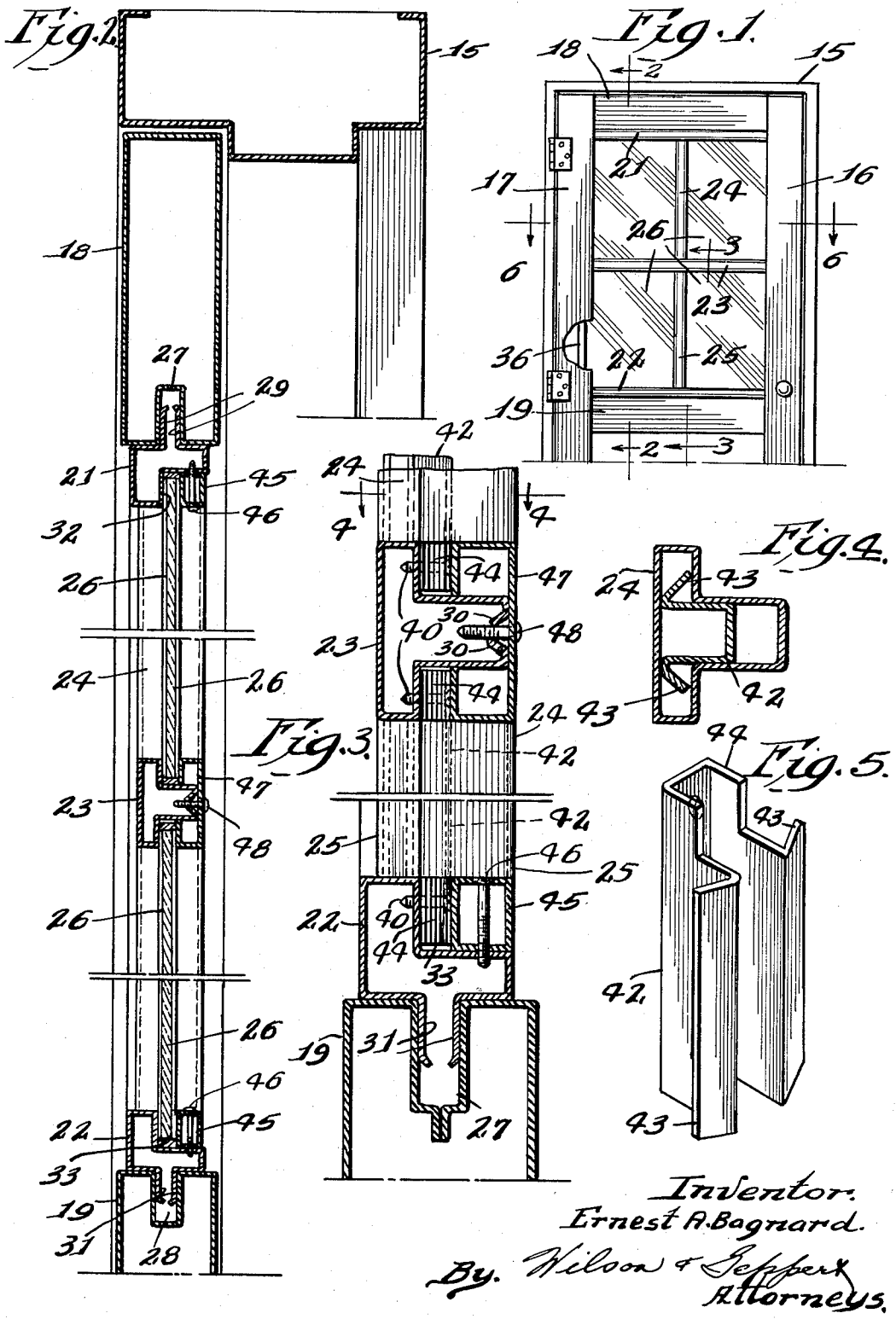
May 29, 1956 E. A. BAGNARD 2,747,705

REVERSIBLE METAL DOORS

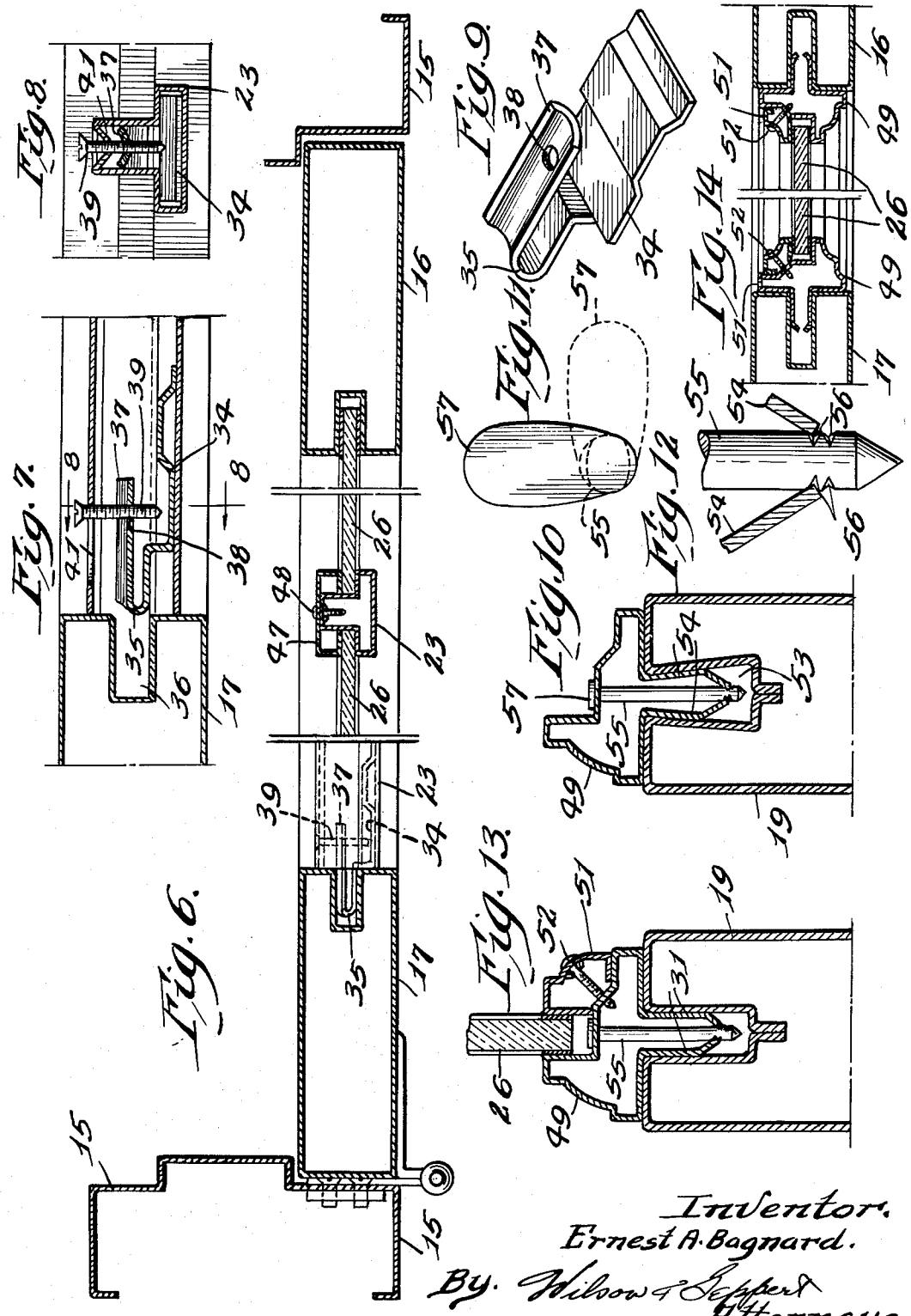
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REVERSIBLE METAL DOORS

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Fig. 16.

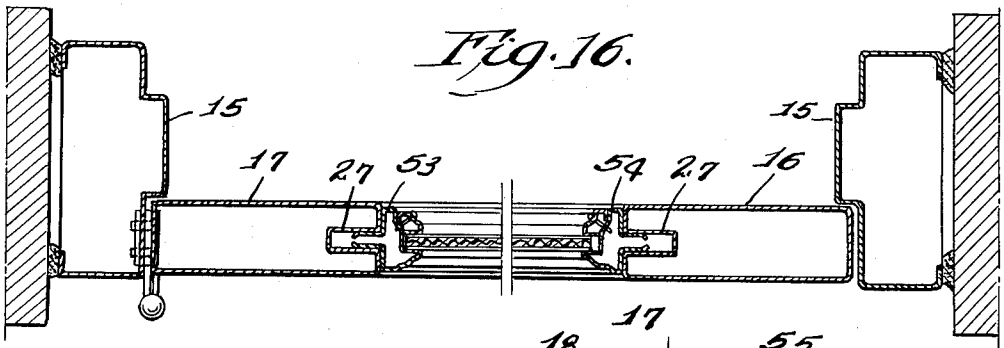
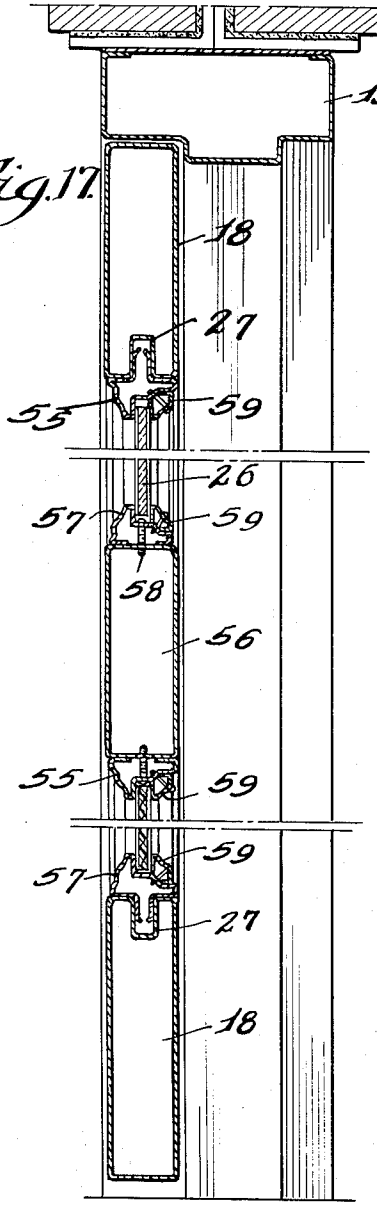


Fig. 17.



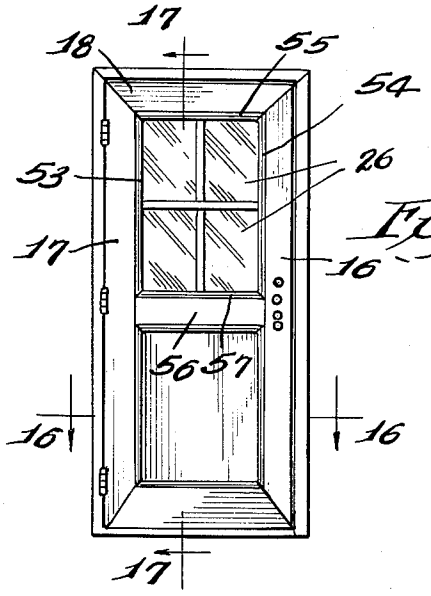
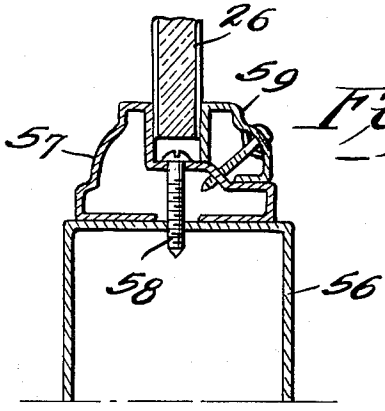


Fig. 15.

Fig. 18.



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REVERSIBLE METAL DOORS

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Application October 18, 1952, Serial No. 315,555

7 Claims. (Cl. 189—46)

This invention relates to metal doors and particularly to doors the center panels of which are made of glass, fiberboard or other preferred sheet material.

In metal doors of this character as made prior to my invention, the center panel is held in position in the frame between opposed glazing beads or stops, one of which is formed integral with the frame on one face of the door and the other of which is removable and held in position by screws or the like on the other face of the door. The removable bead or stop must, of course, be located on the inner face of the door where access to it cannot be had by intruders. Since the glazing stop which is integral with the door frame on one face of the door is formed during the fabrication of the door, the door consequently becomes identified before shipment as a right-hand swing in or left-hand swing out door, or as a left-hand swing in or right-hand swing out door. Unless thus mounted with the permanent integral glazing stop on the outside, the removable glazing stops, if disposed on the outer face of the door, will be accessible for unauthorized removal to afford illegal entry through the door.

It will be apparent, therefore, that since neither a distributor nor a dealer can anticipate whether demand will be predominantly for right-hand or left-hand swing in or swing out doors, they are obliged either to stock both types in substantial numbers, many of which will inevitably constitute stagnant inventory, or to have their requirements for each customer made to order. The latter alternative, which is at present the customary practice, results in prolonged and vexatious delays in delivery.

The primary purpose of my present invention is to provide a standard metal door which may be warehoused and stocked in quantities and sold to be hung and used as either a right or a left-hand swing door without exposing the removable glazing stops on the outer face of the door. To this end the panel structure including the panel proper is reversible in the frame, thereby enabling the removable glazing stops to be disposed on the inside face of the door irrespective of whether the door be hung as a right-hand or a left-hand swing door.

A more specific object is to provide a door in which the glazing stops, instead of being mounted on the frame of the door, are mounted on a detachable molding which can be removed from and reversed in the frame.

A further object is the provision of molding strips or members which may be readily detached from and reversed relatively to the door frame in which the reversible panel is carried.

A still further object is to provide a reversible panel structure, the principles of which may be employed in connection with the different types of metal doors known respectively as "industrial" doors and "hollow metal" doors, thereby enabling both types to be made in standard form and equipped with reversible panel structures.

When the reversible panel structure comprises a plurality of panes or panel members with interposed muntin bars, my invention contemplates the provision of novel means for detachably securing the removable muntin

bars in position, thereby enabling their removal and reversal in the door.

Another feature of my invention resides in the provision of novel means for detachably securing the vertical muntin bars to the horizontal muntin bar and to the detachable molding so that they may be readily detached and reassembled.

Still another feature of my invention resides in the provision of means for locking the detachable molding to the door frame so that the molding will be securely held in assembled relation to the frame.

Other objects and inherent advantages of my invention will be better appreciated as the same becomes further understood by reference to the following description when considered in connection with the accompanying drawings.

Referring to the drawings,

Figure 1 is a fragmentary elevation of an industrial door embodying my invention hung as a left-hand swing out door and as viewed from the outside;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of a muntin bar locking member;

Fig. 6 is a horizontal sectional view on the line 6—6 of Fig. 1;

Fig. 7 is an enlarged detail of a horizontal muntin bar locking clip;

Fig. 8 is a sectional view on the line 8—8 of Fig. 7;

Fig. 9 is a perspective view of the clip shown in Figs. 7 and 8;

Fig. 10 is a fragmentary sectional view of one form of molding lock;

Fig. 11 is a detail plan view of the locking pin;

Fig. 12 is a fragmentary enlarged view of the locking end of the pin;

Fig. 13 is a view similar to Fig. 10 of a modified form of lock;

Fig. 14 is a fragmentary sectional view of another modified form of reversible panel structure;

Fig. 15 is an elevation viewed from the outside, of a hollow metal door hung as a left-hand swing out door;

Fig. 16 is a cross-sectional view on the line 16—16 of Fig. 15;

Fig. 17 is a vertical sectional view on the line 17—17 of Fig. 15; and

Fig. 18 is an enlarged fragmentary sectional view showing the mounting of the center rail molding.

Referring to the drawings more in detail and more particularly to sheet 1, reference character 15 indicates generally a hollow metal doorway frame in which is hinged an "industrial" door embodying my invention. The door, in this instance, is hinged at the left side and is known as a left-hand swing out door. It comprises the front upright stile 16, the rear upright stile 17, the top rail 18, a center rail 19 and a bottom rail (not shown).

Within the door frame formed by the stiles and the connecting cross rails is mounted the detachable and reversible panel structure comprising the upper and lower molding strips or members 21 and 22, the transverse muntin bar 23, the upper and lower muntin bars 24 and 25, respectively, and the glass panels designated collectively by reference character 26.

By reference to Fig. 2, it will be observed that the upper cross-rail 18 is shaped to provide a longitudinally extending downwardly opening groove 27, and similarly the cross-rail 19 is shaped to provide an upwardly opening groove 28. These grooves are designed to receive the resilient legs 29 and 31 of the molding strips 21 and 22, respectively, whereby these strips are detachably con-

nected to and carried by their respective cross-rails **18** and **19**. The moldings **21** and **22** are shaped, as will be apparent from Fig. 2, to provide an abutment or shoulder **32** and **33**, respectively, against which the upper and lower margins of the outer faces of glass or other preferred material panels **26** abut when the panels are in assembled position.

The transverse muntin bar **23** which is substantially T-shaped in cross section and of hollow metal construction, as shown in Figs. 3 and 8, is provided in the base wall of the T with a longitudinally extending slot having inturned edges **30** to receive and engage a series of glazing stop fastening screws to be later described. This muntin bar is detachably connected to the stiles **16** and **17** of the door by tenons, one at least of which is slidably mounted in the bar in proximity to an end thereof. As shown in Figs. 7, 8, and 9 of the drawings, such tenon consists of a base **34** slidable in the head of the muntin bar and a tenon portion **35** projecting from one end of the base and reversely bent so as to provide a tenon adapted to be projected beyond the end of the muntin bar into the groove **36** of the stile **17**. The free end **37** of the tenon is provided with a tapped opening **38** through which projects a machine screw **39**. This screw extends upwardly through a slot **41** so that its head is accessible for engagement by a screw driver at the inner side of the door. A similar adjustable tenon or a tenon integral with the muntin bar at the opposite end of the bar is detachably engageable with a groove in stile **16** similar to the groove **36** in stile **17**.

When the muntin bar is to be mounted in the door between the stiles, it is placed in approximately the vertical position desired with one tenon engaged in the frame groove, whereupon the adjustable clip or tenon at the other end of the bar is projected longitudinally from the end of the mutin bar into the aligned groove of the stile adapted to receive it. This sliding movement of the tenon or tenons may be effected with a screw driver or a light hammer, the screw **39** being free to move with the tenon longitudinally of the slot **41**. The bar may be accurately positioned by tapping it lightly with a hammer to move it upwardly or downwardly with respect to the stiles, and when properly positioned is locked against movement by threading the screw **39** into the bar which is shaped to accommodate the head of the screw at each side of the slot **41**, as shown in Fig. 8. When the end of the screw engages the base **34** of the tenon, the free end **37** of the tenon is forced away from the base, thus expanding the tenon in the groove of the stile so that its upturned edges are forced into firm engagement with the sides of the groove **36**, thereby locking the muntin bar in its adjusted position.

The panel may consist of one, two or four glass panes. In Fig. 1 a four pane panel is illustrated. In the event a single pane panel is employed, the horizontal and vertical muntin bars are, of course, dispensed with and the panel is mounted by sliding one vertical margin into the groove of one stile until the opposite edge of the panel clears the inner edge of the opposite stile, whereupon the panel may be aligned with the groove in that stile and then shifted laterally into that groove so that both vertical margins are disposed in the stile grooves. The position of a panel extending partially into a stile groove **36** is illustrated in the broken-away fragment in Fig. 1.

When a two pane panel is employed, the horizontal muntin bar **23** is required, which is positioned and locked in the stile grooves by means of the slidable locking tenons **35** previously described. Preferably each end of the muntin bar is equipped with one of these adjustable tenons.

Should a four pane panel, such as is shown in Fig. 1, be desired, the vertical muntin bars **24** and **25** are also necessary. These muntin bars are detachably mounted in position by means of slidable locking members **42** shaped as shown in Figs. 4 and 5 and slidably mounted within the muntin bars **24** and **25**. The wings **43** of the locking members are shaped to frictionally engage the interior of the muntin bar and since they are formed of resilient sheet metal they serve to hold the locking members in longitudinally adjusted position.

In assembling the munting bars in the panel structure, the bars with the members **42** inside are placed in position, whereupon these members are projected longitudinally outwardly beyond the ends of the bars so that one of the channel-shaped ends **44** may be secured by a screw **40** to the muntin bar **23** and the other may be similarly secured to one of the moldings **21** or **22**. The members **42** accordingly serve to detachably connect the vertical muntin bars **24** and **25** to the molding and to the cross muntin bar.

When the removable panel formed by one or more panes is placed in position between the molding strip **21** and the transverse muntin bar **23**, it is locked in position at the top by a glazing stop **45** mounted on the molding **21** by means of screws **46** and its lower edge is similarly held by the glazing stop **47** removably mounted on the muntin bar **23** by means of holding screws **48**, all as illustrated in Fig. 2. Putty or similar sealing material may be employed along the stiles to hold the pane or panes against horizontal movement in the frame.

In the fabrication of these doors the frames consisting of the stiles and cross rails are assembled at the factory, and the panel structure comprising the detachable molding strips, the removable glazing stops and the panels, whether single pane or multiple pane, together with the necessary muntin bars, is packaged separately and assembled on the job in the frame. The door may be assembled to serve as a right-hand or a left-hand swing door at will by assembling the detachable molding strips in the frame so that the abutment shoulder **32** faces toward the inside of the room or building structure, thereby locating the removable glazing stops **45** on the inner face of the door. If the door is to be used in a reverse hand mounting, the detachable molding strips will be assembled in the frame so as to face in the opposite direction. By making the detachable molding strips reversible so that they may be assembled in the frame to face in either direction desired, I am enabled to provide a standard metal door made of standard parts capable of being assembled on the job to meet the requirements both as to hand and swing in every instance.

In the form of construction shown in Figs. 1 and 2, the detachable molding strips **21** and **22** are employed only at the top and bottom of the panel, the side margins of the panel being set into the grooves in the stiles as previously explained. It is possible, however, to employ the detachable moldings at the sides instead of the top and bottom and such use is illustrated in Fig. 14, wherein the detachable molding strips designated by reference character **49** are mounted in the stiles **16** and **17**. The glazing bead stops **51** as well as the molding are shaped somewhat differently from the stops and molding shown in Fig. 2, but the holding function and the removability are the same as the structure shown in Fig. 2. In this instance the screws **52** by which the glazing stops are mounted on the molding are disposed diagonally instead of parallel with the plane of the panel. Similarly shaped moldings are shown in Figs. 10 and 13, and in Fig. 13 the glazing stop **51** is similarly held by diagonally disposed screws **52**.

In order to insure against accidental displacement of the detachable molding during assembly of the structure or before the panel is positioned in the frame, and in order to lend rigidity to the structure, my invention contemplates means for locking the molding to the rail, which is illustrated in Figs. 10–13, inclusive.

Referring to Fig. 10, it will be observed that in this instance the rail, which may be either rail **18** or **19** of Fig. 2, instead of being provided with a groove having parallel side walls like grooves **27** and **28** of Fig. 2, is provided

with a groove 53 having downwardly diverging side walls. The legs 54 of the molding 49 are adapted to be spread to conform to such diverging side walls. For the purpose of spreading them and holding them in spread interlocking relation with the side walls, a pin or locking member 55 is provided which, as shown best in Fig. 12, is provided on opposed sides with grooves or notches 56 near one end. The opposite end is provided with a head 57 of elongated contour by which the pin may be rotated through a quarter turn to bring the notches 56 into engagement with the lower converging ends of the legs 55. This engagement of the ends of the legs in the notches 56 locks the pin 55 in position to hold the legs 54 in locking relation with the diverging walls of the groove 53.

In Fig. 13 the locking pin is shown as employed with a groove having parallel side walls. Of course, the locking effect in this instance is not as great as with the diverging side wall groove of Fig. 10. Nevertheless, the legs of the molding are spread sufficiently to provide a strong friction connection of the molding to the rail.

The "industrial" door which has been thus far described is, as previously stated, designed to employ detachable molding strips only on two opposed sides or ends of the panel opening in the frame. The "hollow metal" door previously mentioned and shown in Figs. 15–18, inclusive, of the drawings contemplates the employment of detachable molding strips entirely around the panel receiving opening in the frame. In this instance, the stiles 16 and 17 and the end rail 18 are provided with grooves 27 for the reception of the legs of the detachable molding strips 53, 54 and 55. The center cross rail 56, however, is not provided with a molding receiving groove, as will be evident from Fig. 18.

The molding strip 57 is detachably mounted on the rail 56 so that it may be removed and reversed, but since provision must be made which will enable this strip to be slid laterally into position, it is retained in position by screws 58. The glazing stop 59 is similar to although not identical in form with the stops previously described.

In mounting the panel in the "hollow metal" door of this type the detachable molding strip 55 is first positioned in top rail 18. The vertical molding strips 53 and 54 are then consecutively connected to their respective stiles by first inserting their mitered upper ends into the space at the mitered ends of the strip 55, whereupon the vertical strips may be swung about their upper ends as the pivot to project the legs of the strips into the stile grooves, thereby attaching the molding strips to the stiles. The center rail strip 57, the ends of which are also mitered as shown, is then slid sideways onto the center rail so that it is disposed in alignment with the molding strips 53, 54 and 55, whereupon it is secured in its required position by means of screws 58. The four strips thereby form a continuous molding for the reception of the panel proper which is then secured in position by the glazing stops in the usual manner.

It will be apparent from the foregoing that I have provided a door having a reversible panel structure comprising one or more panel panes which can be mounted in the frame so as to dispose the glazing bead stops on the inner face of the door, irrespective of whether the door be hung as a right-hand or left-hand swing door. By providing for reversibility, standard reversible doors may be carried in stock and mounted either as a right-hand or left-hand swing door. Considerable expense over stocking both right and left-hand swing doos and a substantial saving in time of delivery are thereby attained.

The structural details illustrated and described may obviously be varied within considerable limits without departing from the essence of my invention as defined in the following claims.

I claim:

1. A door structure including a frame formed of connected members having inwardly opening longitudinally extending grooves, molding members having projecting legs adapted to be frictionally engaged in said grooves for detachably mounting the molding members on the frame members, and locking members for spreading and holding said legs in separated relation against the opposite sides of its groove whereby said molding members are locked to the frame member.

2. A door comprising a frame member having a longitudinally extending groove, a detachable molding member provided with separable legs disposed in said groove, and a locking pin insertable through said molding member between said legs for separating the legs into frictional locking relation with the grooved wall, said pin being provided with notches engageable with the ends of said legs for preventing displacement of the pin.

3. A door including a grooved frame member, a molding member having separable legs extending into the groove of the frame member, and a pin projecting through said molding member between said legs for holding said legs in locking relation with the walls of said groove, said pin being provided on opposite sides near one end with notches engageable by the ends of said legs for preventing withdrawal of the pin and with an elongated head at the opposite end whereby said pin may be rotated to withdraw said notches from engagement with the ends of said legs.

4. A reversible metal door comprising a pre-assembled frame composed of frame members including upright stiles and cross rails permanently joined together and provided with a longitudinally extending and inwardly opening groove, hollow molding members detachably and reversibly mounted within said frame in opposed relation, said molding members each having spaced resilient legs extending into a groove and tensionally engaging the opposite sides of its groove whereby said molding members are removably attached to the adjacent frame members, a panel disposed within said molding members, and detachable glazing stops removably mounted on said molding members for holding said panel in position.

5. A metal door comprising a pre-assembled frame composed of permanently joined members including upright stiles and cross rails provided with an inwardly opening and longitudinally extending groove arranged substantially centrally of said members, a reversible panel and reversible panel holding means detachably mounted in said frame, said panel holding means consisting of a plurality of molding members each shaped to provide a panel engaging abutment shoulder and offset and spaced resilient legs received and detachably and removably engaged in one of said grooves of the frame and a glazing stop removably mounted on said molding member, the panel being removable upon removal of the glazing stops and the molding members being removable upon removal of the panel, said molding members being reversible in said frame to dispose said glazing stops on the opposite side of said frame.

6. A reversible metal door, comprising a pre-assembled frame composed of permanently joined frame members including upright stiles and cross rails of rectangular tubular construction, the inner walls of the frame members being provided with a substantially centrally arranged and longitudinally extending groove, hollow molding members for opposed sides of the frame with each member shaped to provide an abutment shoulder and a plurality of outwardly projecting and spaced resilient legs adapted to project into and its legs expanded against the opposite sides of said groove and thereby be resiliently engaged in its groove, whereby said molding members are reversibly and detachably mounted in said frame members, a panel disposed within said frame in marginal abutting relation with said shoulders and detachable glazing stops removably mounted on said molding members for holding said panel in position.

7. A door comprising a frame consisting of upright and transverse members each provided with an inwardly opening and longitudinally extending groove, a reversible panel assembly consisting of detachable molding mem-

bers, panes and detachable muntin bars, said bars being provided with longitudinally slidable holding members having spaced sides adapted to be projected beyond the ends of the bars and into a groove to hold the bars in position, and means for expanding the sides of one or more of said holding members into locking engagement with the opposite sides of its groove in said frame member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,570,310	Ljungberg et al.	Jan. 19, 1926
1,642,553	Nyman	Sept. 13, 1927
1,917,871	Birt	July 11, 1933
2,267,572	Moynahan	Dec. 23, 1941
2,336,999	Peele	Dec. 14, 1943
2,627,632	Kelly	Feb. 10, 1953