Sept. 3, 1963 G. A. KOCHANOWSKI 3,102,581

MOUNTING STRUCTURE FOR SLIDABLE DOORS

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Fig. 1

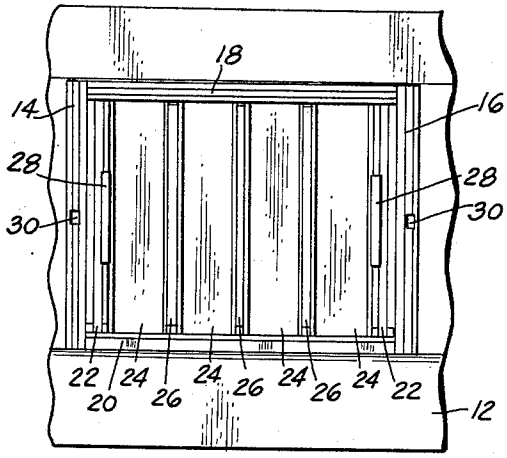


Fig. 2

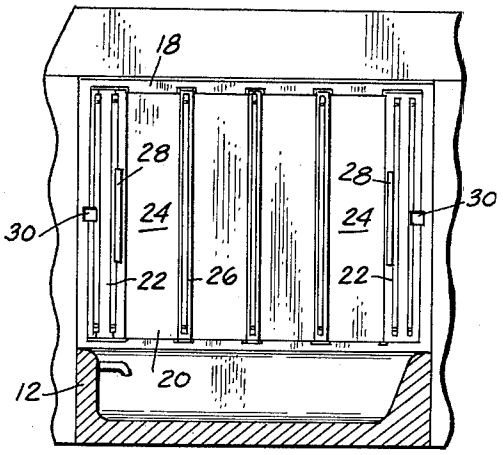


Fig. 3

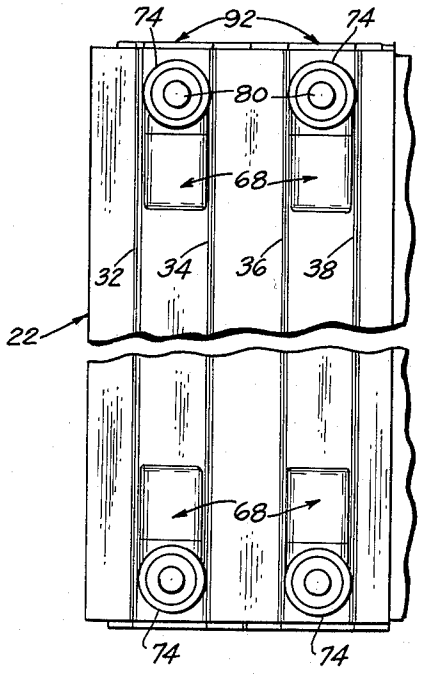
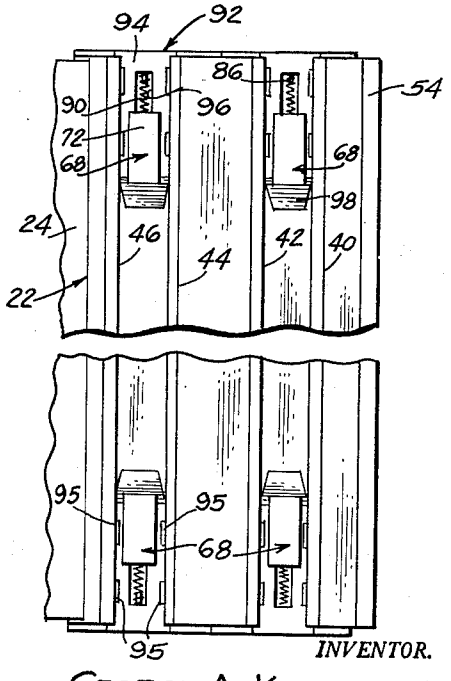


Fig. 4



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FIG. 5

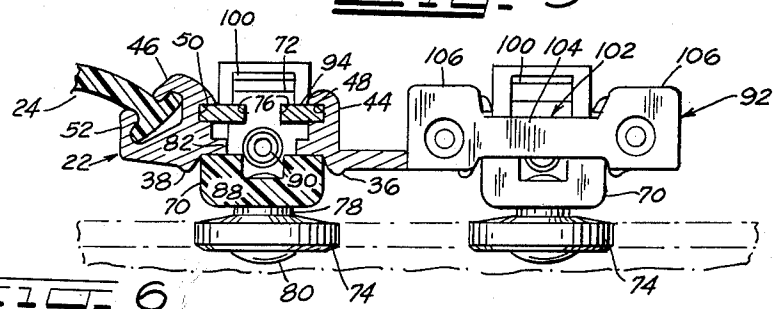


FIG. 6

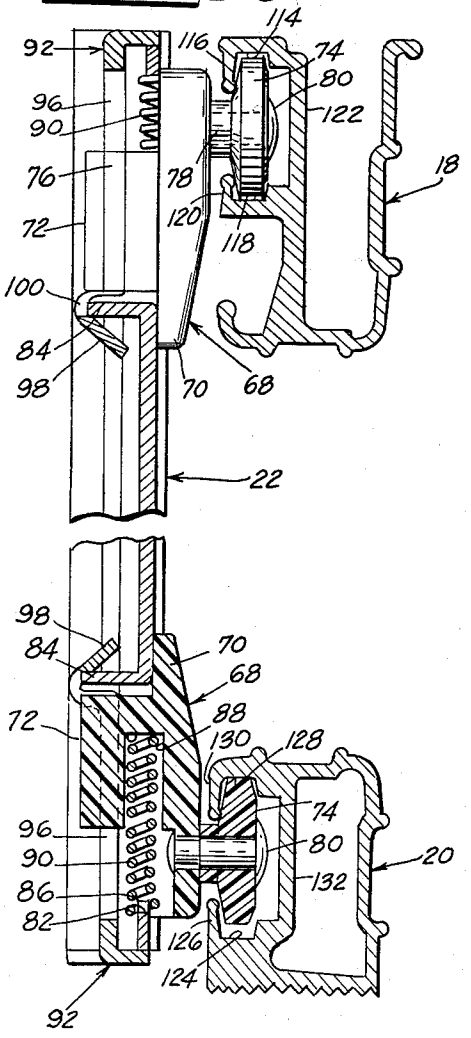


FIG. 8

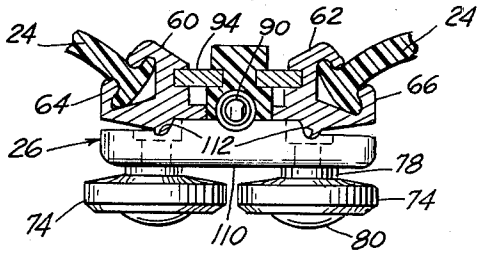
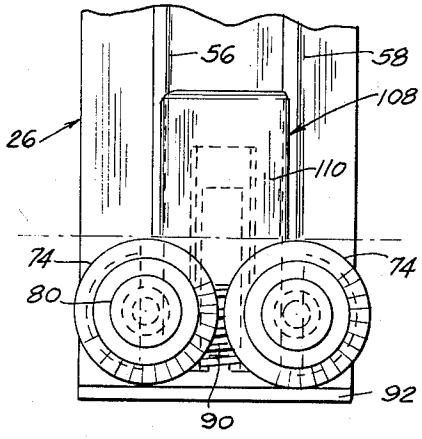


FIG. 7



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MOUNTING STRUCTURE FOR SLIDABLE DOORS

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This invention relates to a structure for resiliently mounting slidable doors on rails for movement thereon, and more particularly, to a structure for suspending the doors from rails without binding when the doors are moved.

An important problem which is frequently encountered in the use of sliding doors is that of binding or sticking when the door is pulled or pushed out of its normal alignment. This problem is especially acute in the case of flexible doors, such as shower doors, which are more prone to misalignment. The slidable doors are also prone to leave their track or normal path of movement. Consequently, a need exists for a slidable door mounting door structure which resists the tendency to bind and to be moved off the track when the door is handled in other than the desired manner, such as when it is grasped off center with a resulting tendency to move the door out of alignment.

It therefore is an important object of the present invention to provide a mounting structure for slidable doors which prevents binding and holds the doors on their tracks.

A particular object is to provide a mounting structure which is adapted for use on flexible doors such as shower doors.

A more particular object is to provide a mounting structure which yields to the forces producing misalignment of a door, thereby preventing binding, and which returns the door to its correct position when the forces are removed.

Another object is to provide a mounting structure which accommodates variations in spacing of the tracks on which the respective ends of slidable doors are mounted.

An additional object is to provide a mounting structure which is adapted for use with sheet or strip material door panels such as extruded metal panels.

A further object is to provide a mounting or suspending unit for doors which is readily and securely mounted thereon to suspend the doors from rails without binding or leaving the track.

Another particular object is to provide such a mounting unit which includes enclosed resilient means that cooperate in accomplishing the foregoing objects.

An additional object is to provide a mounting unit which is simple and economical yet efficient and durable and which is substantially unaffected by temperature and humidity changes and corrosive tendencies.

These and other objects, advantages and functions of the invention will be apparent on reference to the specification and to the attached drawings illustrating perferred embodiments of the invention, in which like parts are identified by like reference symbols in each of the views, and in which:

FIGURE 1 is a front elevational view of a closed slidable shower door mounted on a bathtub;

FIGURE 2 is a rear elevational view thereof;

FIGURE 3 is a broken front elevational view of a leading edge door panel or strip illustrating the new mounting structure at opposite ends thereof;

FIGURE 4 is a broken rear elevational view thereof;

FIGURE 5 is a plan and partly horizontal cross-sectional view of the panel and mounting structure of FIGURES 3 and 4;

FIGURE 6 is a vertical longitudinal sectional view thereof, mounted on upper and lower rails;

FIGURE 7 is a fragmentary front elevational view of a divider panel or strip and another embodiment of the mounting structure, at one end of the panel; and

FIGURE 8 is a plan and partly horizontal cross-sectional view thereof.

The invention provides a mounting structure for slidable doors which includes resilient mounting means mountable on a door and engageable with a rail for moving the door on the rail. The mounting means includes a glide engageable with the rail for movement thereon, retainer means for holding the glide on the door, the glide being movable relative to the door to and from the rail, and resilient means interposable between the glide and the door for urging the glide into engagement with the rail.

In a preferred embodiment of the invention, a slidable door is resiliently suspended between rails, whereby when the door is pushed or pulled incorrectly, the forces are absorbed which would otherwise cause binding and the door remains on the rails. Thus, when the leading edge of a door is grasped nearer one end than the other, the end closer to the force moves more than the other end and the edge moves out of its perpendicular position with respect to the rails. In prior constructions, the glide members engaging the rails are urged into binding engagement therewith. In the present invention, the forces are absorbed by the resilient means, which yield to prevent binding of the glides. When the force tending to cause misalignment is removed, the resilient structure returns the door to its normal position.

FIGURES 1 and 2 of the drawings illustrate a shower door assembly in which my new mounting structure is especially useful. Said assembly includes a flexible slidable shower door **10** mounted on the outer side of a bathtub **12** to form a closed compartment therewith. The door is mounted in a frame or casing composed of upright frame members **14** and **16** on opposite sides of the door, and parallel upper and lower horizontal rails **18** and **20** at the upper and lower ends of the door. The door is constructed of alternate rigid and flexible vertically extending elongated panels, commencing at each end with a leading edge panel **22**. A flexible panel **24** of plastic or other suitable material is joined to each leading edge panel **22** along one edge of each. The opposite edge of the flexible panel is joined to a rigid divider panel **26**. The divider panel is in turn jointed to another flexible panel **24** followed by another rigid divider panel **26**. The door illustrated thus is constructed of two outer leading edge panels **22** and four flexible panels **24** alternating with three rigid divider panels **26** therebetween. A handle **28** is mounted on each leading edge panel, and a latch **30** is mounted on each of the uprights **14** and **16**, for opening and closing the door **10** from either side.

This type of structure utilizes relatively narrow rigid panels joined by flexible panels which afford little resistance to misalignment, and my new mounting means markedly improves the operation thereof.

Referring to FIGURES 3, 4, 7 and 8, the rigid door panels **22** and **26** preferably are constructed of relatively thin sheet or strip material which in the illustrative embodiments is extruded metal such as an aluminum alloy. The front or facing surface of the leading edge panel **22** is provided with two pairs of spaced parallel longitudinal ridges **32** and **34**, and **36** and **38** in the respective pairs. The ridges serve as guides for the glide members, as subsequently described. The back side of the panel **22** is provided with two pairs of spaced parallel longitudinal walls **40**, **42** and **44**, **46** which extend laterally outwardly from the panel and provide channels therebetween aligned with the pairs of ridges on the front surface. As illus-

trated in FIGURE 5, the inner surfaces of the walls such as 44 and 46 are provided with respective grooves 48 and 50 for receiving the retainer of the mounting assembly, also as subsequently described. One of the walls 46 is also adapted to cooperate with a marginal wall 52 on the panel for receiving and locking the flanged end of a flexible panel 24 therebetween. An inclined wall or flange 54 (FIG. 4) extends along the opposite margin of the leading edge panel 22, and it is adapted for engagement with the latch 30.

The divider panel 26 illustrated in FIGURES 7 and 8 is constructed similarly to the leading edge panel 22. It includes a pair of parallel longitudinal ridges 56 and 58 on the front surface, and a pair of spaced parallel longitudinal outwardly extending walls 60 and 62 on its back surface. The walls are constructed in the same manner as the channel wall 46 illustrated in FIG. 5, and they cooperate in like manner with marginal walls 64 and 66 on the divider panel to receive flexible panels 24.

The mounting structure of the invention includes a glide, one embodiment of which is generally indicated by the number 68 in FIGURES 3–6. The glide includes a generally rectangular body 70, an integral shank 72, and a roller 74. The guide body 70 is mounted for reciprocal sliding movement on the front surface of the leading edge panel 22, between the pairs of ridges 32, 34 and 36, 38. The shank 72 is rectangular and extends laterally outwardly from the glide body. As seen in FIGURE 5, the opposite sides of the shank are provided with longitudinal grooves 76. The roller 74 includes an integral hub 78 which serves as a spacer to project the wheel portion of the roller forwardly from the body. The roller is rotatably mounted on the body by a rivet 80 extending through the hub. The glide body 70, the integral shank 72, and the roller 74 preferably are constructed of a suitable plastic, such as acetal resin. Such construction is tough and resilient and has good bearing properties. The glide is resistant to the physical and chemical forces encountered, including temperature and humidity conditions, frictional forces, and corrosive influences.

A longitudinally extending rectangular slot 82 (FIGS. 5 and 6) is provided adjacent each end of the leading edge panel 22 between each of the pairs of channel walls 40, 42 and 44, 46, for a total of four such openings. A glide 68 is mounted in each of the openings with the shank 72 thereof extending through the opening and received loosely therein. As illustrated in FIGURE 6, an integral flange 84 is struck out from the panel 22 at the inner end of the panel opening, and it forms a laterally extending ledge between the channel walls. A longitudinally extending nib 86 (see FIGS. 4 and 6) is integral with the panel at the opposite, outer end of the panel opening 82.

A longitudinal bore 88 (FIGS. 5 and 6) is provided in the shank 72, inwardly of the grooves 76 thereof. The bore is also formed partly in the adjoining glide body portion 70. The bore receives one end of a coiled compression spring 90 therein, and the other end of the spring engages the nib 86 therearound and may abut on the adjoining outer margin of the panel opening 82. The springs 90 urge the glides 68 inwardly of the respective ends of the panel 22, with the shanks 72 normally seated on the ledges 84. From this position, each glide 68 may be moved longitudinally outwardly against the force of the spring, in the path of movement defined by the ridges 32, 34 or 36, 38. The glide may move outwardly until its shank 72 abuts on the outer margin of the panel opening 82, at which time the spring 90 is compressed, and it and the nib 86 are received within the shank bore 88.

Each mounting structure includes a glide retainer strip 92, best illustrated in FIGURES 4–6. The retainer strip constitutes a single bent piece of preferably corrosion-resistant metal such as aluminum alloy. The retainer includes a central elongated substantially flat body portion 94 provided with two wedge-like projections 95 (FIG. 4) at each of its side margins. The retainer body is insertable in the channel grooves 48 and 50, and the projections 95 furnish a press fit therein.

The retainer body 94 is provided with an elongated slot 96 which extends longitudinally and registers with the wider panel opening 82 when the retainer is in position. A hook or locking flange 98 is integral with one end of the retainer body 94, and an enlarged opening 100 therein registers with the slot 96. With the hook flange 98 initially parallel to the body portion 94, the shank 72 of the glide is insertable through the hook flange opening 100 to position the shank in the retainer body slot 96. The slot provides a slideway for the shank, with adjoining portions of the retainer body being received within the shank grooves 76 in sliding engagement as illustrated in FIGURE 5. The retainer body slot 96 is longer than the panel opening 82, as seen in FIGURE 6, so that the glide shank 72 does not strike the end margins of the retainer slot and disturb the position of the retainer when the glide is moved longitudinally.

The retainer is anchored in fixed position on the panel by bending the hook flange 98 into locking engagement with the panel ledge 84, as illustrated in FIGURE 6. The retainer is also held in position and manipulated by an integral flange 102 extending laterally at the other end, which abuts on the end of the panel 22. The flange has a relatively narrow central portion 104 which allows the glide body 68 to glide thereover, and enlarged ears 106 serving to close and finish the ends of the panel.

The mounting structure thus is a compact cartridge type of unit which includes the glide 68, the retainer 92, and the spring 90. It is readily mounted on a panel which is appropriately extruded and stamped to cooperate therewith. Preferably, two tandem rollers are mounted at each end of a panel, and two spaced apart mounting structures are therefore mounted at each end in the embodiment of FIGURES 3–6. In assembling each structure on the panel 22, the spring 90 is positioned around the panel nib 86. The glide shank 72 is inserted through the panel opening 82, and the spring 90 is received within the shank bore 88. The retainer 92 is inserted into the channel grooves 48 and 50 from the end of the panel, until the outer flange 102 is seated on the panel edge. The hook flange 98 is bent inwardly over the panel ledge 84, to complete the assembly.

A second type of glide 108 is mounted on the relatively narrow divider panel 26 illustrated in FIGURES 7 and 8. The essential differences between this glide and the glide 68 of the preceding views are that the glide body 110 is enlarged at its outer end and two tandem rollers 74 are mounted thereon by means of rivets 80. The enlarged portion of the body 110 is provided with longitudinal grooves 112 which receive the ridges 56 and 58 on the front surface of the panel. The mounting structure is otherwise substantially the same as that described in connection with the preceding views. The use of the glide 108 having two rollers 74 and the use of two glides 68 at each end of their respective panels provides resilient two-point support for the panels.

The new mounting structure is especially adapted for suspending the door panels between rails of the type indicated at 18 and 20 and shown in detail in FIGURE 6. These rails preferably are also extruded corrosion-resistant metal, and they are adapted with the rollers 74 for holding the rollers on the respective tracks and preventing them from becoming dislodged. An outer or upper track 114 is formed within the top rail 18, and it is bordered by a guard flange 116. An inner or lower track 118 is provided parallel to the outer track, and it is bordered by a guard flange 120. The opposite sides of the tracks are closed by a rail wall 122. Similarly, the bottom rail 20 is provided with an outer track 124 and

adjoining guard flange **126**, and an inner track **128** and adjoining flange **130**, together with a closure wall **132**.

The glides **68** and **108** are tensioned or pulled into engagement with the rails **18** and **20**, so that the glides and the panels **22** and **26** are suspended therefrom. The rollers **74** bear against the respective inner tracks **118** and **128**, and the rollers roll along the tracks in opening and closing the sliding door **10**.

The mounting structure of the invention provides a door mounting which is virtually trouble-free, notably in the case of flexible doors. Not only are the rollers prevented from being removed from the rails, but they are not bound or jammed when an off-center pulling or pushing force is exerted. When this happens, the glides **68** and **108** move outwardly against the springs **90**, which absorb the forces that would otherwise tend to cause binding. When the leading edge panels **22** are moved out of alignment, which is more often the case, the individually mounted glides **68** at each end move individually according to the force at each point, preserving the two-point suspension on the rollers **74**. The rollers at each end of the panel continue to roll on the rail tracks. When the force is altered or released, the structure automatically rights itself. The invention provides the further advantage that variations in spacing between the top and bottom rails **18** and **20** are accommodated by the resilient mounting, as are irregularities and possible foreign substances on the individual tracks.

The door panels with the mounting structure thereon present a very pleasing appearance when viewed from the front. The springs **90** are enclosed by the glide body **70** on the front and the retainer **92** on the back, so that they are protected from fouling and are only visible from the rear. The mounting structure is easily and rapidly yet securely affixed to a door panel. The entire construction is reliable, durable and economical.

It will be apparent that various changes and modifications may be made in the construction and arrangement of the parts without departing from the spirit and scope of the invention. It is intended that such changes and modifications be included within the scope of the appended claims.

I claim:

1. A resiliently mountable panel structure for slidable doors comprising
   - a door panel having an elongated opening therethrough,
   - resilient mounting means on said panel and engageable with a rail for moving the panel on the rail,
   - said mounting means comprising
   - a glide including a body disposed on one side of said panel,
   - projecting means on said body engageable with said rail for movement of said glide thereon,
   - and a shank on said body extending through said panel opening and movable therein for relative movement of said glide and said panel,
   - a glide retainer mounted on the reverse side of said panel and engaging said shank,
   - said shank being movable on said retainer for said relative movement of said glide and said panel,

   - and resilient means interposed between said glide and said panel for tensioning said projecting means into engagement with said rail.

2. A panel structure as defined in claim 1 wherein said door panel is provided with at least one said elongated opening therethrough adjacent each of two opposite ends thereof,
   - and one said resilient mounting means is associated with each of said openings for movably suspending said panel from two rails respectively disposed adjacent said opposite ends.

3. A resiliently mountable panel structure for doors comprising
   - a door panel having a longitudinal channel on one side and having an elongated opening therethrough adjacent one end thereof and communicating with said channel,
   - a glide including a body mountable on the opposite side of said panel,
   - a roller projecting from said body and engageable with a rail for movement of said glide thereon,
   - and a shank extending laterally from said body through said panel opening,
   - said shank having longitudinal groove means thereon and a longitudinal bore disposed inwardly of said groove means,
   - a glide retainer strip insertable in said channel from said panel end and engageable with said shank groove means for relative longitudinal sliding movement of the retainer strip and shank,
   - and a compression spring mountable in said shank bore and engageable with said panel,
   - tending to move said glide longitudinally and urge said roller into engagement with a rail.

4. A panel structure as defined in claim 3 including tandem rollers projecting from said body and engageable with a rail.

5. A panel structure as defined in claim 3 including integral flanges at opposite ends of said retainer strip,
   - a laterally extending integral flange on said panel at the inner end of said panel opening,
   - and an integral nib on said panel at the outer end of said panel opening,
   - one said retainer strip flange abutting said panel end,
   - the other said retainer strip flange being engageable with said panel flange to lock the retainer strip in place,
   - and said compression spring engaging said nib and tending to move said glide inwardly of said panel end for tensioning said roller into engagement with a rail.

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