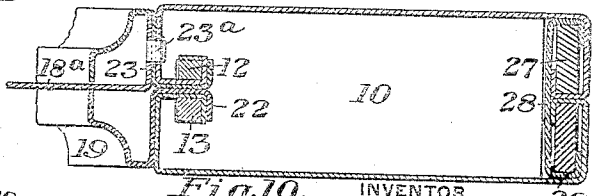


Fig. 10.

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4 SHEETS—SHEET 3.

Fig. 11.

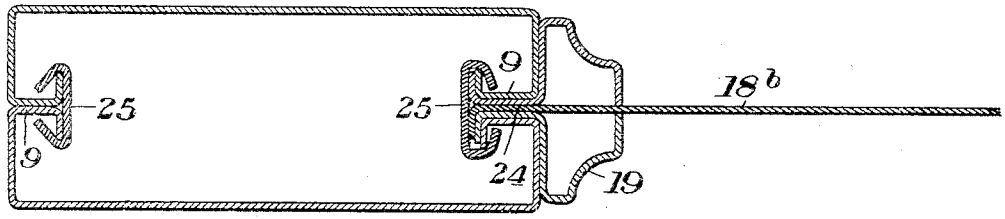
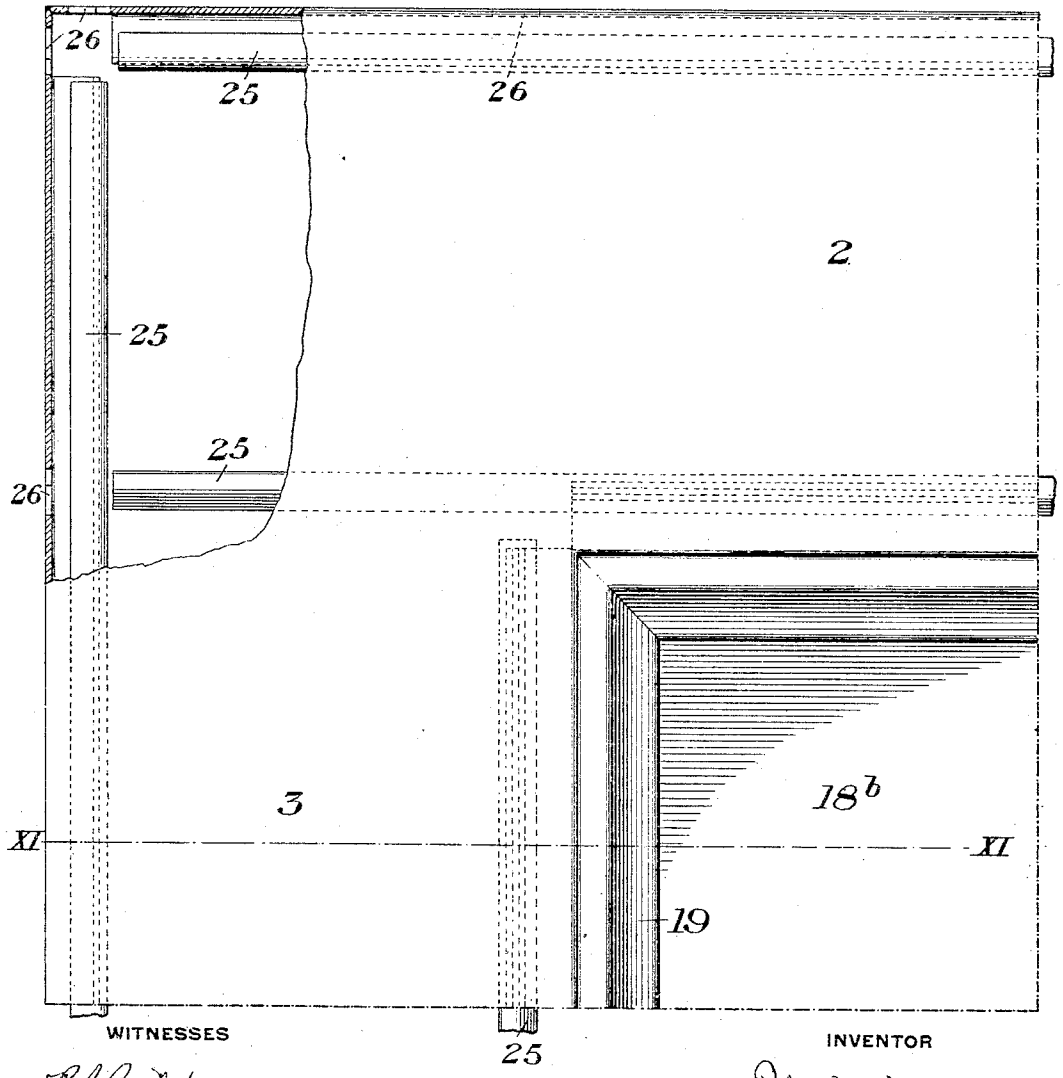


Fig. 12.



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4 SHEETS—SHEET 4.

Fig. 13.

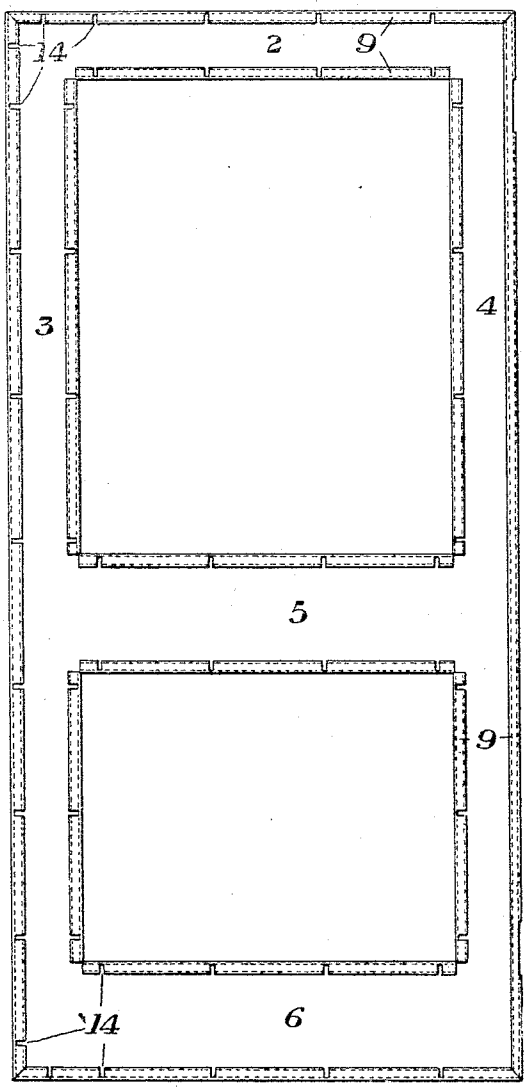


Fig. 14.

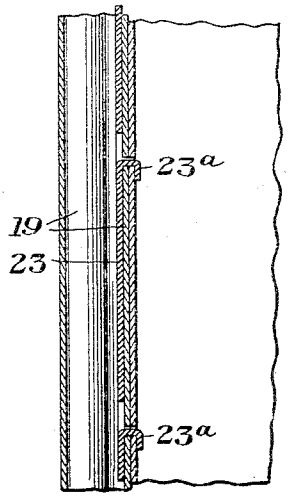
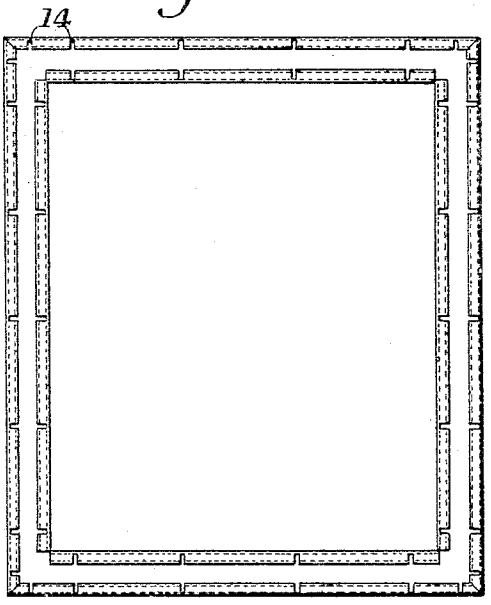


Fig. 15



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UNITED STATES PATENT OFFICE.

PETER M. WEGE, OF YOUNGSTOWN, OHIO, ASSIGNOR TO THE GENERAL FIREPROOFING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF OHIO.

METAL STRUCTURE.

956,536. Specification of Letters Patent. **Patented May 3, 1910.**

Application filed March 11, 1908. Serial No. 420,377.

To all whom it may concern:

Be it known that I, PETER M. WEGE, of Youngstown, in the county of Mahoning and State of Ohio, have invented a new and useful Improvement in Metal Structures, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation partly in section of a door embodying my invention; Fig. 2 is a horizontal section of the door partly broken away; Fig. 3 is a vertical section of the same on the line III—III of Fig. 2; Fig. 4 is a partial view of the blank showing the cut-outs for the spacers, and indicating by dotted lines the lines on which the blank is bent; Figs. 5 and 6 are detail views of the keys; Fig. 7 is a detail view of one of the spacers; Fig. 8 is a sectional view through the upper rail, showing a modified form of the panel with a molding applied thereto; Fig. 9 is a sectional detail view through one of the vertical rails; Fig. 10 is a similar view showing a modification; Fig. 11 is a section on the line XI—XI of Fig. 12, showing a further modification; Fig. 12 is a front view of the same, partly in section; Fig. 13 is a plan view of the inner side of one of the metal plates constituting one-half of the door frame of Fig. 1; Fig. 14 is a detail view of a portion of the panel plate shown in Fig. 10; and Fig. 15 shows a plan view similar to Fig. 13 of a formed blank constituting one-half of a window sash.

My invention has relation to an improvement in the construction of metallic structures, such as doors, window sashes, and the like.

A distinctive feature of my invention is that it permits of the construction of a door and other articles from two main pieces of metal, in the novel manner hereinafter described and claimed, thereby obviating the necessity of joints on the exposed surfaces of the door or other article. It has been customary heretofore in practice to construct doors, frames, etc., of several separate parts, commonly called stiles and rails, which are fastened together at their junction points; whereas according to my invention the stile and rail portions are contained in a single piece or sheet of metal without the necessity of any joint on either of the two faces of the door or frame, and the stile and rail-forming sections which constitute the structure are united in a novel manner.

According to my invention, the two pieces of metal which are employed to form the body of the door, frame or other device, are brought together in a single seam which I prefer to make at the edges, so that in case of a door, no seam is visible when the door is closed. When the stiles and rail members are made of separate pieces and connected by seams at their junction points, the joints are elements of cost and weakness, since it is extremely difficult to make the joint as strong as the solid metal unless heavy reinforcing parts and rivets are employed. The use of rivets is objectionable, in that they mar the appearance and indicate the metallic character of the device which it is often desirable to conceal by coating and graining it in imitation of wood.

Another important consideration is that metallic bodies formed in accordance with my invention are extremely rigid, being of great strength in proportion to their weight and thus reducing very largely the cost of material. This reduction of material is also of advantage, since in many cases, particularly with doors, it is desired to have as little weight as possible.

Another important feature of my invention is that it provides a construction which is adapted to resist the action of heat and retard the spread of fire. To this end the parts are so assembled that the structure will not warp or spread open at the seams when subjected to great heat.

The precise nature of my invention will be best understood by reference to the accompanying drawings, in which I have illustrated its application to the construction of doors, and which will now be described, it being promised, however, that various changes may be made in the details without departing from the spirit and scope of the invention as defined in the appended claims.

In these drawings, the numeral 2 designates the top stile of a door, 3 and 4 the side rails, 5 the middle stile, and 6 the bottom stile.

7 is the upper panel, and 8 the lower panel.

In accordance with my invention, the

entire exterior door structure, with the exception of the two panels 7 and 8 is made from two plates or sheets of metal, which are pressed or otherwise shaped into channel or trough form, each constituting one-half of the structure, as clearly shown in Fig. 13. The marginal portions of each sheet are bent inwardly to form the L-shaped flanges 9, which abut each other under the stiles or rails, as shown. Placed within the hollow stiles and rails thus formed at suitable intervals, are the reinforcing and key plates 10, which are formed with slots or openings 11 being adjacent to the inwardly bent L-shaped flanges which are slitted or cut away to receive the plates.

12 and 13 designate locking bars or keys, which secure the two parts of the structure together, these bars or keys being driven both longitudinally and transversely through the several rails or stiles and through the slots 11 of the plates 10 at opposite sides of the abutted L-shaped flanges 9, as clearly shown in the drawings. Thus, by reference to Figs. 1 and 2, it will be seen that two of these locking bars or keys are driven through each vertical rail at both the inner and outer edges thereof, while two similar but shorter keys are driven transversely through the top, middle, and bottom stiles. The keys 12 are formed with the beveled portions 12^a, which as clearly shown in Fig. 3, engage with the walls of the slots 11 with a wedging action to thereby draw and hold the two members of the structure closely together. 10^a designate short reinforcements which further connect and strengthen the construction at the upper and lower forward corner portions thereof.

Fig. 4 shows a view of a portion of a blank from which one of the members of the structure is made, the dotted lines indicating the lines on which the blank is bent, and the slits or cuts shown at 14 being the slits or cuts for the plates 10.

Each of the panels 7 and 8, in the form shown in Figs. 1 and 2, is also composed of two plates bent into trough or channel form, with their lips or flanges 15 turned outwardly and into hooked engagement with bent edges 16 of the securing plates 17 which fit against the inner faces of the adjacent stiles or rails, with their inner edges turned inwardly between the L-shaped flanges 9, as clearly shown in Fig. 2. When the keys 12 and 13 are driven in place, these securing plates 17 are firmly clamped between the L-shaped flanges 9 and the panel plates are thereby securely held. The members 17 may be made to form beads or moldings.

In the modification shown in Fig. 8, the panel 18 consists of a single plate having its edge portions extending into a hollow molding 19, the edges being split and turned in opposite directions to form the flanges 20, which fit within the molding. The molding is formed of two similar pieces of sheet metal bent to a desired form, with their outer edges bent at right angles and brought together between the L-shaped flanges 9 of the main door sections, as shown at 21, the edge portions thereof being bent outwardly behind the short members of the flanges 9 as shown at 22.

Fig. 8 shows the manner of connecting the panels and the molding to the upper stile, its connection with the middle stile, and with the bottom stile, in the case of the lower panel, being made in a similar manner.

Fig. 9 shows the manner of connecting the central panel and molding to the vertical rails, being in all respects similar to the manner of connecting them to the stiles.

Fig. 10 shows a further modification in which the edges of the panel 18^a instead of being cut and bent in both directions, are bent in one direction only, as shown at 23, with a securing lip 23^a (Fig. 14) which extends into the adjacent rail or stile.

In the modification shown in Figs. 11 and 12, the inner edge of the single panel plate 18^b is carried through the molding into the interior of the adjacent rails or stiles, passing between the inwardly extending portions of the molding and between the L-shaped flanges of the main sections, as shown at 24. In the modification shown in these figures, the spacing and key plates 10 are omitted, and instead of using key-rods or bars of the form shown in Figs 5 and 6, the parts are secured by the key members 25 in the form of sleeves, consisting of pieces of metal having their edge portions bent around to engage over the short members of the L-shaped flanges, as clearly shown in Fig. 11, these keys being inserted through openings 26 at the edge portions of the structure. In order to provide the hinge edge of the door with a reinforcement to enable it to carry these hinges, the key members at its side may be made larger and of the form shown at 27 in Figs. 2, 9 and 10, with the interior reinforcing strips 28 having the bent edge portions 29 which are engaged by these keys. These keys materially reinforce the hinge-carrying edge of the door.

In assembling the parts which compose, for instance, a door, I prefer to first lay on the floor or other support the formed blank which constitutes one-half of the structure (see Fig. 13) with its inner surface up. For convenience, this blank may be termed the under member of the structure, and the other and complementary formed blank, the upper member. I next place in position in the under member the several key and reinforcing plates 10 and insert the

keys which engage them in this member. I also lay in place the panel and molding pieces preparatory to placing the upper member in place. This upper member is now laid upon the under member, and the remaining keys are driven in, suitable apertures similar to the apertures 26 above referred to being provided at the edges of the structure through which they are driven. The keys which engage the intermediate rails between the panels must, of course, be driven first, being drifted into their final positions shown in Fig. 1; since if the keys in the stiles were driven first, they would obstruct the driving of the first-named keys. The rail keys may, however, be cut in two and one-half driven from each end edge of the structure, but this is not so desirable. The particular mode of assembling is not essential, and will naturally vary with different structures, but is given only as an illustration of a method by which the parts may be conveniently and quickly brought together. The apertures at the edges of the structure through which the keys are inserted and driven may be closed when the structure has been assembled, either by plugging and soldering, or in any other known manner.

The application of my invention to the construction of door and window frames, window sashes, partitions and various other articles will be taken from the foregoing. In each case the article is formed from two metallic plates or sheets having their edge portions bent in the manner shown and secured by locking members or keys engaging the flanges formed by the bending, panels between the rails or stiles being used or not, according to the nature of the structure.

In Fig. 15 I have shown one of the members or shaped blanks 31 which would constitute one-half of a window frame constructed in accordance with by invention.

While I have shown the abutted inturned flanges of the sections as being of L-shape, this is not essential, since the short lips of these flanges can be omitted when keys such as shown in Figs. 1 to 10 are employed. The term "abutted" as used herein and in the claims is intended to apply to cases in which these flanges are not only in actual abutting contact, but also in those cases in which they are separated by an intervening portion of either the panel or the molding. It will also be obvious that if, for any reason, either from the size of the parts, or otherwise, it is desirable to make the complete structure in sections, this may be done, the sections being constructed in accordance with my invention and joined in any suitable manner. I prefer, however, wherever possible, to avoid this. It will also be understood that while, in some structures, such as doors, it is extremely desirable to form the joints at the edges, these joints may be formed at other places.

The key plates 10 materially strengthen and stiffen the structure, being shaped in each case to fit snugly within the complementary main sections. Where the keys are made to form reinforcements, as shown at the hinge edge of the door-structure of Fig. 2, these plates may be shortened to terminate adjacent to the reinforcing keys, as shown in said figure. Said plates may be entirely dispensed with, but their use is preferable.

The hollow rails or stiles together with the hollow panels, where panels formed of double plates are use, may be left unfilled as shown, or they may be filled with any suitable heat-resisting material.

The moldings at the edges of the panels may be of any desired form; and various other changes may be made in the details of construction and arrangement without departing from the spirit and scope of my invention, since

What I claim is:—

1. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile members, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets together, said key members extending vertically of the stiles and horizontally of the rails, and some of said members being extended into the corners of the structure so as to be common to both the rails and the stiles; substantially as described.

2. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile portions, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets together, said key members extending vertically of the stiles and horizontally of the rails, and some of the vertical key members extending substantially the full thickness of the interior of the structure to form a solid reinforcement for an edge of the structure; substantially as described.

3. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile portions, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets

together, said key members extending vertically of the stiles and horizontally of the rails, and some of said keys having wedge portions within the structure, together with members which are engaged by said portions to lock the keys; substantially as described.

4. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile portions, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets together, said key members extending vertically of the stiles and horizontally of the rails, and some of said members being extended into the corners of the structure so as to be common to both the rails and the stiles, together with moldings having portions extending into the structure and also secured by the keys; substantially as described.

5. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile portions, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets together, said key members extending vertically of the stiles and horizontally of the rails, the keys at the outer edges of the structure being extended into the corners of the structure to substantially meet each other; substantially as described.

6. A metallic structure, consisting of two metal plates or sheets shaped into trough form and abutted to form hollow rails and stiles with abutted interior flange portions, spacing and key plates within the hollow stiles and rails and having slots therein, and key members driven through the slots of the said plates upon opposite sides of the abutted flange portions; substantially as described.

7. A metallic structure, consisting of two metal plates or sheets shaped into trough form and abutted to form hollow rails and stiles with abutted interior flange portions, spacing and key plates within the hollow stiles and rails and having slots therein, and key members driven through the slots of the said plates upon opposite sides of the abutted flange portions, one key of each pair having cam or wedge portions substantially as described.

8. A metallic structure composed of two sheets or plates fitted together with their joints at the edges of the structure, and forming a frame composed of hollow rails and stiles, the meeting portions of the two plates having abutted L-shaped flanges extending within the interiors of the rails and stiles, and key members extending vertically and transversely through the rails and stiles and having a locking engagement with said flange portions; together with spacing members within the hollow rails and stiles and having apertures for the keys, substantially as described.

9. A metallic structure consisting of two metal plates or sheets shaped and fitted together to form a frame having hollow stiles and rails, the meeting edges of the two plates being extended inwardly into the interiors of the rails and stiles in the form of flanges, and key members engaging said flanges, one set of key members extending vertically within the vertical rails and stiles, and another set of key members extending horizontally through the horizontal rails and stiles; together with spacing members within the hollow rails and stiles and having apertures for the keys, substantially as described.

10. A metallic frame structure, composed of two abutted, complementary, plates or sheets having rail and stile portions, and constituting the entire frame structure, said plates or sheets having inturned flanges at the edges of each of the rail and stile portions, and key members driven through the rail and stile members and engaging said flanges to secure the two plates or sheets together, said key members extending vertically of the stiles and horizontally of the rails, and some of said members being extended into the corners of the structure so as to be common to both the rails and the stiles, together with moldings having portions extending into the structure and also secured by the keys, and panel members extending into the moldings; substantially as described.

11. In a sheet-metal structure, the combination with two complementary side portions with edge portions flanged to abut each other, a key engaging the flanges thereof to fasten the parts together, a panel having a bent edge, and a molding engaging the bent edge of the panel and securing it in place; substantially as described.

12. In a sheet-metal structure, the combination with the frame composed of the abutted complementary flanged plates, of molding strips having each an edge flange engaging and secured to the said plates, and a panel having flanged edge portions secured within the molding strips; substantially as described.

13. In a sheet-metal structure, the combination with two complementary plates fitted together to form a hollow frame, and having flanged edges secured to each other within the frame, a molding strip having an edge portion engaged by the flanged edges of the

said plates, reinforcing and key plates within the hollow frame, and key members passing through said plates and engaging said flanged edges to secure the parts together; substantially as described.

14. A metallic door frame composed of two metal plates or sheets of complemental form shaped and fitted together to form the entire frame of the door, including the side rails and upper, lower and middle stiles, and means entirely contained within the interior of the rails and stiles which engage and unite the said plates or sheets; substantially as described.

15. A metallic door frame composed of two metal plates or sheets of complemental form shaped and fitted together to form the entire frame of the door, including the side rails and upper, lower and middle stiles, and means entirely contained within the interior of the rails and stiles which engage and unite the said plates or sheets, the joints between the said plates or sheets being at the edges of the structure, and the securing means forming reinforcements for such edges; substantially as described.

16. In a metallic structure of the character described, the combination with complementary shaped blanks or sections having abutting interior flanges, and together forming a complete frame structure having hollow stile and rail members, spacing plates within the stile and rail members, and key members engaging said flanges and securing the blanks or sections together, said key members also engaging the spacing plates; substantially as described.

In testimony whereof, I have hereunto set my hand.

PETER M. WEGE.

Witnesses:
H. E. WHITE,
H. R. GLENN.