W. L. CONWELL.

METALLIC DOOR WITH INTERLOCKING PARTS.

APPLICATION FILED DEC. 4, 1914.

1,270,014.

Patented June 18, 1918.

2 SHEETS—SHEET 1.

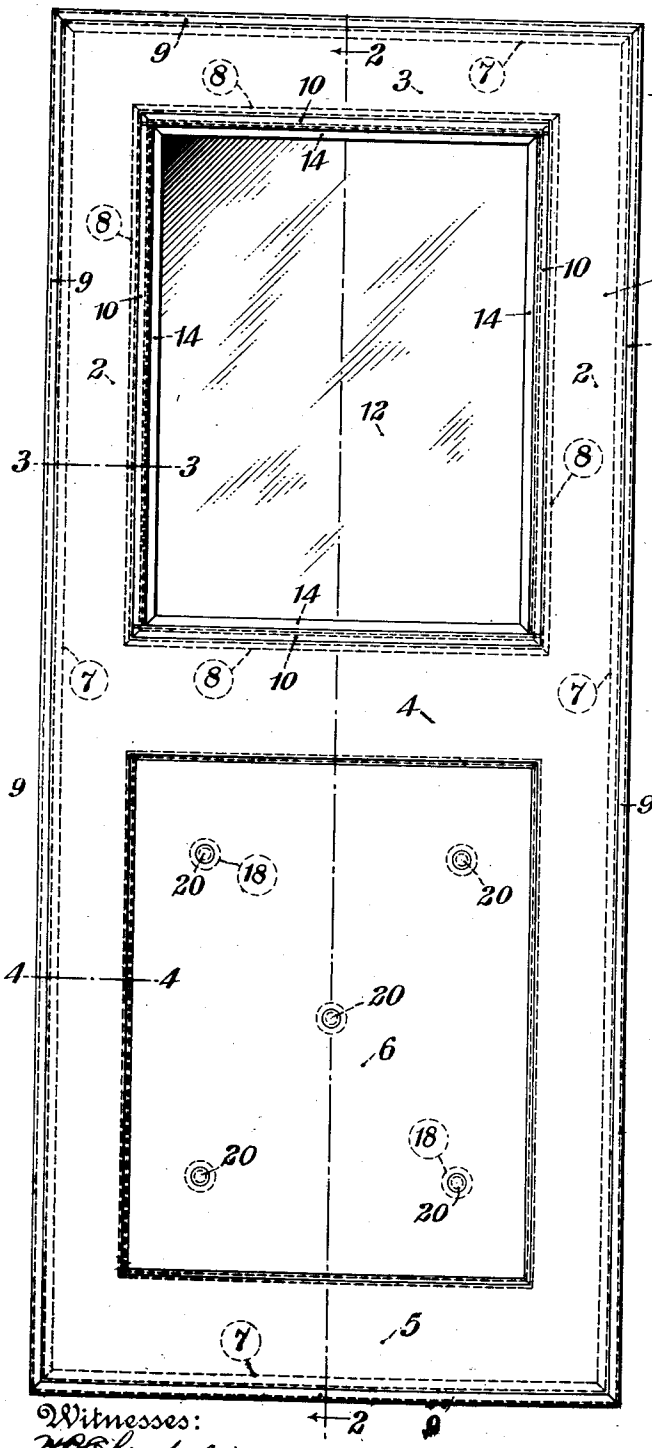


Fig. 1.

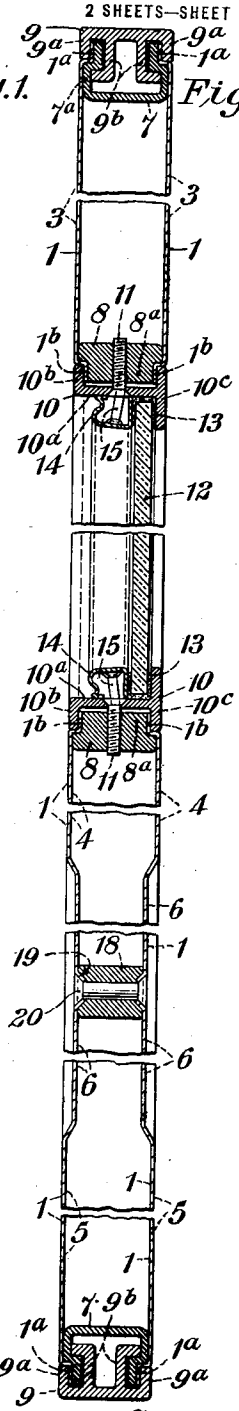


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

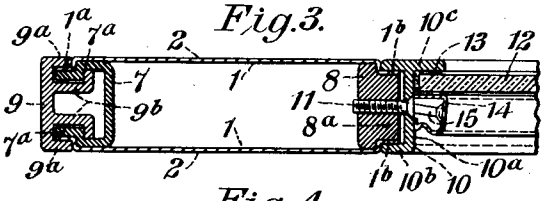


Fig. 4.

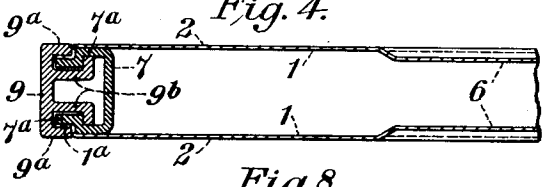


Fig. 8.

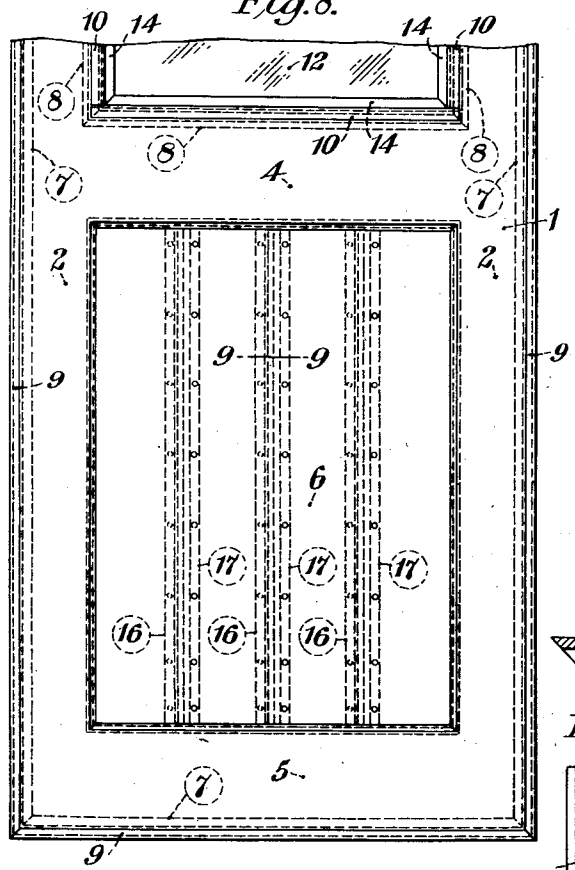


Fig. 9.

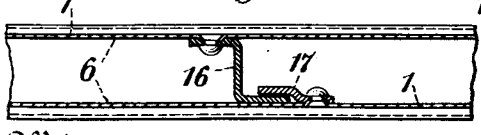


Fig. 10.

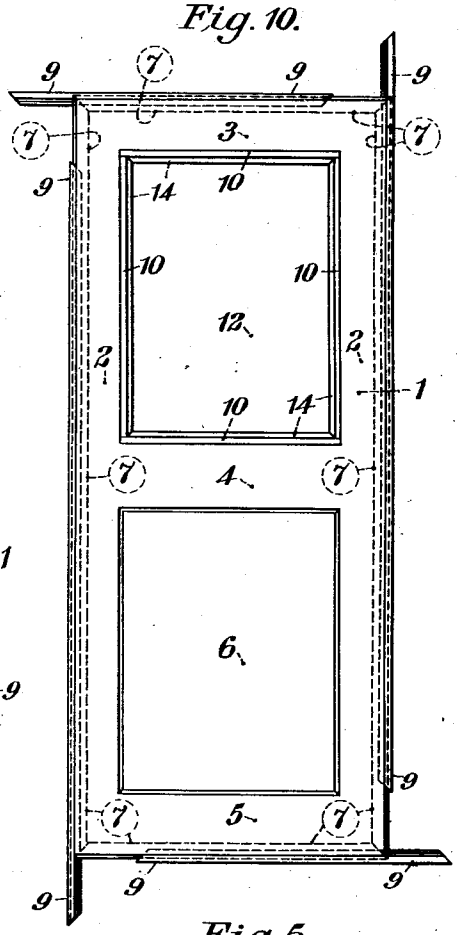


Fig. 5.

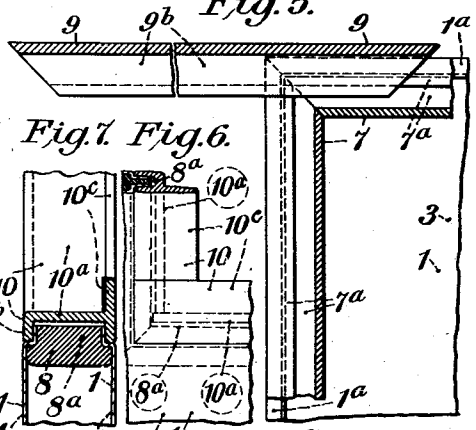


Fig. 7. Fig. 6.

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UNITED STATES PATENT OFFICE.

WALTER L. CONWELL, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO ELLCON COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METALLIC DOOR WITH INTERLOCKING PARTS.

1,270,014. Specification of Letters Patent. Patented June 18, 1918.

Application filed December 4, 1914. Serial No. 875,485.

To all whom it may concern:

Be it known that I, WALTER L. CONWELL, residing at Montclair, New Jersey, and being a citizen of the United States, have invented certain new and useful Improvements in Metallic Doors with Interlocking Parts, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art. In said drawings:—

Figure 1 is a side elevation of my improved door.

Fig. 2 is an enlarged transverse vertical section thereof, taken on line 2—2 of Fig. 1, parts being broken away.

Fig. 3 is a horizontal section through one of the stile portions, and is taken on line 3—3 of Fig. 1.

Fig. 4 is a similar view, but is taken on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary sectional view of one of the corner portions of the door, showing the application of one of the finishing strips.

Fig. 6 is a fragmentary detail view of a corner of the panel opening frame, illustrating the relation of the frame members.

Fig. 7 is a transverse section of the structure shown in Fig. 6.

Fig. 8 is a side elevation of the lower part of a door containing the preferred panel reinforcement means.

Fig. 9 is an enlarged horizontal section, taken on line 9—9 of Fig. 8; and

Fig. 10 is a diagrammatic view of the door, more fully illustrating the application of the finishing strips.

This invention pertains to metallic doors, and it has for an object the creation of a structure of this character which shall possess but few and relatively simple parts.

It is also an object to so construct the parts that they may be susceptible to easy assembling, and, when finally grouped be interlocked against separation. A large reduction in the number of screws and rivets for combining the parts of the door is also an advantage derived.

Another object is to form certain parts of the door from extruded metal, thereby avoiding the bending of portions of these elements in giving to them their required shapes, and hence the consequent weakening of the metal from strains resulting from bending stresses.

A further object is the introduction into the door of substantiality and rigidity, partially obtained through outlining frames and reinforcements, and partly through the relationship of the parts.

Other advantages becoming manifest hereinafter are, of course, to be understood as coming within the scope of this invention.

Referring to the drawings, 1 represents door side sheets having panel openings and being pressed to simulate the characteristic parts of a door, as stiles 2, top rail 3, intermediate rail 4, bottom rail 5 and lower simulated panel 6.

Side sheets 1 are opposingly spaced from each other by intervening door edge-outlining and panel opening-outlining frames, and are preferably conterminous therewith, the former frame comprising strips 7 and the latter frame strips 8.

Strips 7 are shown as being channel-shaped and provided with Z-shaped flanges 7^a, the outer borders of which are depressed or less widely spaced from each other, while panel frame strips 8 are illustrated as being solid, but having substantially the same external contour as door edge frame strips 7. Panel frame strips 8 thus have depressed portions 8^a, which are inwardly directed. Both the strips 7 and strips 8 are composed, by choice, of extruded metal.

The edges of the door sheets 1, which form the outlining borders of the sheets themselves and of the panel openings they contain, are in the form of depressed flanges 1^a along the sheet boundaries, and 1^b about the panel opening borders, there being shoulders connecting said flanges with the contiguous raised portions of said sheets 1. As shown, said depressed flanges, the shoulders, and the contiguous raised portions of sheets 1, conform to and contact with the Z-shaped flanges 7^a of strips 7 and the corresponding sides of strips 8. The flanges of said sheets

are preferably welded to the depressed portions of the flanges 7^a of said door edge frame strips and the sides of said panel-opening frame strips, 7 and 8, respectively. Thus, said strips, which are mitered or otherwise fitted, are bound together by side sheets 1, which in turn are connected by the frames comprising said strips.

Interlocking with each of the channel strips 7 of the door edge frame is a finishing strip 9 of extruded metal. Said finishing strips 9 each comprise a channel-shaped portion having outer side flanges 9^a and a spaced pair of inner flanged ribs 9^b integral with said channel-shaped portion of the finishing strip, and spaced from and parallel to said outer side flanges 9^a.

In the finishing strips 9, the outer side flanges 9^a, inner flanged ribs 9^b and those segments of the web of the channel-shaped portion of said strips which connect the side flanges 9^a with flanged ribs 9^b, are arranged to form telescopic guideways on opposite sides of each finishing strip 9.

The flanges of inner ribs 9^b are outturned, and so spaced from the edges of side flanges 9^a as to form longitudinal slits in the sides of finishing strips 9, which slits communicate with said guideways.

When the door parts are in normal relation the outer portions of the Z-shaped flanges 7^a of the door frame channel strips 7 and the conformate flanges 1^a and their adjacent shoulders of the outer bounding edges of side sheets 1, are confined within the telescopic guideways. The outturned flanges of inner ribs 9^b of each finishing strip 9 lap the inwardly extending transverse portions of the Z-shaped flanges 7^a of the associated door frame channel 7, and the internal walls of said guideways envelop said outer portions of Z-shaped flanges 7^a and the side sheet flanges 1^a, and the contiguous shoulders of the latter are abutted by the slit-forming edges of outer side flanges 9^a. The finishing strips 9 are thus interlocked with their respective channel members 7 of the door edge-outlining frame.

Figs. 5 and 10 disclose the method of applying the finishing strips 9 to their respective door edge frame strips 7. At each pair of opposite door edges, an endwise insertion of the inner angular-shaped ribs 9^b of finishing strips 9 is made into the interior of their respective channel-shaped door edge frame strips 7, the interlocking relation previously described, and shown in the various sectional views of the drawings, then existing between said finishing strips 9 and door frame strips 7 throughout the extent of the insertions.

At opposite door edges, such insertions are made in opposite directions, and finishing strips 9 are then pushed along their respective channel-shaped door edge frame strips 7, moving, as it were, about a circuit, one after the other.

Each end of each finishing strip 9 is beveled to form a miter surface, and ultimately each strip 9 will contact with an adjacent strip 9. When finishing strips 9 do this, and a little in advance of their assumption of their final positions, the adjacent beveled ends, or end surfaces of said finishing strips 9 will be alined in diagonal planes.

Thereafter, the inclined planes constituting the beveled ends of the strips can be made to ride one upon the next adjacent, until all of the finishing strips 9 are in the mitered relation shown in Figs. 1 and 8, and said strips will then be interlocked against withdrawal in any direction.

The panel-opening outlining frame comprising the solid strips 8 is supplemented by a panel-holding frame comprising frame-forming strips 10 of extruded metal and they are shown as being J-shaped in cross section. When the panel-holding frame is assembled, the J-shaped strips 10 are preferrably arranged as shown in Fig. 1, enlarged detail views of the corners being illustrated in Figs. 6 and 7.

In this mode of fitting, the upper and lower horizontal J-shaped strips 10 of the panel-holding frame extend entirely across the panel opening delineated by solid strips 8, while the vertically disposed J-shaped strips extend from said lower horizontal J-shaped strip 10 to the upper horizontal J-shaped strip.

The web portions 10^a of the upper and lower horizontal J-shaped strips 10 are coped or cut out to accommodate the inwardly facing depressed portions 8^a of the solid panel-opening strips 8, as shown in Fig. 6, and the webs 10^a and single flanges 10^b of the vertically disposed J-shaped strips 10 contact at opposite ends with the uncut portions of the web 10^a of said upper and lower J-shaped strips 10.

The double flanges 10^c of the vertically arranged J-shaped strips 10 are cut away to have their ends lie against the inwardly directed edges of the double flanges 10^c of the horizontally extending J-shaped strips.

With this arrangement, the upper and lower horizontal J-shaped strips 10 are put into place, and the vertically disposed J-shaped strips 10 pushed in between them and find a support upon the web portion 10^a of the lower horizontal J-shaped strip. The end portions of the web 10^a of the upper horizontal J-shaped strip 10 rest upon the upper ends of the webs 10^a of the vertically disposed J-shaped strips.

All of the strips thus form a substantial panel-holding frame having flanges which interlock with the depressed inwardly extending portions 8^a of the solid strips 8 of the panel opening-outlining frame. In the

form shown in the drawings, said J-shaped strip flanges 10^b and 10^c actually contact with the panel border flanges 1^b of side sheets 1, but the essential interlock is between the panel-opening frame and the outwardly extending flanges 10^b and 10^c of the panel-holding frame, it being conceivable that in some instances said side sheet flanges 1^b may not be interposed. Screws 11 are usually, but not necessarily, employed to bind the J-shaped strips 10 to the solid panel-opening frame strips 8.

Within the panel-holding frame comprising the J-shaped strips is a removable panel 12, which may often be transparent or translucent in character, and is usually protected by cushioning strips 13. Panel-retaining strips 14, being, by choice, pressings shaped in the form of molding, constitute a retaining frame for said removable panel 12.

Each combined retaining and molding strip 14 is provided with slightly inclined frusto-conical sockets, adapted to receive the heads of screws 15, which screws pass obliquely through the J-shaped strips 10 of the panel-holding frame and into the solid strips 8 of the panel-opening frame. The obliquity of the axes of the screws 15 obviously causes the retaining strips 14 to bind the removable panel 12 firmly in place.

That the lower part of the door, or any part insufficiently braced, may have proper rigidity and strength, reinforcements are provided, preferably of the form shown in Fig. 8. Each of these reinforcements comprises a Z-shaped strip 16, one flange of which is secured by rivets or welding to one of side sheets 1 and a co-acting strip 17 secured to the other side sheet 1 and having a portion bent into a parallel inner plane and directed toward the Z-shaped strip 16.

Said inbent portion of strip 17 and the side sheet portion from which it is spaced form a longitudinal socket adapted to receive the unfastened flange of Z-shaped strip 16, which partakes of the nature of a longitudinal tongue. The connection between strips 16 and 17 is made on opposite sliding of the side sheets when they are being opposingly positioned, and before said side sheets 1 and the door edge and panel edge outlining frames are connected into the equivalent of a unitary structure.

Another form of reinforcements is shown in Figs. 1 and 2, and comprises a plurality of cylinders 18 having cylindrical bores terminating in frusto-conical depressions. In this instance, the side sheets 1 have inwardly drifted frusto-conical sockets 19, adapted to contain the heads of rivets 20, passing through the bores of cylinders.

It is evident that I have devised a door largely free from dependency upon screws and rivets, and which has numerous interlocked parts. Also the constructing of the principal frame portions from extruded metal adds very materially to the strength of these members, and as this metal is preferably an aluminum alloy, the door is quite light and contains non-corrosive properties, particularly as the pressed parts may be of aluminum sheet.

Having now described my invention, what I claim is:

1. In a metallic door, spaced door side sheets having panel openings and depressed borders adjacent the door edges and the panel openings, said borders being parallel with stile and rail faces of the opposite door sides, door edge and panel opening outlining frames of metal free from bending strains and comprising members narrower in cross section between said depressed side sheet borders, strips lapping and embracing said depressed sheet borders and the narrower portions of said frame members, and a removable panel.

2. In a metallic door, spaced and opposed door side sheets, a door edge outlining frame comprising strips connecting said side sheets, and finishing strips interlocking with and slidable longitudinally of said frame strips and formed to ultimately interlock with themselves, said finishing strips having isolated guideways at opposite sides thereof with entrances from the door sides through which edge portions of said frame strips and side sheets pass to be interlockingly enveloped by the guideway walls.

3. In a metallic door, spaced and opposed door side sheets having border flanges, a door edge-outlining frame of extruded metal interposed therebetween comprising channel-shaped strips connecting and connected by said side sheets, the flanges of each channel strip having internal and external interlock walls, and slidable finishing strips of extruded metal with interlock flanges and guideways adapted to interlock transversely with said channel-shaped strip interlock walls and side sheet flanges, said finishing strips having beveled ends and each being slidable longitudinally of one of said channel-shaped strips to ultimately miter with an adjacent finishing strip, all of said finishing strips thereupon interlocking with each other against longitudinal movement.

4. In a metallic door, opposing door side sheets having inset borders parallel with stile and rail faces of the opposite door sides and extending about panel openings in said opposing side sheets, a panel opening-outlining frame comprising strips maintaining said inset side sheet borders widely separated from each other and having partially inset sides in continuous contact with said side sheets, a panel-holding frame comprising other strips each flange in opposite di-

rections to receive said panel-opening frame and to form panel abutments, means uniting both frames and a removable panel.

5. In a metallic door, opposed side sheets forming registering panel openings, a panel opening-outlining frame spacing said sheets, said frame comprising solid strips spaced from the door edge, a separate panel-holding frame comprising other strips of practically J-shaped cross section forming a channel which receives said solid strips substantially throughout their lengths, the flange representing the normal top of each J forming a panel abutment, means affixing said J-shaped strips to said solid strips, a removable panel, cushioning means therefor positioned by the abutment flanges, a retaining frame comprising strips and means coöperating with said solid strips to draw said retaining strips toward said panel.

6. In a metallic door, a door edge-outlining frame comprising channel-shaped strips having outwardly directed flanges with internal and external interlock walls, a panel opening outlining frame comprising solid strips with partially inset side portions, door side sheets with registering panel openings connected and conforming to opposite sides of said door edge and panel opening outlining frames and connecting the strips thereof, slidable finishing strips for the door edge frame having interlock flanges and guideways adapted to interlock transversely with said channel-shaped strips and door sheets and longitudinally with each other, a panel-holding frame comprehending strips connected to and transversely interlocking with said panel opening frame solid strips, a removable panel in the holding-frame, and a molding frame secured to retain said panel.

7. In a metallic door, a door edge outlining frame of extruded metal comprising channel-shaped strips having outwardly directed flanges with internal and external interlock walls, a panel-opening outlining frame of extruded metal comprising fitted strips, door side sheets of corrosion-resisting material with registering panel openings, said sheets being connected and conforming to opposite sides of said door edge and panel opening outlining frames and connecting the strips thereof, slidable finishing strips of extruded metal for the door edge channel strips having interlock flanges and guideways adapted to interlock transversely with said channel strips and side sheets and longitudinally with each other, a panel-holding frame of extruded metal comprehending strips connected to and transversely interlocking with said panel-opening frame, a removable panel in the holding frame, and a panel retaining molding frame of corrosion-resisting material positioned within said holding frame.

8. In a metallic door, an open channel door edge-outlining frame having flanges partially inset to form external and internal shoulders intermediate their width, door side sheets on opposite sides of said frame provided with borders conformate with the outer faces of said flanges and slidable interlocking finishing strips each comprising a door edge-forming portion and external and internal flanges, the former bearing against said conformate side sheet borders and the latter having portions engaging the internal shoulders of said door edge frame flanges.

9. In a metallic door, a solid panel opening outlining frame having stepped sides whereby said frame has portions of wider and narrower widths, opposing door side sheets suitably connected near the door edges and having panel openings the side sheet borders about which follow the stepped sides of said panel opening frame, the most closely approaching portions of said borders of the opposing side sheets being separated for nearly the thickness of the door by said panel opening frame, a panel-holding frame into which the portions of said panel opening-outlining frame which are of narrower width project, a panel and retaining means therefor.

10. In a metallic door, opposing door side sheets suitably connected near the door edges and forming panel openings, a panel opening frame extending between and preventing relatively close approach of the opposed side sheets near the panel openings, said frame being narrower near said openings, a panel-holding frame comprising portions forming a channel into which the narrower portions of said panel opening frame project and portions forming abutments for a panel, a panel and retaining means therefor.

11. In a metallic door, a panel opening frame narrower in some portions than in other portions, door side sheets secured thereto and suitably connected near the door edges, a panel-holding frame comprising separate strips each comprising a web-portion and flanges near opposite edges thereof extending in the same direction on one side of said web to embrace said side sheets and narrower panel opening frame portions, the flanges near one edge extending in an opposing direction to form panel abutments, means securing said strips to said panel opening frame, a panel and retaining means therefor.

12. In a metallic door, a panel opening frame narrower in cross section about its inner perimeter, door side sheets suitably connected near the door edges and inclosing panel openings, a panel-holding frame of substantially J-shaped cross-section between flanges of which the narrower portion of said panel opening frame projects, the panel opening borders of said side sheets lying be-

tween opposing faces of said panel opening and panel-holding frames, said panel holding frame also forming a panel abutment, a panel, a panel-retaining frame and means for securing the same in place.

13. In a metallic door, a panel opening frame and a panel holding frame one inset into the other and the latter frame having a panel abutment, opposing door side sheets suitably connected at their outer borders and sandwiched between said frames to be there relatively widely spaced from each other, means for drawing said frames one within the other, a panel in said holding frame, adjacent said abutment, a panel-retaining frame within the latter frame and securing means therefor.

14. In a metallic door, a panel opening frame, a panel-holding frame comprising strips slidable over receiving portions of said panel opening frame and provided with panel abutment portions, door side sheets suitably connected at their outer borders and having panel opening borders sandwiched between said frame and strips, means for drawing said strips to said panel-opening frame, a panel in the panel-holding frame adjacent said abutment, a panel-retaining frame and means securing the same in place.

15. In a metallic door, a door edge-outlining frame of channel formation having outwardly directed flanges inset intermediate their widths to form internal and external interlock walls, door side sheets on opposite sides of said frame having outer borders paralleling said flanges, and slidable finishing strips each comprising a door edge portion and internal and external flanges shaped to form guideways for portions of said door edge frame flanges and side sheet borders and to interlock with said interlock walls.

16. In a metallic door, a channel-shaped door edge-outlining frame having outwardly directed flanges provided with transversely extending intermediate portions and inset borders, door side sheets on opposite sides of said frame having transverse portions and inset borders, and slidable finishing strips each comprising a door edge portion and internal and external flanges shaped to form guideways, said transverse portions of said door edge frame flanges and door side sheets extending from the exterior of said finishing strip and interlocking with the flanges thereof and said inset borders being retained in said guideways.

17. In a metallic door, finishing strips shaped to form internal guideways and provided with slits communicating therewith from the exterior, a door edge-outlining frame and door side sheets connected to opposite sides of said frame, said frame and side sheets having portions exteriorly of said finishing strips and other portions passing between the walls of said slits, interlocking therewith and extending into and being retained in said guideways.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WALTER L. CONWELL.

Witnesses:
H. B. CHAMBERLAIN,
JOSEPH C. DUNI.