

May 2, 1933.

T. BRADY

1,907,144

DOOR HANGING EQUIPMENT

Filed June 21, 1930

3 Sheets-Sheet 1

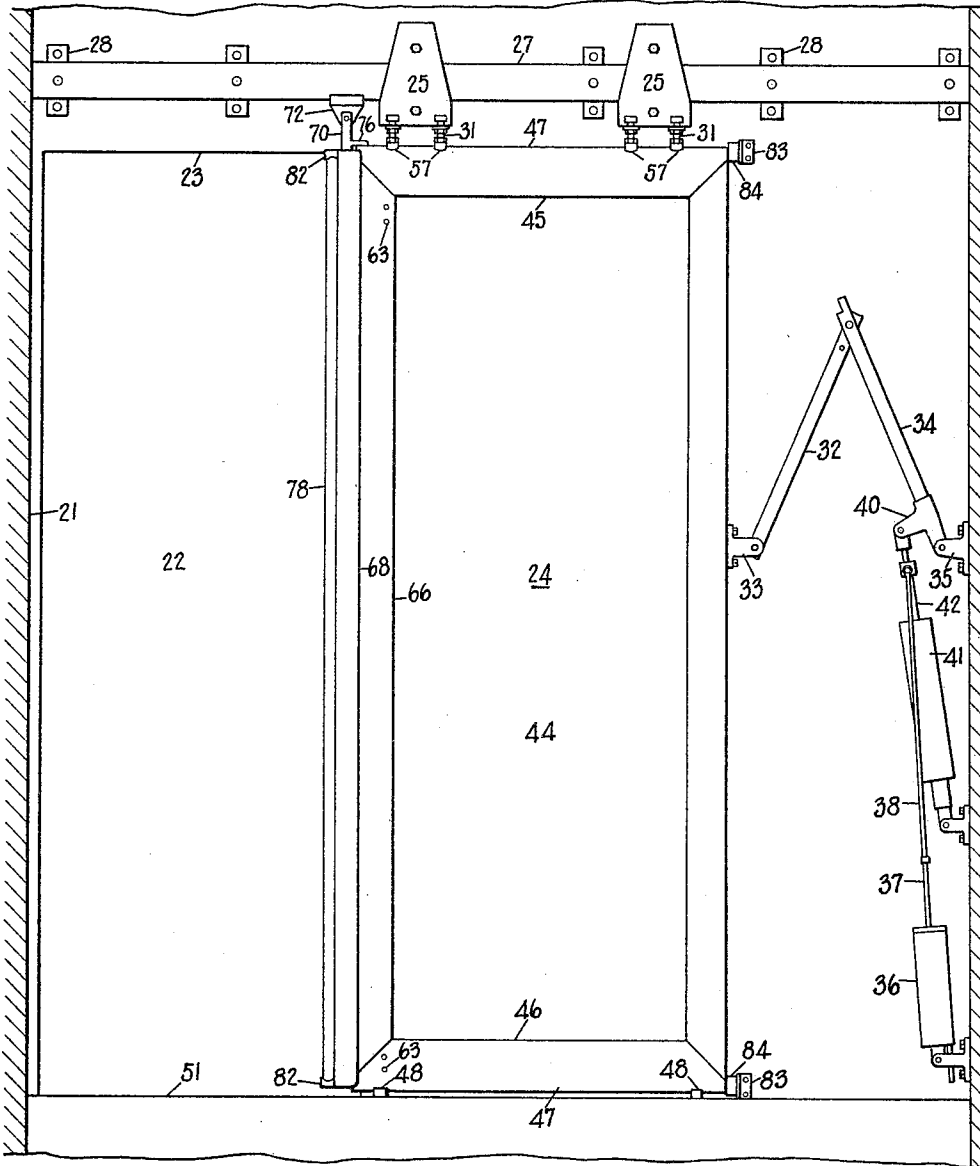


FIG. 1

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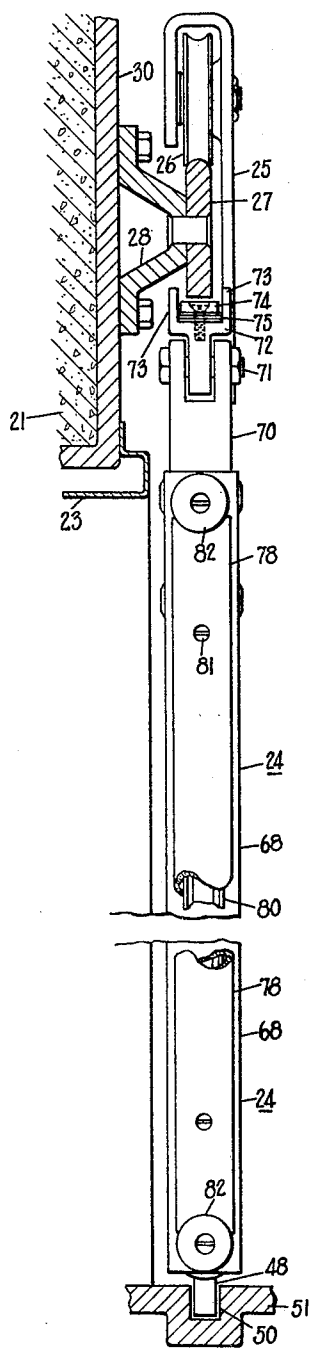
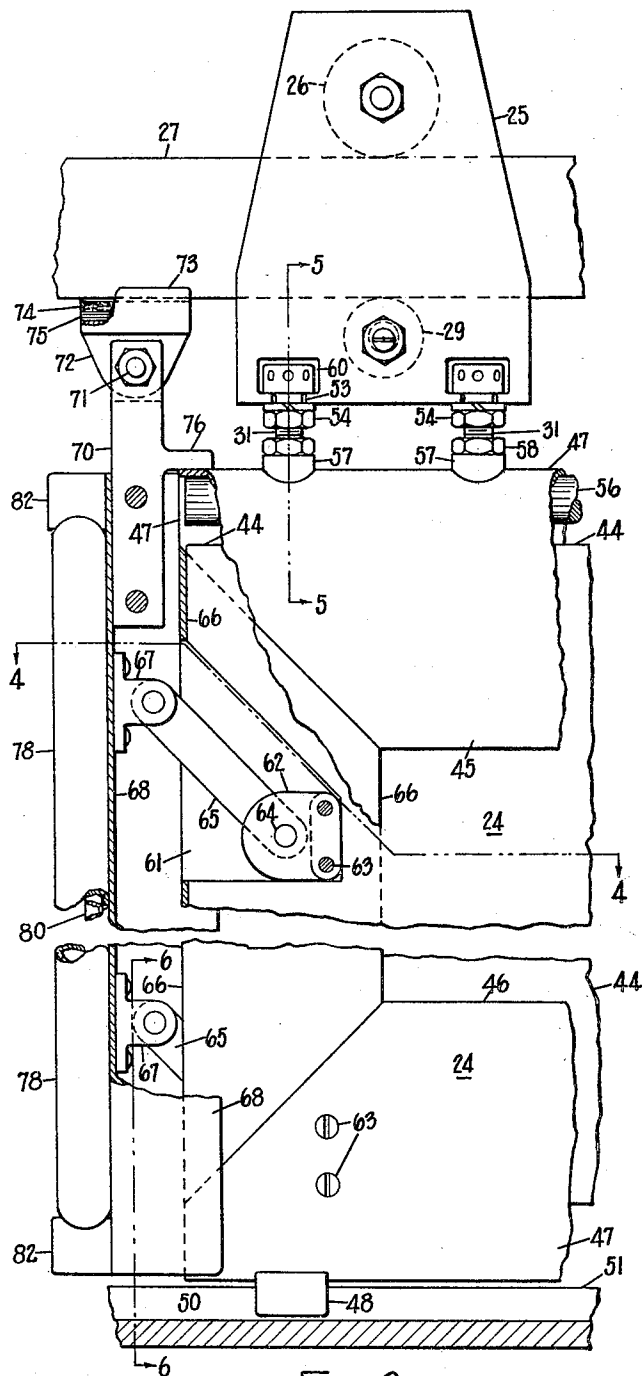


FIG. 3

FIG. 2

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3 Sheets-Sheet 3

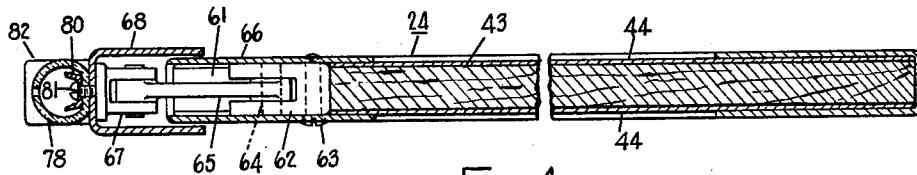


FIG. 4

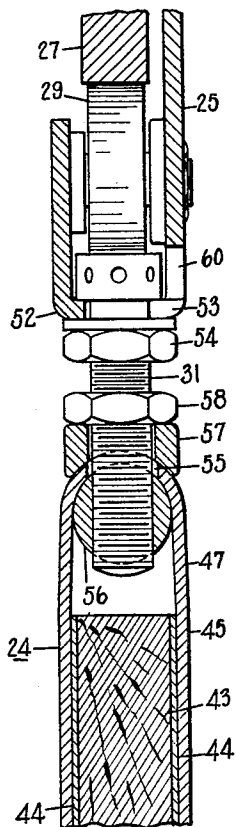


FIG. 5

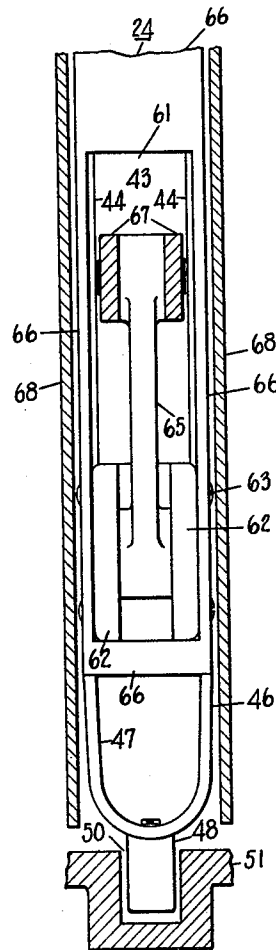


FIG. 6

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DOOR HANGING EQUIPMENT

Application filed June 21, 1930. Serial No. 462,882.

The invention relates to closure means and particularly to closure means for use in elevator installations.

When doors of the sliding type are employed as closures for openings, such as openings affording access to and from an elevator car through the hatchway wall of an elevator installation, it is desirable that the doors may be operated with a minimum of friction. In the event of misalignment between the door guide at the top of the door, from which the door is suspended and on which it is guided at the top, and the supplementary guide for the bottom of the door, it is desirable to compensate for such misalignment in order to lessen friction as the door is moved on its guides to cover and uncover the door opening. The present invention is directed in part to adjustable means for compensating for misalignment of the door guides relatively to each other.

In elevator installations it is desirable in many instances to effect the closing of the hatchway doors as rapidly as is possible in order to avoid unnecessary delay in the operation of the elevator system. Accordingly various types of door operating mechanisms may be employed to effect the automatic closing of the hatchway doors. Such door operating mechanisms in many instances impart a comparatively high closing speed to the door. Because of such rapid movement of the door, and also because the door is frequently of appreciable weight, it is desirable to lessen the possibility of injury to persons who may enter or leave the car during the door closing operation and who may thus become exposed to the danger of being struck by the closing door or being caught between the forward edge of the door and the side of the door casing. The invention is further directed to mechanism for lessening the possibility of injury to persons entering or leaving the elevator car during the door closing operation.

A feature of the present invention resides in adjustably suspending a sliding door from hangers engaging a door track at the top of the door.

A second feature resides in adjusting a

sliding door on a supporting rod, secured to a door hanger which cooperates with a guide track to guide the door, for compensating for misalignment between the guide track and a supplementary guide.

A third feature resides in compensating for misalignment between a guide track for the top of a door and a supplementary guide track for the bottom of the door by adjusting the door on a supporting rod mounted within the door and secured by pendant bolts to a door hanger having guide rollers engaging the guide track.

A fourth feature is the provision of an emergency stop for an automatically closed sliding door to arrest the closing of the door in the event that the door in closing encounters an obstruction, thereby lessening the possibility of injury to persons passing through the door opening and also the possibility of damage to the installation.

Other features and advantages will become apparent from the specification, taken in connection with the accompanying drawings wherein one embodiment of the invention is illustrated.

In the embodiment of the invention to be described the hatchway door comprises a body portion having moldings fitted over the top, bottom and side edges of the door. The top and bottom moldings have hollow portions extending beyond the ends of the body portion of the door. Guide lugs secured to the bottom molding are arranged to cooperate with a guide slot in the door sill for guiding the door at the bottom. A rod mounted within the hollow portion of the top molding supports the door for suspension from pendant bolts secured to hangers which are provided with rollers engaging a guide track on the hatchway wall above the door. The pendant bolts extend freely through openings in the top molding and are connected to the door supporting rod. The door is adjustable on the supporting rod to compensate for misalignment of the door track at the top of the door with the guide slot in the door sill, suitable nuts and washers being provided on the pendant bolts for tightly

connecting the door in its adjusted position to the supporting rod and hanger bolts.

The door is opened and closed through a pair of interconnected toggle levers mounted on the door and hatchway wall respectively. A door opening device and a door closing device are connected to one of the toggle levers and are respectively operable to open and close the door. A yieldable member mounted at the forward edge of the door carries a brake shoe arranged to engage the door track to oppose the action of the door closing device and stop the door in the event the door in closing strikes an obstruction, thereby lessening the possibility of injury to persons entering or leaving the elevator car during the door closing operation and also avoiding damage to the installation. Resilient bumpers are provided at the top and bottom of the door and a resilient buffer element is mounted on the forward edge of the door to lessen the possibility of injury to a person with whose body the door may come in contact during the closing operation.

In the drawings:—

Figure 1 is an elevation of the hatchway side of a door embodying the door supporting and suspension means and the emergency stop mechanism of the present invention;

Figure 2 is a fragmentary elevation, on an enlarged scale, of a hatchway door embodying the door suspension means and the emergency stop mechanism, parts being broken away to illustrate details of construction;

Figure 3 is an end view of the parts as shown in Figure 2;

Figure 4 is an enlarged sectional view, taken along the line 4—4 of Figure 2, showing the arrangement of the emergency stop mechanism on the forward edge of the door;

Figure 5 is an enlarged sectional view, taken along the line 5—5 of Figure 2, showing the arrangement of the pendant bolts and the door supporting rod; and

Figure 6 is a sectional view, taken along the line 6—6 of Figure 2, showing the guides on the bottom molding and the guide slot in the door sill.

Referring to Figures 1, 2 and 3, the numeral 21 designates one wall of an elevator hatchway provided with a door opening 22 for affording access to and from an elevator car in the hatchway when the car is positioned at the landing at which the opening is provided. A door casing 23 is mounted within the opening 22.

A hatchway door, designated as a whole by the numeral 24, is suspended from hangers 25 provided with guide rollers 26 and retainer members 29 for cooperating with a track 27 to guide the door in its movement transversely of the door opening. The track 27 is mounted on supports 28 secured to a plate 30 on the hatchway wall above the door opening and the door 24 is suspended from

the hangers 25 by pendant bolts 31, as will be more fully described hereinafter.

A toggle lever 32 is pivotally mounted on a bracket 33 secured to the rear edge of the door and is connected to a toggle lever 34 pivotally mounted on a bracket 35 fastened to the hatchway wall. The toggle levers assume a straight line position, when the door is closed, to lock the door and prevent opening thereof from the corridor. A fluid pressure operated door opening device 36 is mounted on the hatchway wall and its piston rod 37 is connected by a link 38 to an extension 40 of toggle lever 34. A door closing and checking device 41, which may be of the type described in applicant's prior Patent 1,685,081 issued September 25, 1928, is mounted on the hatchway wall and the piston rod 42 thereof is also connected to the extension of the toggle lever 34. The arrangement is such that energy is stored in a spring within the casing of the device 41 as the door is opened, upon the admission of pressure to the piston cylinder of device 36 to open the door, and the tensioned spring acts, upon releasing the supply of fluid pressure to the device 36, to move the door to closed position.

Referring also to Figures 4, 5 and 6, in the embodiment illustrated the hatchway door comprises a body portion 43 of wood covered on opposite sides with metallic panels 44. Moldings are fitted over the edges of the body portion of the door to provide a rigid and rugged door construction. The moldings at the top and bottom of the door, designated 45 and 46 respectively, are formed with hollow portions 47 extending beyond the body portion of the door. The bottom molding 46 is provided with guide lugs 48 for cooperating with a guide slot 50 in the door sill 51 to guide the door at the bottom.

Inasmuch as the arrangement of each of the pendant bolts 31 for suspending the door from the hangers is the same only the arrangement of a single pendant bolt will be described in detail. Referring to Figures 2 and 5 in particular, the portion 52 of the hanger 25 is provided with a slot 53. The shank of a pendant bolt 31 extends freely through the slot 53, the underside of the head of the bolt resting on the portion 52 at the sides of the slot. The shank of the bolt is threaded to receive a nut 54 for engaging the underside of the portion 52 of the hanger so that the pendant bolt may be secured to the hanger.

The pendant bolt 31 extends freely through an opening 55 in the portion 47 of the top molding 45 and is threaded into a cylindrical rod 56 within the molding for suspending the door from the hanger. The rod 56 is not directly fastened to the door 24 or molding 45 but is freely mounted in the portion 47 of the molding, the underside of the portion 47 of the molding engaging the rod 56 so that

the door is supported on the rod which in turn is suspended from the hanger 25 by the pendant bolt 31. A washer 57, the underside of which conforms to the contour of the molding; and a nut 58 are provided on the pendant bolt, for tightly connecting the door to the rod 56 and thus to the pendant bolt and hanger. An opening 60 is provided in the hanger at the end of the slot 53 to provide clearance for the head of pendant bolt 31 in the event the bolt is secured to the hanger near the end of the slot and also for permitting the door and hanger to be assembled by passing the head of the bolt through the opening 60 and securing the pendant bolt to the hanger by nut 54.

Referring to Figures 2 and 6, the body 43 of the door and panels 44 are cut away near the top and bottom of the forward edge of the door to form pockets 61. A bracket 62 is mounted within each pocket 61, being secured to the side molding 66 by fastening devices 63. Each bracket 62 supports a stud 64 on which a link 65 is pivotally mounted. The links 65 extend through openings formed in the edge of the side molding 66, the openings being in registration with the ends of the pockets. The other end of each link is pivotally connected to a bracket 67 mounted on the base of a channel member 68. Thus, the channel 68 is pivotally supported at the forward edge of the door, the sides of channel 68 overlapping part of the side molding 66. A member 70 is secured to the channel 68 near the top of the door. Member 70 extends beyond channel 68, and also above the top of door 24, and terminates in a bifurcated end supporting a stud 71. A brake shoe 72 mounted on the stud is arranged to cooperate with the underside of the door track 27, as will be described hereafter. The brake shoe is formed with side portions 73 overlapping, but out of contact with, the front and back of the track. A suitable brake lining 74 is secured to the brake shoe within the side portions thereof. Shims 75 may be inserted between the brake lining and the shoe for securing the desired normal clearance between the lining of the brake shoe and the underside of the door track. Member 70 has an extension 76 forming a stop arranged to engage the top of the door for limiting the downward movement of channel 68 and for determining the normal position of the channel.

A resilient member is secured to the channel 68 at the forward edge of the door for lessening the possibility of injury to persons with whose body the door may come in contact during the closing operation of the door. In the embodiment illustrated the resilient member comprises a length of hollow rubber tubing 78 through which a channel 80 extends, fastening devices 81 being provided to secure the tubing to the back of channel 68 carried by the door. Solid rubber bumpers

82 are secured to channel 68 at the top and bottom of the door and are mounted in fitted relation to the tubing 78. Stops 83 provided with resilient bumpers 84 are positioned to be engaged by the rear edge of the door to limit the opening movement of the door.

The door is assembled with the pendant bolt 31, carrying the nuts 54, and 58 and washers 57 thereon, threaded into the rod 56 within the top molding 45. In mounting the door the guide lugs 48 on the bottom of the door are inserted in the guide slot 50 in the door sill 51 and the head of the bolt 31 is inserted through the opening 60 at the end of the slot 53 in the hanger 25. Thus the door, supported by the rod 56, is suspended from the hanger 25. The pendant bolt 31 is adjusted in the rod 56 to raise or lower the door and thus obtain the desired clearance at the bottom of the door. The nut 54 may then be turned into binding contact with the underside of the portion 52 of the hanger, thus securing the pendant bolt to the hanger. The door may be swung, toward or away from the door opening, about the rod 56 to compensate for inaccurate positioning of the door track 27 with relation to the guide slot 50, or vice versa, so that the guide lugs 48 are movable in guide slot 50 to guide the door at the bottom without undue friction. When the desired adjustment of the door on its supporting rod 56 is obtained, the nut 58 is turned to bind the washer 57 against the top of the molding 45, thus fastening the door to the rod 56 and hence to the pendant bolt and hanger.

The hatchway door when in closed position is locked against being opened from the corridor due to the straight line position of the toggle levers 32 and 34. Upon the arrival of the car to make a stop at the landing at which the door is located, fluid under pressure is admitted to the piston cylinder of the device 36 for opening the door. The admission of fluid to the piston cylinder of the device 36 may be effected automatically upon arrival of the car or may be under the control of the car attendant. In either case, the admission of fluid under pressure to the piston cylinder results in movement of piston rod 37 which acts through link 38 to move toggle lever 34 upwardly about bracket 33, thus "breaking" the toggle levers to unlock the door and operating them to open the door. As the door is opened energy is stored in the spring within the casing of door closing device 41 for returning the door to closed position. The opening movement of the door is limited by the engagement of the rear edge of the door with the resilient bumpers 84 on the stops 83 and the supply of fluid under pressure to the devices 36 is continued as long as it is desired to maintain the door in open position.

When it is desired to close the door, the sup-

ply of fluid under pressure to the device 36 is cut off. The spring of door closing device 41 then acts through the piston rod 42 thereof to rock the toggle lever 34 downwardly thus
 5 moving the door toward closed position. If, as the door is closed, the forward edge of the door encounters an obstruction, such as the body or effects of a person entering or leaving the car, the movement of the channel
 10 68 in the door closing direction with the door is terminated by the resistance presented by the obstruction. The closing device 41 continues to exert force through toggle levers 32 and 34 to close the door and as a result
 15 the channel 68 is rocked upwardly about the pivots of the links 65 on the brackets 62 mounted in the body of the door. Thus, the brake shoe 72 is moved upwardly with channel 68 and is forced into contact with the
 20 underside of door track 27 to oppose the closing of the door by the device 41. The spring of the device 41 continues to act to attempt to close the door and consequently the brake shoe is pressed against the underside of track
 25 27 with greater and greater force until the brake shoe overcomes the closing device and stops the door.

When the obstruction is removed the channel 68 gravitates downwardly about the pivots
 30 of the links 65 until the stop 76 engages the top of the door, thus moving the brake shoe 72 from engagement with track 27 and permitting the closing device 41 to move the door to fully closed and locked position. The
 35 door is checked and thus brought to rest easily and quietly, in the latter part of its closing movement, by checking mechanism which is part of the device 41.

It is to be noted that the door which is
 40 supported by the rod within its top molding may be swung toward or away from the door opening to compensate for misalignment between the door track at the top of the door and the guide slot at the bottom of the door
 45 and then tightly secured to the rod in its adjusted position. Thus, such misalignments as exist may be compensated for in order to lessen friction between the guide lugs and the
 50 guide slot, without bending the hanger or in any way altering the mounting of the hanger on the guide track. As a result, the position of the rollers of the hanger on the guide track is unchanged by adjustments to compensate
 55 for misalignment of the door track and guide slot and the hanger is movable along the door track to guide the door with a minimum of friction.

It is also to be noted that the resilient bumper 78 carried by the channel 68 lessens
 60 the possibility of injury to persons who may be struck by the closing door. The yielding movement of the channel 68 upon encountering an obstruction causes the brake shoe 72 to engage track 27 to stop the door by oppos-
 65 ing the action of closing device 41 and thus

further lessens the possibility of injury to persons tardily entering or leaving the car. The action of channel 68 and brake shoe 72 also lessens the possibility of such injury as
 70 might be caused by the application of force to the body of a person struck by the door and also the possibility of injury as a result of a person being pressed between closing edge of the door and the side of the door casing by
 75 the force applied to the door by the closing device.

Although the door has been described as supported by a rod mounted within a portion of the top molding, which extends beyond
 80 the top of the body of the door, it is to be understood that the rod may be mounted within a hollow member, other than a molding, secured to the top of the door. In the event that the door is of hollow frame construction, the rod may, for example, be with-
 85 in the door and engaged by the underside of the top of the door to support the door. It is also to be understood that the supporting member by means of which the door is supported and suspended from the pendant bolts
 90 and hangers may be of other desired shapes or forms.

Solid or hollow resilient members, similar to the tubing 78, may also be secured to the rear and bottom edges of the door, if desired.
 95 With such arrangement the door when closed would be substantially light and air tight.

As many changes could be made in the above construction and many apparently
 100 widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall
 105 be interpreted as illustrative and not in a limiting sense.

What is claimed is:

Hanging means for a sliding door sliding on a track above said door and guided by a
 110 runway in the door sill at the lower edge of said door, said hanging means comprising; a plurality of hangers each provided with a supporting roller engaging the top of
 115 said track and each provided with two apertures for accommodating pendant bolts; a pair of pendant bolts for each hanger, one rotatably positioned in each of said apertures; means for supporting each pair of
 120 pendant bolts from its corresponding hanger and for securing such bolts against rotation; a moulding extending along the top of said door for the entire width thereof, said moulding having a hollow half-round section be-
 125 yond the top edge of said door and having a clearance hole in the top of said hollow section for each of said pendant bolts; a cylindrical rod positioned within said hollow section of said moulding and extending the
 130 entire width of said door, each of said pend-

ant bolts being threaded into said cylindrical rod; and a washer and lock nut for each pendant bolt for gripping said hollow section of said moulding between said cylindrical rod and said washers.

In testimony whereof, I have signed my name to this specification.

THOMAS BRADY.

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