Feb. 15, 1955 R. A. FRITZ 2,701,896

VERTICAL SLIDING ACCESS DOOR

Filed April 24, 1951 2 Sheets-Sheet 1

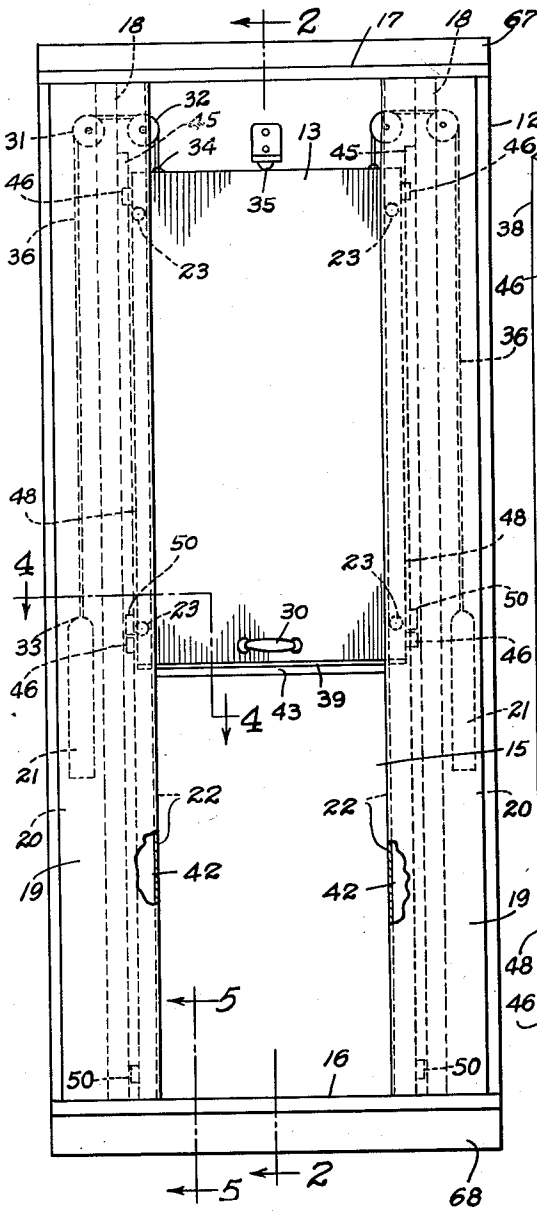


Fig. 1.

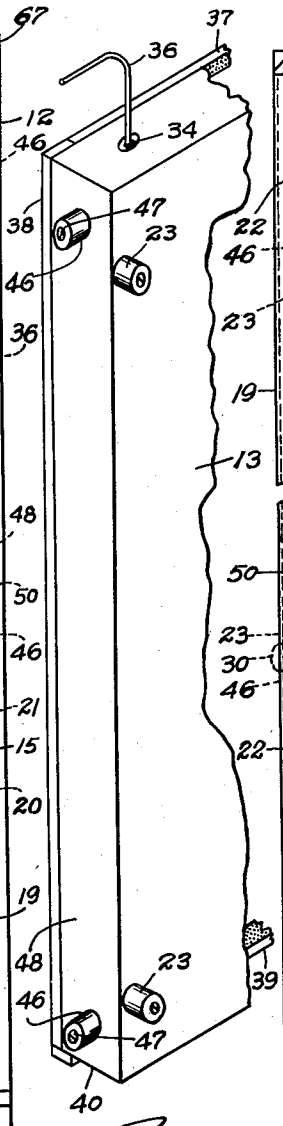


Fig. 3.

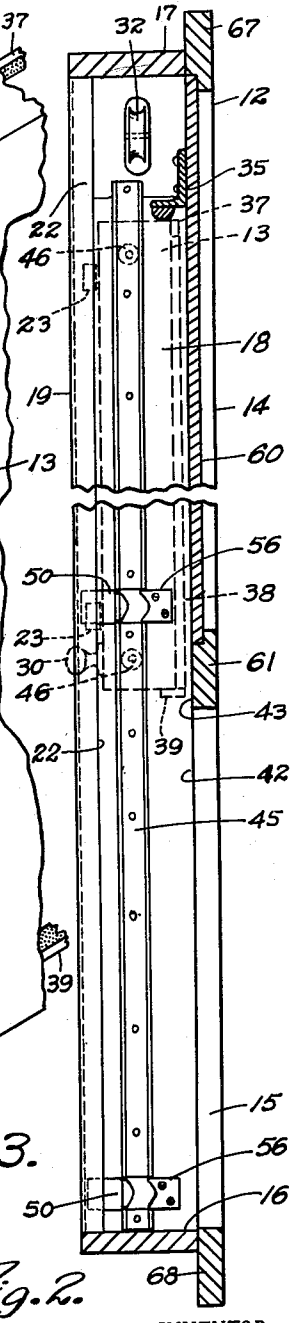


Fig. 2.

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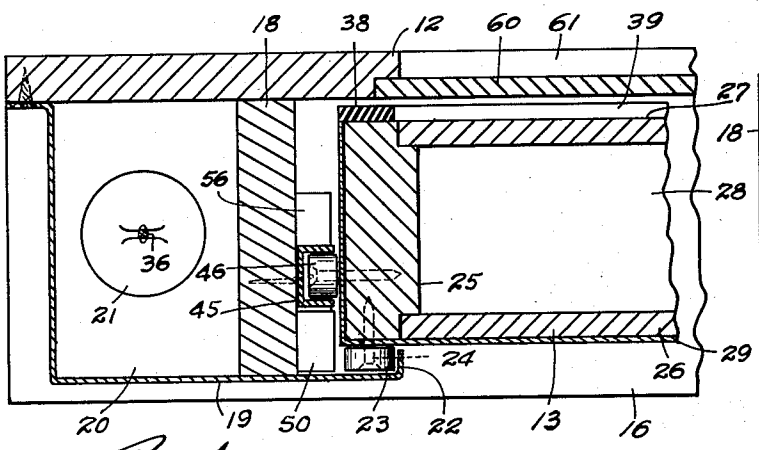


Fig. 4.

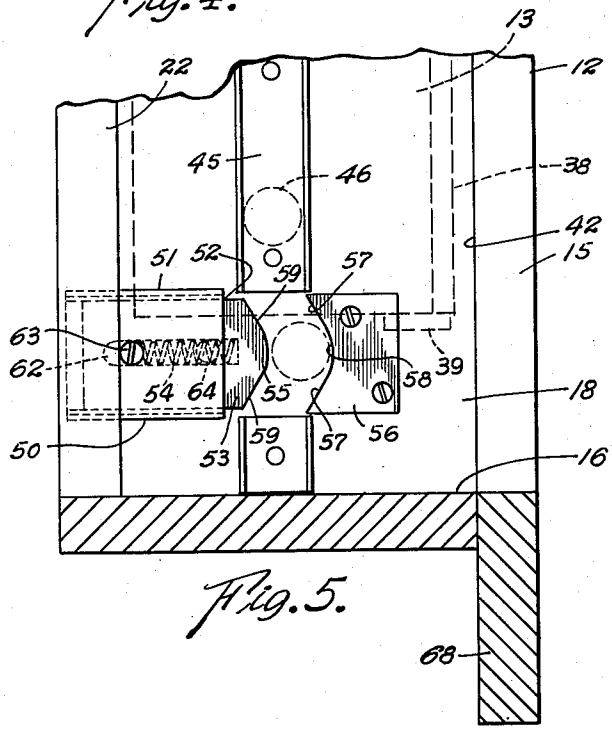


Fig. 5.

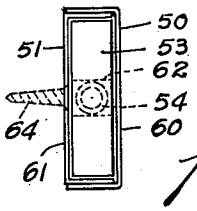


Fig. 6.

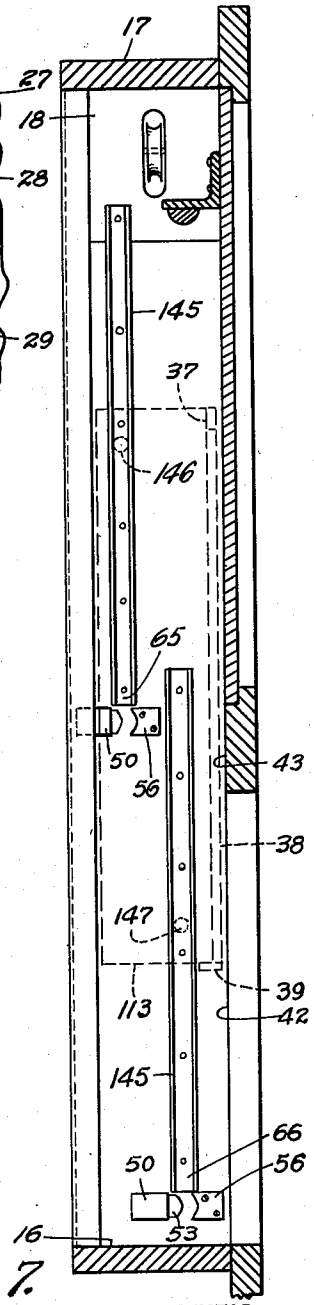


Fig. 7.

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VERTICAL SLIDING ACCESS DOOR

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Application April 24, 1951, Serial No. 222,603

12 Claims. (Cl. 20—19)

The present invention relates to improvements in vertical sliding access doors, such as may be employed in providing for the passage of articles and persons into and from cold storage rooms or other compartments.

An object of the invention is to provide means in a vertical sliding access door structure, whereby a tight fit is effected between the door and the frame only when the door is closed, whereas at all positions of the door intermediate the upper and lower limits of travel, movement of the door is attended by a negligible amount of drag or friction. Thus, the structure is characterized by unusual ease of operation.

A further object is to so construct a device of the character stated, that gasket wear is virtually eliminated and maintenance cost reduced to a practical minimum.

Another object of the invention is to eliminate binding of moving parts, and frictional wear with defacement of surfaces which are normally exposed to view, so that the structure will present a pleasing and new appearance even after having been in use for a considerable period of time.

Another object is to provide a device of the character above referred to, which is simple and inexpensive to manufacture and install, the construction being such that any needed repairs or replacements of parts can be performed at slight cost in labor and materials.

The foregoing and other objects are attained by the means described herein and illustrated upon the accompanying drawings, in which:

Fig. 1 is a front elevational view of the improved device, showing the sliding door in fully open raised position.

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1, showing the structure on a slightly enlarged scale and with the sliding door removed.

Fig. 3 is a fragmental perspective view on an enlarged scale, showing the left side of the sliding door depicted in Fig. 1.

Fig. 4 is an enlarged fragmental cross-sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is an enlarged fragmental cross-sectional view taken on line 5—5 of Fig. 1.

Fig. 6 is an end view of the resilient plunger unit shown in elevational upon Fig. 5.

Fig. 7 is a view similar to Fig. 2, showing a modification.

The device of the present invention comprises two principal parts, namely, a rectangular frame 12 and a vertically slidable door 13. The rear planar face 14 of the frame is adapted to rest against a vertical apertured wall (not shown), which forms part of the storage compartment to which the access may be had by way of the device of the invention. The aforesaid aperture of the compartment wall will register with the aperture 15 in the lower half of frame 12, and the frame will be bolted or otherwise fixedly secured against the wall with all cracks or spaces suitably filled or plugged to avoid cold loss or passage of air around the frame. This mounting of the frame upon the wall is performed in accordance with practice common in the art, and forms no part of the present invention. It may here be noted that frame aperture 15 is not necessarily at floor level, but may be located at the level of truck beds or railway car floors to facilitate passage of goods or articles into and from the storage compartment.

The frame 12 may consist of a sill 16, a header 17, and a pair of spaced upright stiles 18 secured together

to form a rectangular structure. These parts conveniently may be of wood, but might in some cases be formed from metal or other suitable materials. A cladding of sheet metal, indicated at 19 (Fig. 4), might be applied to the stiles and other parts of the frame, to furnish a compartment 20 to house the weights 21 used in counterbalancing the sliding door 13. The cladding or stile covers may extend somewhat beyond the vertical side edges of the door, where flanges 22 may be formed thereon as a means to guide the door throughout its vertical travel within the frame. Rollers 23 on the door cooperate with the flanges 22 at opposite sides of the frame, to eliminate friction at the flanges 22 as the door is elevated and lowered lengthwise of the frame. The rollers may rotate on studs 24 anchored in the framework 25 of the door, with the rollers rotating in a plane which is parallel to the mean plane of the door, this being a vertical plane.

Door 13 may be constructed on a rectangular framework of wood or other suitable material, having front and rear panels 26 and 27, respectively, spaced apart to provide a compartment 28 for insulating material, not shown. The door may be covered wholly or partly with a cladding 29 of sheet metal or the like, if desired. A suitable handle 30 may be applied at any convenient location on the front of the door to facilitate shifting of the door vertically to open or closed positions. The door aperture being indicated at 15, it is readily understood that the door is closed when fully lowered, and open when fully elevated.

Movements of the door are facilitated by use of a counterbalancing mechanism, which may be of any approved type. As herein disclosed by way of example, the counterbalance may be in the form of weights 21 traveling vertically in the ways or compartments 20—20, and suspended by chains, cables, ropes or other flexible suspension means 36 passing over suitable pulleys 31—32, opposite ends of such suspension means being anchored to the weights and to the upper corner areas of the door, as at 33 and 34, respectively. The method of anchoring is immaterial to the invention, and may therefore be conventional. A stop or bumper 35 may be applied to the frame 12 at any suitable location, to limit upward travel of the door to open position.

As is most clearly illustrated by Fig. 3, the rear face of the door carries flexible or resilient gasket members marginally thereof, these being indicated by the characters 37, 38, 39. Vertical gasket members 38 are furnished at opposite sides of the door, whereas the gasket member at 37 spans the upper margin of the same face of the door and extends horizontally. A fourth gasket 39 is applied to the lower edge 40 of the door, and is adapted to engage the sill 16 of the frame when the door is fully lowered. The gaskets may be rubber or rubber-like strips or pads tacked or adhesively applied to the door; however, other forms of gaskets or sealing means may be resorted to in accordance with proper engineering practice.

At all elevated or open positions of the door 13, the gaskets carried thereby are spaced from the frame so that sliding of the door vertically within the frame is accomplished without frictional contact or drag between the door gaskets and the frame. However, as the door is lowered to a nearly closed position, means come into play for automatically shifting the door laterally in such manner as to bring the gaskets 38—38—37 into face contact with adjacent parts of the frame to effect a seal, as may best be understood by referring to Figs. 2 and 4. Finally, in the fully lowered or closed position of the door, the lower gasket 39 impinges upon the sill 16 to complete the seal. A suitable mechanism whereby the stated action may be accomplished, is described below in detail.

Referring to Figs. 1 and 2, it may be noted that the frame 12 includes vertical coplanar jamb areas 42—42—43, from which the door gaskets are spaced whenever the door is elevated to any position above the lower limit of travel. The desired spacing may be maintained with the use of opposed vertical straight guides or tracks 45—45 cooperating with suitable followers carried by the side edges of the door. The followers may be in

the form of rollers 46 rotatably mounted upon studs 47 projecting horizontally from the side edges 48—48 of the door. Such rollers may be applied near the top and bottom portions of the door, and as shown in Fig. 3, will preferably rest in a common vertical plane so that the door in its vertical shifting movements will be guided along the tracks or rails 45 likewise in a vertical plane, throughout the major portion of the movement. Upon reaching a point near the closing position, however, the door becomes free of the guiding influence of the straight tracks or rails 45, and is thereupon subjected to a laterally directed force which shifts the door bodily toward the jamb areas 42—42—43, upon which the door gaskets seat flatwise to effect the desired seal.

The means utilized for displacing the door bodily toward the jamb areas of the frame as above related, may be in the form of resilient plunger or pusher units 50 interposed in the guideways provided by the tracks 45. Such units are best illustrated upon Figs. 2, 5 and 6, and will be seen to comprise a tubular housing 51 having at least one open end 52 through which may project the plunger 53. The plunger is normally urged resiliently outwardly by means of a compression spring 54 or otherwise, so as to dispose the nose end 55 of the plunger always partly across the track 45 and into the path of movement of a roller or follower 46. Opposed to the nose of the plunger is a stop or wedge block 56, screwed or otherwise secured to the frame side, and having inclined edges 57 to guide the roller 46 gently toward or from the jamb area, depending upon the direction of vertical shifting of the door 13. The crotch 58 of the wedge block may limit the extent of lateral shifting of the roller and the door toward the jamb. The nose of the plunger may be complementary in shape to the shape of the crotch, as shown, and will include inclines 59—59. The nose of the plunger is located directly opposite the crotch of stop or block 56.

A convenient method of making the plunger unit 50, is to produce two channel-shaped stampings 60 and 61 (Fig. 6), one of which may fit over the other with the legs overlapping. This forms an elongate angular tube in which the plunger 53 may slide. The plunger may be slotted longitudinally as at 62 to receive the compression spring 54. A screw or other fastener 63 passes through the body parts 60 and 61, and forms an abutment for one end of the spring. The opposite end of the spring abuts the end of the slot near the nose of the plunger. A second screw or fastener 64 secures the part 61 to the door frame, as does also the screw 63, to mount the unit upon the frame.

The parts 50 and 56 may be separately secured to the door frame as shown, but to facilitate application thereof in perfect alignment, these parts may first be mounted upon a thin plate which in turn may be secured to the frame as an assembled unit. In either case, the plunger nose 55 will extend partly across the track or line of travel of the roller 46, whereas the crotch 58 of block 56 will be disposed beyond the track an equal distance. The action of members 53 and 56 is that of displacing the roller 46 and door 13 toward the jamb areas of the frame, causing the gaskets to seat thereon for effecting a seal. The inclines 57—59 of said members force the lower door gasket 39 to seal against the sill 16, thereby completing the seal.

As will be understood by reference to Figs. 1 and 2, the door frame is provided with upper and lower pairs of plunger units 50—56, spaced apart vertically a proper distance to ensure simultaneous displacing actions at both the upper and lower ends of the sliding door, when the door is lowered to closing position. In other words, the plunger units act simultaneously upon both of the rollers 46—46 shown in Fig. 3, and upon the similar rollers carried by the opposite side edge of the door. The vertical distance between an upper roller 46 and a lower roller 46, is the same as the distance between upper and lower plunger noses. The stop or bumper means 35, however, is preferably located at such an elevation upon the frame as to preclude the lower rollers 46 of the door from engaging the upper plunger units when the door is fully open. This is clearly indicated at 50—46, in the middle portion of Fig. 1.

In Fig. 2, the character 60 indicates a solid panel fixed in the frame to close the upper half thereof. It may be noted that the door gaskets can at no time rub or chafe the finish of this panel, which is of course exposed to view when the door is lowered or closed, and should therefore present a pleasing appearance. The structural frame part or cross piece 61 may constitute the top of the frame opening 15, and can furnish the jamb area against which the upper door gasket 37 may abut when the door is closed.

Referring now to the modification illustrated by Fig. 7, it may be noted that the frame in this form of the invention is identical to that of Fig. 2, the only difference being in the track structure indicated at 145—145, and the location of the rollers 146—147 upon the sliding door 113. Instead of having the track sections vertically aligned as in Fig. 2, the track sections of Fig. 7 are offset from one another a distance somewhat less than the door thickness, and in vertical spaced planes. The lower end 65 of the upper track section terminates at a point near the middle of the frame, and the lower end 66 of the lower track section terminates near the sill 16. At the lower ends of the track sections are located the plunger or pusher units 50—56, operative to laterally displace the sliding door toward the jamb areas 42 and 43, for the same purposes and in the same manner as was explained hereinbefore in the description of Figs. 1 to 6. Because of the offset relationship of the track sections, the rollers 146 and 147 of the sliding door are necessarily similarly offset upon the side edges of the door, as shown, so that the door in its vertical movement is always disposed in a vertical position.

It will readily be evident from the disclosure of Fig. 7, that lowering the sliding door 113 to a nearly closed position will bring the rollers or followers 146 and 147 under the influence of the plunger or pusher elements at 50—56, with the result that the door finally will be shifted thereby or displaced laterally to place the door gaskets 37—38—39 in contact with the jamb areas 43—42—16, to effect the desired seal as the door is fully closed. The action to which the door is subjected in closing and opening, is the same as that described in connection with the disclosure of Figs. 1 to 6.

In conclusion, it is to be understood that various modifications and changes in the structural details of the device may be made, within the scope of the appended claims, without departing from the spirit of the invention. For example, the sliding door may be counterbalanced by means other than that disclosed; the door and frame may be of all-metal construction, or of various combinations of materials suitable therefor; and the stop or bumper 35 may be applied otherwise than as shown, and in fact may be eliminated by substituting other means to limit upward travel of the sliding door.

Mounting of the frame 12 upon a wall may be effected by passing bolts, screws or other fasteners through the header and sill aprons 67 and 68, and possibly also through the frame stiles before the cladding 19 is finally applied to the frame.

What I claim is:

1. A sliding access door structure, comprising a frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a sliding door movable along the frame to an operative position at which the door closes the opening, and to an inoperative position at which the opening is uncovered, said door having a face which traverses the jamb areas of the frame, and said face having margins to abut flatwise upon the jamb areas of the frame, track means on the frame and followers on the door cooperating to guide the door in sliding from one said position to the other, the track means being in a plane parallel to the jamb areas, and spaced from the plane of the latter a distance such as to maintain a substantial clearance between the door face and the jamb areas of the frame during sliding of the door, said track means having terminal ends from which the followers emerge as the door is moved toward closed position and resilient plungers disposed beyond the terminal ends of the track means near opposite ends of the opening, to impose lateral force upon the door at substantially the closing position thereof, causing bodily shifting of the door toward the jamb areas of the frame.

2. A sliding access door structure, comprising a frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a sliding door movable along the frame to an operative position at which the door closes the opening, and to an inoperative position at which the opening is uncovered, said door having a face which traverses the jamb areas of the frame, and

said face having margins to abut flatwise upon the jamb areas of the frame, track means on the frame and followers on the door cooperating to guide the door in sliding from one said position to the other, the track means being in a plane parallel to the jamb areas, and spaced from the plane of the latter a distance such as to maintain a substantial clearance between the door face and the jamb areas of the frame during sliding of the door, said track means having terminal ends from which the followers emerge as the door is moved toward closed position and resilient plungers disposed beyond the terminal ends of the track means near opposite ends of the opening, to impose lateral force upon the door at substantially the closing position thereof, causing bodily shifting of the door toward the jamb areas of the frame, and means having inclines located opposite the plungers, for gently guiding the followers of the door onto and from the track means aforesaid.

3. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the latter defining the lower end of the opening aforesaid, and a member on the frame located substantially midway between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, resiliently extended plungers interposed in the track means near the sill and that frame member which defines the upper end of the opening, said plungers each having a wedge-shaped nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, members on the stiles opposed to each plunger and providing inclines to gently guide the displaced followers onto and from the track means while the plungers act upon said followers, and means limiting elevation of the door to preclude engagement of the lower followers with the upper plungers when the door is moved toward the header.

4. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the latter defining the lower end of the opening aforesaid, and a member on the frame located substantially midway between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, resiliently extended plungers interposed in the track means near the sill and that frame member which defines the upper end of the opening, said plungers each having a wedge-shaped nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, members on the stiles opposed to each plunger and providing inclines to gently guide the displaced followers onto and from the track means while the plungers act upon said followers, and means limiting elevation of the door to preclude engagement of the lower followers with the upper plungers when the door is moved toward the header, an elongate casing member covering each stile, said casing members each including a flange turned inwardly at substantial right angles to the plane of movement of the door established by the track means, and followers on the door riding upon said flanges to preclude shifting of the door toward and from the stiles.

5. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the latter defining the lower end of the opening aforesaid, and a member on the frame located substantially midway between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, resiliently extended plungers interposed in the track means near the sill and that frame member which defines the upper end of the opening, said plungers each having a wedge-shaped nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, members on the stiles opposed to each plunger and providing inclines to gently guide the displaced followers onto and from the track means while the plungers act upon said followers, an elongate casing member covering each stile and forming therewith a vertical channel extending from the header to the sill, and means in said channels for counterbalancing the weight of the door.

6. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the latter defining the lower end of the opening aforesaid, and a member on the frame located substantially midway between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, resiliently extended plungers interposed in the track means near the sill and that frame member which defines the upper end of the opening, said plungers each having a wedge-shaped nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, members on the stiles opposed to each plunger and providing inclines to gently guide the displaced followers onto and from the track means while the plungers act upon said followers, an elongate casing member covering each stile and forming therewith a vertical channel at one side of each stile, means in said channels for counterbalancing the weight of the door, flanges on said casing members at the opposite side of each stile, and followers on the door riding upon said channels to preclude shifting of the door toward and from the stiles.

7. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the

latter defining the lower end of the opening aforesaid, and a member on the frame located between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, resiliently extended plungers interposed in the path of the track means near the sill and that frame member which defines the upper end of the opening, said plungers each having a wedge-shaped nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, and members on the stiles opposed to each plunger and providing inclines to gently guide the displaced followers onto and from the track means while the plungers act upon said followers.

8. A vertical sliding access door structure, comprising an upright frame having an opening therethrough, and coplanar jamb areas substantially bounding said opening, a header at the upper end of the frame, a sill at the lower end thereof, and spaced vertical stiles connecting the sill to the header, a door shiftable vertically along the stiles toward and from the header and the sill, the latter defining the lower end of the opening aforesaid, and a member on the frame located between the sill and the header defining the upper end of said opening, said door including a lower end to engage the sill when the door covers the opening and is closed thereon, one face of said door having coplanar side and upper margins to coincide with the jamb areas of the frame bounding said opening, vertical track means fixed upon the stiles in opposing relationship, and upper and lower followers on the door cooperating with the track means to guide the door vertically in moving toward and from the sill, wedge members interposed in the path of the track means near the sill and that frame member which defines the upper end of the opening, said wedge members each having a nose normally in the path of movement of the followers, for displacing the followers and the door laterally toward the jamb areas of the frame when the door is moved into close proximity with the sill, thereby to dispose the side and upper margins of the door in abutting relationship upon the jamb areas aforesaid, and members on the stiles opposed to each wedge member and providing inclines to gently guide

the displaced followers onto and from the track means while the wedge members act upon said followers.

9. A structure as specified in claim 8, and in which is included means limiting elevation of the door to preclude engagement of the lower followers with the upper wedge members when the door is moved toward the header.

10. A sliding access door structure, comprising a frame having an opening therethrough, and jamb areas substantially bounding said opening, a sliding door movable along the frame to an operative position at which the door close the opening, and to an inoperative position at which the opening is uncovered, said door having a face which traverses the jamb areas of the frame, sealing means extending from said door face toward the jamb areas, means for guiding the door during the major extent of its travel, to maintain a clearance space between the door sealing means and the jamb areas of the frame, said guiding means comprising straight track sections at opposite sides of the frame, and upper and lower followers on the door riding upon said tracks, the track sections having ends spaced in substantial correspondency with the distance between the upper and lower followers so that the followers may simultaneously overrun the ends of the track sections as the door reaches closed position, and means beyond the lower ends of the track sections to displace the door laterally, placing the sealing means in contact with the jamb areas of the frame.

11. A structure as specified in claim10, and in which the means to displace the door comprises an incline at the lower end of each track section, directed obliquely toward the sill and the frame opening.

12. A sliding access door structure, comprising a frame having an opening therethrough, and jamb areas substantially bounding said opening, means for slidably mounting the door including longitudinal guide tracks stationarily supported on the jamb areas adjacent the side edges of the door and anti-friction means engaging said tracks and stationarily mounted on the door adjacent the side edges thereof, and means associated with said guide tracks adjacent the ends thereof dimensioned to receive and laterally shift the anti-friction means for forcing the door toward and in contacting relationship with the jamb areas.

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