

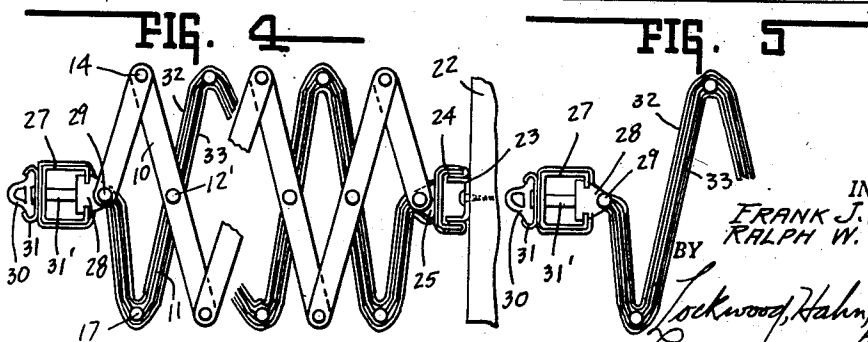
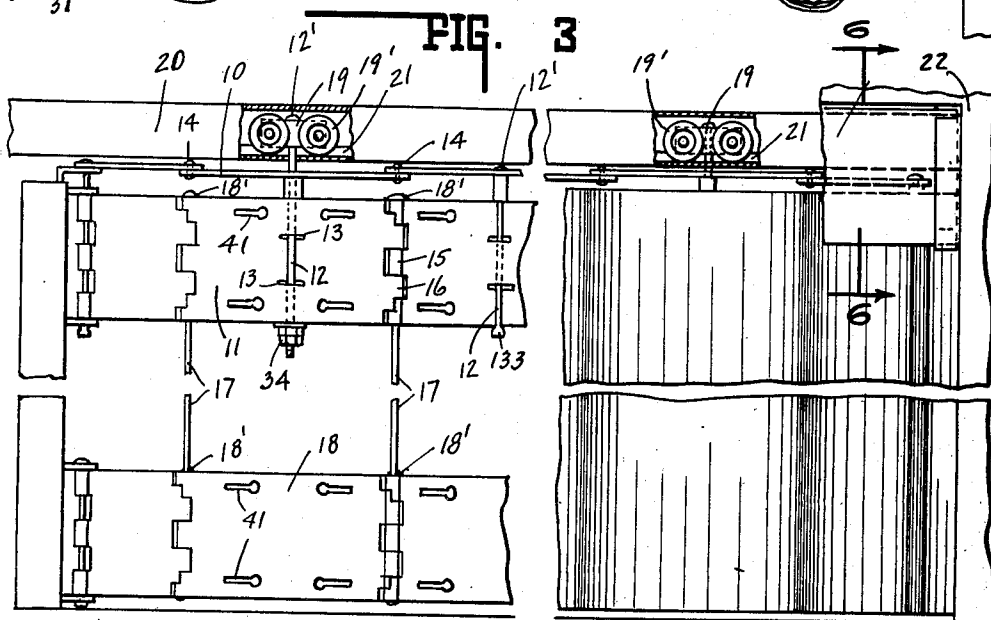
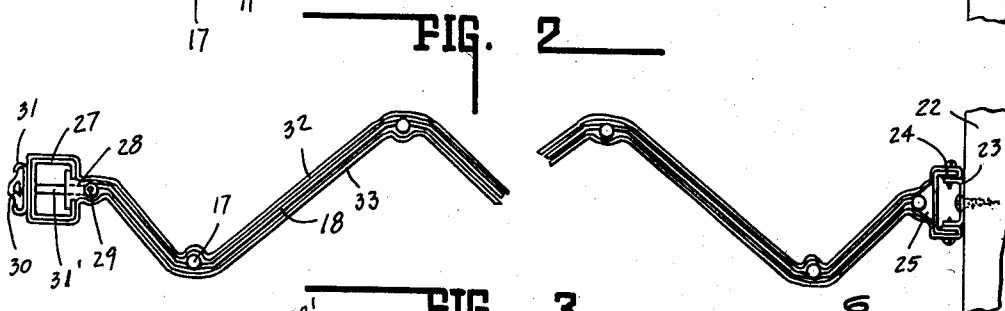
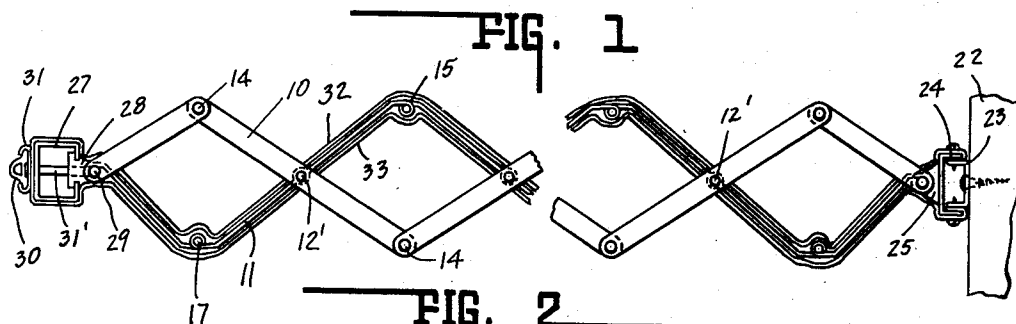
Aug. 18, 1953

F. J. HOKE ET AL
FOLDING DOOR CONSTRUCTION

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2 Sheets-Sheet 1



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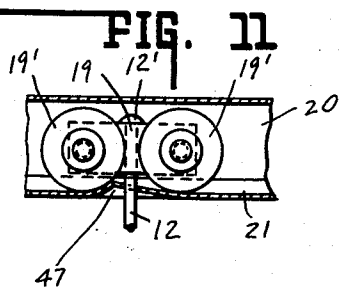
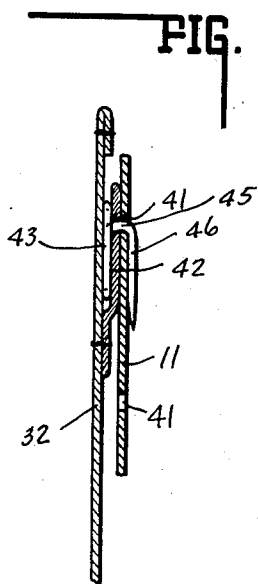
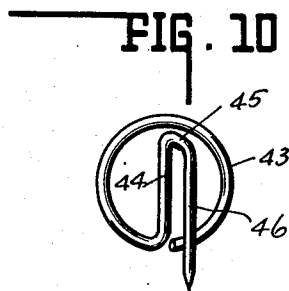
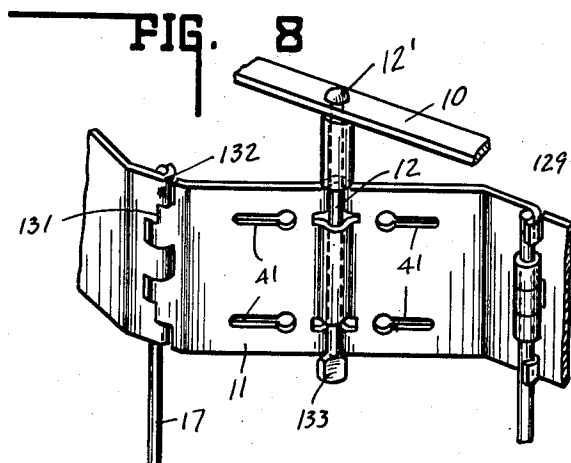
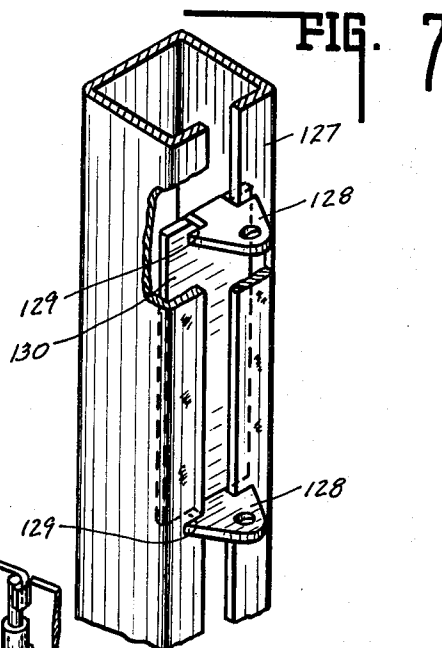
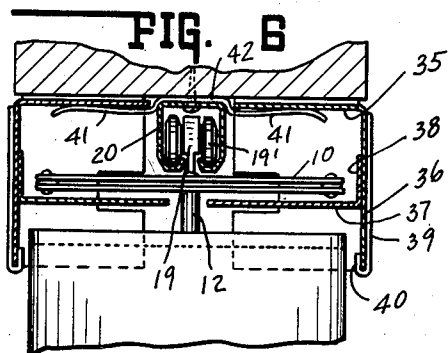
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2 Sheets-Sheet 2



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FOLDING DOOR CONSTRUCTION

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4 Claims. (Cl. 160—35)

1

The present invention relates to a flexible door or closure member particularly of that type which consists of a plurality of articulated leaves or panels adapted to fold upon one another or to be extended from their folded position to provide a closure for an opening.

More specifically the invention relates to that type of closure wherein a lazy tong movement of the panels is provided to permit of the panels to fold upon one another into rather a compact unit when the opening is adapted to be uncovered.

One of the objects of the invention is to provide an extremely light readily assembled structure dispensing with complicated parts and using a minimum of material.

Another object of the invention is to provide means for enclosing the lazy tong structure at the top of the foldable door, and a still further object of the invention is to provide means readily operable for securing the flexible covering to the lazy tong structure.

For the purpose of disclosing the invention an embodiment thereof is shown in the accompanying drawings in which

Fig. 1 is a plan view of a structure embodying our invention.

Fig. 2 is a plan view of the panels forming one of the pairs of lazy tong structure.

Fig. 3 is an elevation of the structure with the covering material partially removed.

Fig. 4 is a plan view similar to Fig. 1 with the closure collapsed.

Fig. 5 is a plan view similar to Fig. 2 with the closure collapsed.

Fig. 6 is a transverse sectional view of the trolley support and its associated track showing in detail the means for securing in position a canopy.

Fig. 7 is a detail perspective partly broken away showing a modification of the end of one of the end members of the door.

Fig. 8 is a detailed view showing more particularly the manner of forming the hinge joints and the manner of preventing the pivot members from vertical displacement.

Fig. 9 is a longitudinal sectional detailed view showing the manner of securing the flexible covering to the supporting plates.

Fig. 10 is an elevation of the securing pin for holding the flexible covering in position.

Fig. 11 is a detailed view showing the manner of maintaining the door section in its closed position or in a position adjacent an opposite door section.

2

In the embodiment of the invention I provide a flexible closure including plurality of pairs of lazy tongs pivotally connected at their mid-section and the adjacent ends of each pair being pivotally connected whereby said closure may be extended and contracted.

In carrying out this structure, referring more particularly to Figs. 1 and 3, each pair of tongs comprises what may be termed a top bar 10 and a panel or plate 11 spaced from and below the respective bars. The pair of tongs are pivotally connected at their mid-section and this pivotal connection may comprise a hanger pin 12 which extends through the mid-section of the bar 10 and tong plate 11.

In order to accommodate this pin 12 in the tong plate 11 the plate is slit transversely as at the points 13 and the sides of the plate are then bent outwardly to provide a pivot receiving opening. There may be any number of pairs of these lazy tongs and each pair is connected to the adjacent pair of lazy tongs, the tong bar 10 being connected to an adjacent tong bar by the pivotal joint 14 and the tong plate 11 being pivotally connected by hinge joints as at 15, these hinge joints comprising interdigitated hinged members as 16 through which extends a pivot or hinge rod 17.

Spaced below the tong bars and plates there is provided a series of hingedly connected lower plates 18, said lower plates being paired with the tong plates 11 respectively to lie in the same plane therewith.

To insure lower plate or plates 18 swinging with their upper paired plates 11 and maintain the same planetary relation therewith, the plates 11 constituting one tong member are rigidly connected to their respective paired plates 18 by spot welding the pivot 17 thereto as indicated at 18'. By this arrangement the paired plates 11 and 18 are caused to move together as a unitary structure when the closure is extended or contracted.

At spaced intervals along the entire structure the pivot members 12 are extended through a carriage 19 having trolley wheels 19', the pivot members being headed as at 12' to prevent downward displacement. The wheels 19 are adapted to travel on and be supported by a channel member 20 having inturned tracks 21. These channel members may be projected from one side member 22 of the opening to be closed by the door and supported thereby in any suitable manner or the channel members may be secured to the top of the opening in any suitable manner.

The side member 22 of the opening also has

fastened on its face channel clip 23 which is adapted to telescopically receive a channel 24. Secured to this channel is a plurality of spaced apart pivot members 25. The opposite or closure member of the lazy tong structure comprises a hollow box-like member 27 which is vertically slotted to receive the hinge clips 28 in which the free ends of the lazy tongs are pivotally connected as at 29. A bumper which may be in the form of a rubber strip 30 is provided on the face of the box-like structure 27 being held in position by strips 31 in turn secured in position by screws 31' or any other suitable manner.

Fabric covers are provided for the structure, which covers are secured over opposite faces of said plates but short of the bars 10 so as not to interfere with the movement thereof. Each of these covers comprises a flexible covering which may be of fabric or any desired material 32 and 33. The ends of the fabric on the free end of the closure member are brought around the box 27 and are returned over the free face of the box structure being glued and held in clamped position by the strips. Similarly at the anchored end of the structure the free ends of the fabric are brought around and glued to the channel 24 then clamped between the channel bars 24 and clips 23.

On those pairs of tongs 11 wherein the pin 12 is extended to be supported from a trolley the lower projecting end of the pin is screw threaded to receive nuts 34 which prevent vertical displacement of the pin relative to the tong plate 11.

In assembly it is, of course, desirable and in fact always necessary to provide some means for covering the top of the articulated door so that lazy tong bars, the trolley track, etc., will be hidden. To this end we provide a canopy which is made in two sections, one being adapted to be positioned on each side of the opening. Each of the sections of this canopy consists of a box-like structure having a top flat plate 35 which is bent downwardly at right angles to form a side plate 36. This side plate extends downwardly to beyond the upper edge of the closure portion of the door. An inner plate 37 having an angular fastening portion 38 projects between the top of the tong plates and the tong bars 10. The portion 38 is preferably welded to the downturned face plate 36.

In those instances where the canopy structures are formed of more than one longitudinal section decorative cover plates 39 are secured on the face of plates 36 where the sections meet to cover the joint. These decorative cover plates are maintained in position by an inwardly and upwardly turned clamping edge 40.

For supporting the canopy in position we provide longitudinally spaced pairs of spring arms 41, the mid-portion 42 of which is shaped to fit over the top of the track 20 and be secured in position with the track member when the same is secured to the top of the opening frame.

These spring arms are disposed at spaced intervals and in order to position each of the canopies it is merely necessary to slip the top plate 35 over the spring arms whereby they will be securely mounted in position although readily removable to permit access to the trolleys and working parts of the upper part of the frame.

In Fig. 7 we have shown a modification of the end member 27. In this structure the end member 127 is slotted as is the end member 27. The pivot member 29 is adapted to be mounted in a pair of pivot lugs 128 which are notched as at

129 and are turned at right angles from and form a part of a supporting plate 130. By this arrangement the supporting plate 130 may be slipped in the member 127 with the notches 129 accommodating the walls of the member 127. After the parts are in position the plates 130 may be secured in any desired manner as by spot welding. This structure makes an assembly which is readily placed in position during construction and which will provide a suitable pivot or hinge support.

In the structure shown in Fig. 8 the hinge joints for the plates 11 are shown with stop notches as at 131 which prevent a complete straightening of the leaves. Furthermore, in order that the pins 17 may be more securely welded to the plates 11 and 18 one finger 132 at least is made sufficiently long to partially wrap around the pin 17 and provide ample spot welding surface at this point.

It is to be noted that in Fig. 3 those pivot pins 12 which are adapted to be supported from the trolley are provided with nuts 34 to prevent vertical displacement. If desired these nuts may be dispensed with and the bottom ends of the pivot pins 12 may be swedged over as at 133 to lock the pins against vertical displacement.

In securing the fabric cover to the plates 11 and 18 it is desirable that this securing means should be blind and at the same time should be of a character which will permit quick application of the securing means in position. To this end the plates 11 and 18 are each provided with vertically spaced apart key hole slots 41. On the under side of each of the fabric coverings 32 and 33 there is provided an attachment strip 42 which is adapted to lie against the plates 11 and 18. For securing this strip in position we provide a securing pin which comprises a circular ring 43 having an intumed bar 44 bent outwardly at 45 to form a shank and then having a portion 46 parallel with the bar, which portion is pointed. This portion 46 provides a pin which may be passed through the securing strip 42 with the pin portion parallel with the shank portion of the keyhole slot so that the pin 46 will pass through the slot and the portion 45 through the opening or hole of the keyhole slot. When this is accomplished by turning the pin 46 at right angles to the keyhole slot the parts are securely locked together.

It is desirable that when the door is closed it should not have a tendency to roll back from the edge of the opening or when two sections are provided from the adjacent edge. Accordingly in the track portion 21 of the track we provide a hump 47 at the end of the travel of the trolley so that at least one wheel of the trolley will ride over this hump and accordingly be prevented from return movement although a slight push in moving the door towards closed position will cause the wheel to ride over the hump.

The invention claimed is:

1. In a flexible closure adapted to be extended and contracted, a lazy tong comprising a series of tong bars hingedly connected to each other at their adjacent ends and a series of depending fabric supporting tong plates hingedly connected to each other at their adjacent ends, said plates being spaced below said bars to prevent interference with the movement of said bars by the fabric supported by said plates, a hanger pin pivotally supporting said plates from said bars mid-way between their respective ends, a series of

5

hingedly connected lower plates corresponding to and spaced below said tong plates paired therewith to lie in the same vertical planes respectively, a common hinge rod extending from the hinge connection of each adjacent tong plate to the hinge connection of each adjacent paired and spaced lower plate, each of said rods being rigidly secured to one tong plate and its paired lower plate to maintain their planetary relation as said closure is extended and contracted, and a fabric covering removably secured over opposite sides of said plates to extend over the space between the tong plates and their paired lower plates.

2. In a flexible closure adapted to be extended and contracted, a lazy tong comprising a series of tong bars hingedly connected to each other at their adjacent ends, a series of depending fabric supporting tong plates hingedly connected to each other at their adjacent ends and a hanger pin pivotally supporting said plates from said bars midway between their respective ends, said plates being spaced below said bars to prevent interference between the movement of said bars and the fabric supported by said plates, a fabric covering removably secured over opposite sides of said plates to extend downwardly therefrom and with the outer edge of said cover terminating in the space intermediate the upper edge of said plates and the lowermost of said bars, a fixed closure frame mounting and supporting track thereon, a trolley wheel carriage operating on said track and connected with said hanger pin, a canopy including oppositely disposed closure sections, each section comprising a horizontal wall positioned above and terminating adjacent opposite sides of said trolley and a vertical wall extending downwardly beyond the upper edge of said fabric covering, means for removably securing the horizontal wall to said closure frame, and a tong bar concealing flange extending inwardly from the vertical wall between the upper edge of the fabric covering and the tong bars to adjacent said hanger pin.

3. In a flexible closure, a series of horizontally disposed tong bars pivotally connected end to end, a series of upper fabric supporting tong plates substantially equal in length with said bars disposed beneath said bars and with their upper edges in spaced parallel relationship with the latter, elongated hanger pins pivotally connecting the medial portions of said tong plates to said tong bars intermediate the ends of the latter, a series of lower plates corresponding

6

in number and size to said tong plates in spaced parallelism and in the same plane with the latter, a common hinge rod connecting adjacent ends of said tong plates and hingedly connecting the corresponding ends of the said lower plates, and each of said hinge rods being rigidly secured to one tong plate and to the corresponding lower plate, whereby the planetary relationship of the tong plates and the lower plates will be maintained when the tong bars have been moved either to extended or retracted positions.

4. In a flexible closure, a series of horizontally disposed tong bars pivotally connected end to end, a series of upper fabric supporting tong plates substantially equal in length with said bars disposed beneath said bars and with their upper edges in spaced parallel relationship with the latter, elongated hanger pins pivotally connecting the medial portions of said tong plates to said tong bars intermediate the ends of the latter, means on said hanger pins interposed between said tong bars and said tong plates to maintain the bars and plates in spaced relationship, a series of lower plates corresponding in number and size to said tong plates in spaced parallelism and in the same plane with the latter, a common hinge rod connecting adjacent ends of said tong plates and hingedly connecting the corresponding ends of the said lower plates, and each of said hinge rods being rigidly secured to one tong plate and to the corresponding lower plate, whereby the planetary relationship of the tong plates and the lower plates will be maintained when the tong bars have been moved either to extended or retracted positions.

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