Sept. 11, 1962 W. J. MATHEWS 3,052,930

SLIDING DOOR CONSTRUCTION

Filed Nov. 17, 1959 3 Sheets-Sheet 1

Fig 1

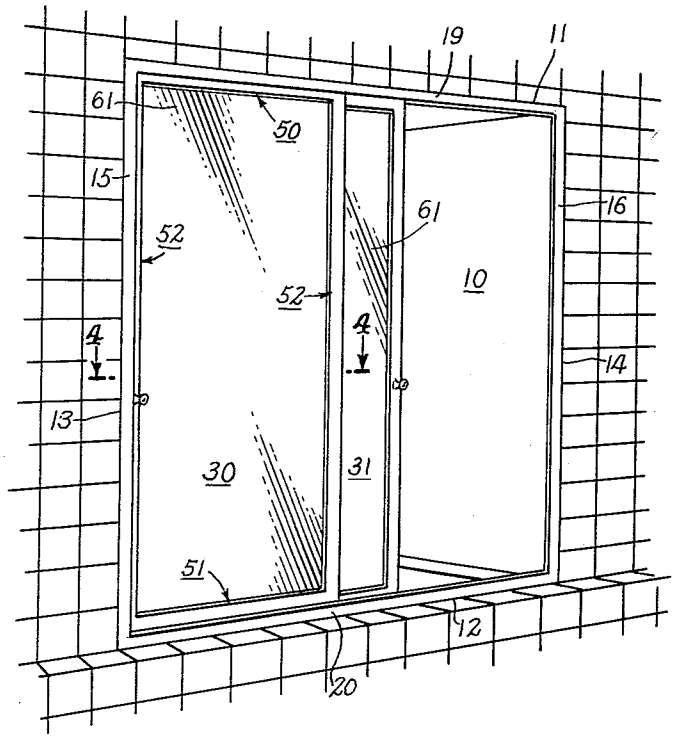
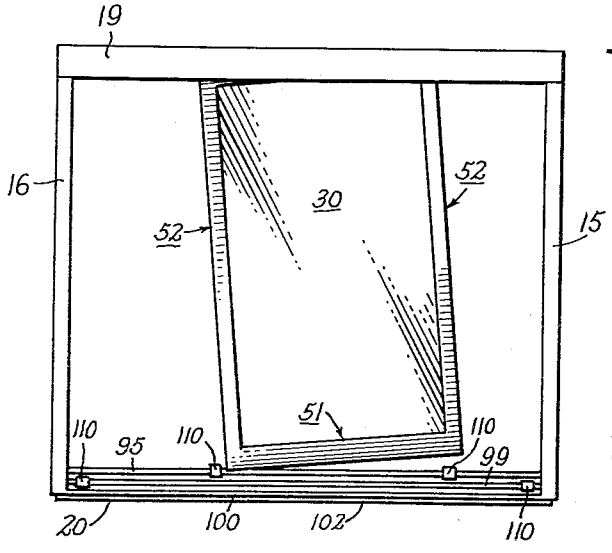


Fig 6



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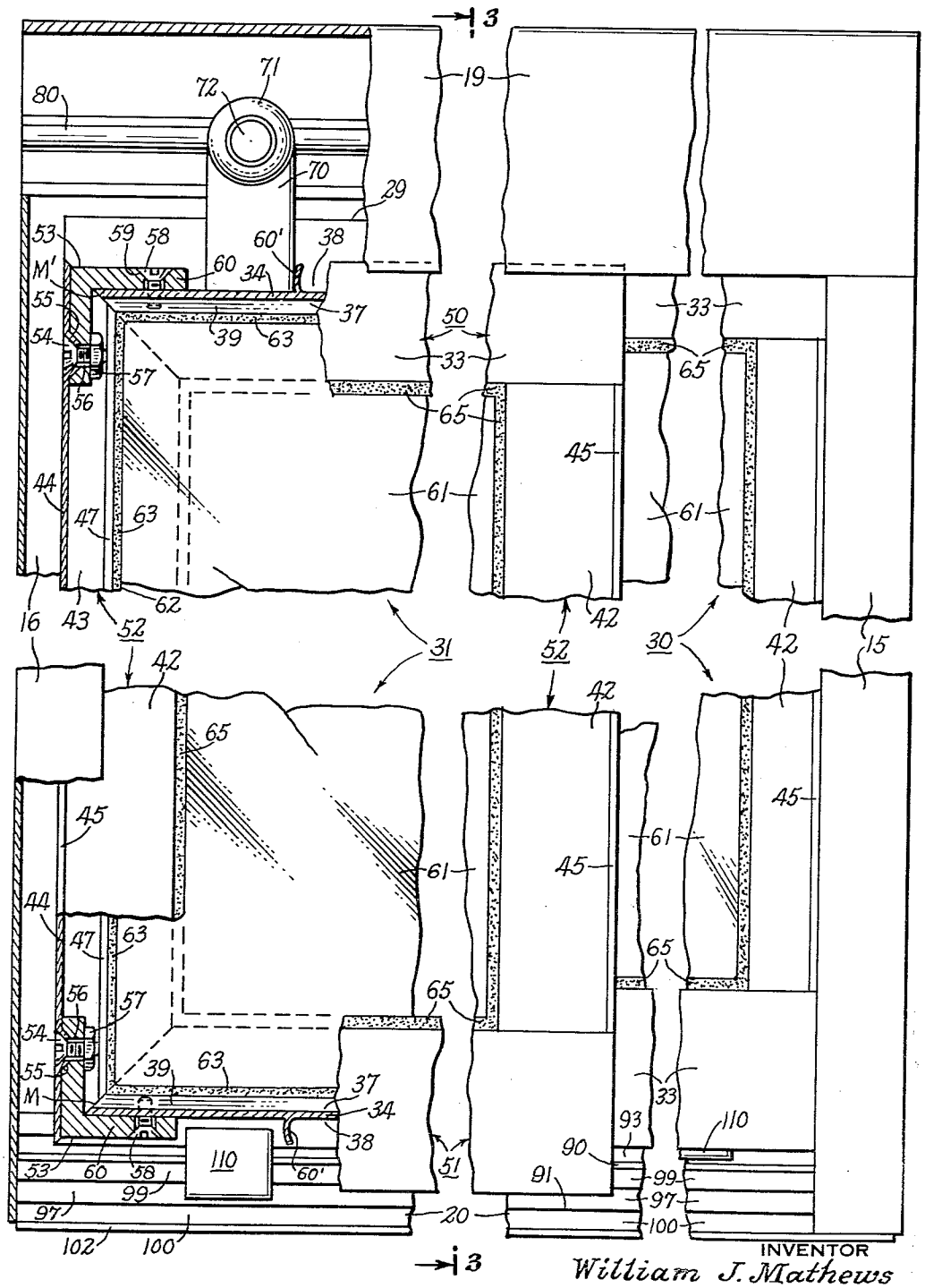


FIG 2

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SLIDING DOOR CONSTRUCTION

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Fig 3

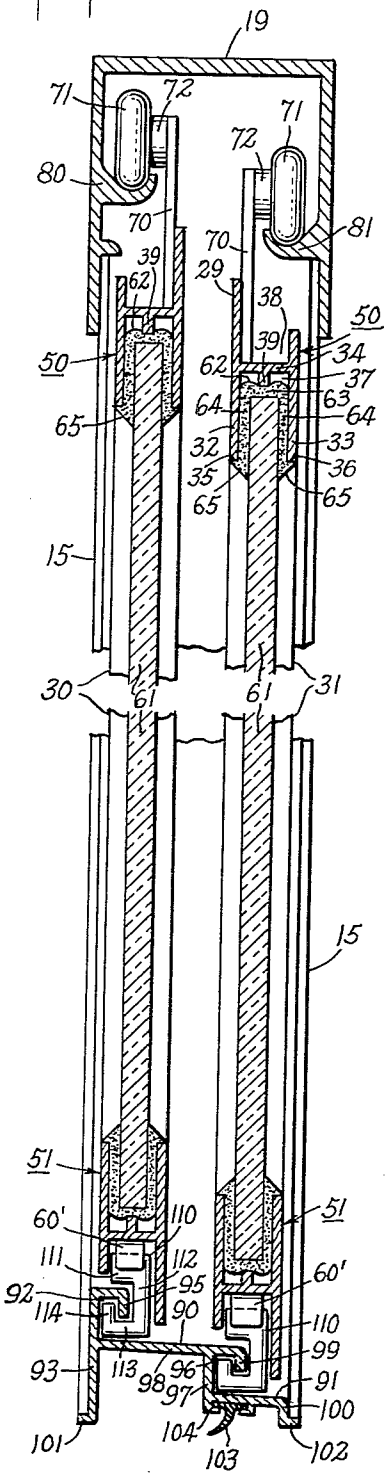


Fig 4

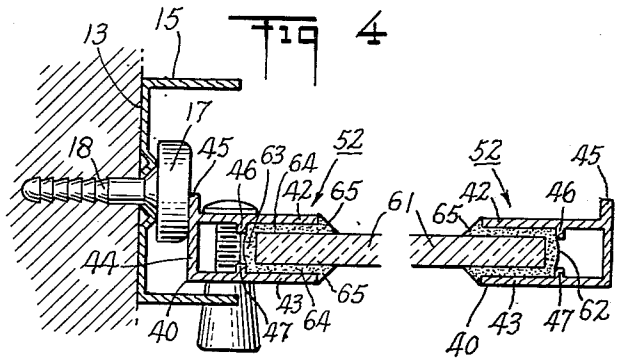
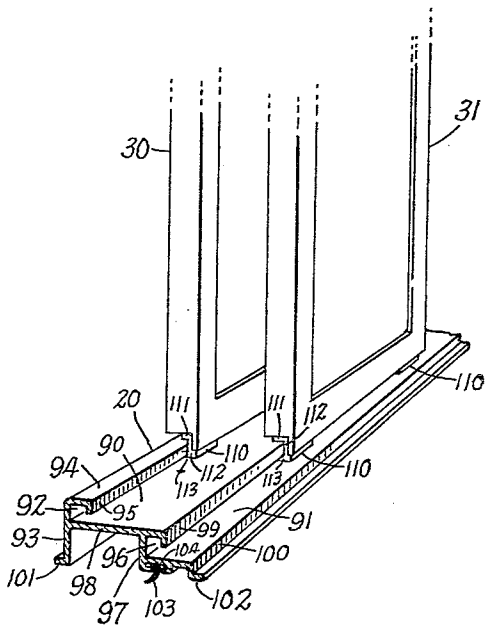


Fig 5



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3,052,930

SLIDING DOOR CONSTRUCTION

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8 Claims. (Cl. 20—19)

This invention relates to a closure assembly and more particularly to a sliding door closure assembly of the type wherein a panel or panels are mounted for translatory movement along vertically spaced apart guideways.

Still more particularly, this invention relates to a sliding door closure assembly having especial utility as a shower enclosure or in like applications involving exposure to water.

This invention, further relates to a novel sliding closure structure and sill therefor having many advantages as compared with sliding doors heretofore known.

It is known in the art to provide a sliding door assembly wherein a panel or panels are suspended by rollers for sliding translatory movement along overhead tracks. In such known assemblies, the lower edges of the panels are normally guided in extended U-shaped channels formed on the upper surface of a sill structure disposed beneath the overhead tracks. Such known assemblies, particularly when used as part of a bath or shower enclosure or other application wherein they may be subjected to water spray, present certain drawbacks, due in large part to the U-channeled sill structure above described.

These channels tend to collect water, notwithstanding the drainage apertures usually provided intermittently along sides thereof. As a result, such collected water, especially as a carrier of soap suds, may stagnate, creating an unsightly as well as unhygienic condition in the bathroom. In areas where the mineral content of the water is high, evaporation of water collected in the sill channels leaves a white residue or scale which similarly detracts from the appearance of the sill and assembly.

The above noted problems are magnified by the difficulty of cleaning the sill structures heretofore known, the exposed surfaces of the U-shaped channels being relatively inaccessible.

It is, accordingly, an object of this invention to provide a sliding closure assembly substantially free from the drawbacks commonly associated with similar assemblies heretofore known. More specifically, it is an object of this invention to provide a sliding door assembly for use as a shower enclosure or the like having a sill structure substantially free from a tendency to permit water to collect thereon.

A further object of this invention is to provide an assembly of the type described wherein the exposed parts are readily accessible for cleaning.

Still a further object of this invention is to provide an assembly of the type described wherein the assembly, in a measure, is self-cleaning.

Still a further object of this invention is to provide an assembly of the type described wherein slight inaccuracies in alignment of the assembly parts will not adversely affect the smooth operability of the panels, thereby enabling relatively inexperienced "do it yourself" craftsmen to install the assembly, particularly to existing bath tub installations to convert them to shower stalls.

Still a further object of this invention is to provide an assembly of the type described, featuring exceptionally smoothly operating sliding panel members.

Still a further object of this invention is to provide an assembly of the type described wherein the panel members may be easily mounted and demounted from the guideways provided therefor.

Still further objects of the invention relating to details of construction and economies of manufacture as well as the advantages of the invention will appear more fully hereafter.

The invention will now be described in detail with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of the sliding closure assembly used in a shower enclosure installation;

FIGURE 2 is a magnified fragmentary rear elevational view of the sliding closure assembly, with parts broken away to show details of construction;

FIGURE 3 is a vertical section taken on the line 3—3 of FIGURE 2;

FIGURE 4 is a magnified horizontal section taken on the line 4—4 of FIGURE 1;

FIGURE 5 is a perspective of the sill and lower panel members, as viewed from within the shower enclosure;

FIGURE 6 is a diagrammatic assembly view from inside the enclosure, illustrating the manner in which the panel members are installed within the framework.

A sliding door assembly in accordance with the invention is illustrated in FIGURE 1 in use as a closure for a tile framed opening 10 to a shower enclosure, it being understood that this opening may be the space over an existing bath tub installation for conversion to a stall for showers instead of a curtain enclosed space.

The opening 10 to the enclosure is defined by horizontally disposed top and bottom walls 11, 12, respectively, and by vertically disposed left and right side walls 13, 14, respectively.

Side jamb pieces 15, 16 are secured to the vertical edges of the walls 13, 14, respectively, by suitable fastener means, such as expansion bolts, friction nails or the like, depending upon the materials of which the walls are fabricated. A countersunk buffer 17 (see FIGURE 4) of nylon or a like shock reducing material may be interposed between fasteners 18 and the jamb pieces 15, 16, to prevent damage or shock when the panels are slid against the jambs with undue violence.

The panel supporting strurcture is completed by the provision of upper frame member 19 and sill 20, secured, respectively, to the upper and lower walls 11 and 12. The complete framework consisting of the jamb pieces, upper frame member and sill, in accordance with known practice, is aligned in a vertical plane.

The panel members 30, 31 comprise rectangular frames, preferably of extruded aluminum or the like, said frames presenting on their inner peripheries, a continuous U-shaped channel within which rectangular lights of glass, plastic or the like may be secured.

The extrusions 29 forming the upper and lower frame portions of panels 30 and 31, as may best be seen in FIGURE 3, comprise in cross section spaced parallel walls 32, 33 joined by an intermediate connecting web 34 disposed normal to the plane of the walls 32, 33. The wall 32 is longer than the wall 33, and since the inwardly directed edges 35, 36 of the walls 32, 33, respectively, extend the same distance beyond the web 34, a cross section through the extrusion 29 is to define an inwardly directed, U-shaped channel 37 and an outwardly directed J-shaped channel 38. In addition, a reinforcing rib or wall 39 extends inwardly from the web 34 within channel 37, in parallelism with walls 32, 33, for purposes which will appear hereafter.

The extrusions 40 forming the side or vertically directed frame portions of the panels 30, 31, as may be seen from FIGURE 4, comprise, in cross section, inwardly directed extended U-shaped channels 41 defined by parallel side walls 42, 43, extending from base wall 44. A ledge or extension 45 of the wall 44 may be provided to coact with the buffers 17 in limiting the closing movement of the

doors or panels 30, 31, as well as to provide a means for gripping the doors from within the shower enclosure. In addition, the side walls 42, 43 of extrusions 40 are provided with opposed lips 46, 47, normal to the walls 42, 43, respectively, for purposes appearing hereafter.

The upper and lower components 50, 51 of the panel frames are formed by cutting extrusions 29 and the sides 52 by cutting extrusions 40 into sections of a size dependent upon the ultimate size of panel desired. The side and lower sections of the frames are mitered to join at a line M extending through the corners thereof, the miter line M' where the upper frame section 50 joins the side sections 52 being at the corner of the side sections, but downwardly spaced from the corner of the upper frame sections 50.

The side sections 52 are secured to the upper and lower sections 50, 51 by means of corner key members 53 comprising right angular, L-shaped parts. Machine screws 54 inserted through countersunk apertures 55 in walls 44 of side sections 52 and through holes 56 in the members 53 and lock nuts 57 subsequently tightened over the said screws, serve to secure the said key members 53 tightly adjacent the inner face of wall 44 at the upper and lower extremities of the side sections 52.

The key members 53 are secured adjacent the outer face of the walls 34 of the upper and lower frame sections 50, 51, respectively, by self-tapping screws 58 passed through countersunk apertures 59 in key members 53 and threaded into the walls 34 and 39 of the said upper and lower members. It will be readily recognized that when thus assembled, the horizontal legs 60 of the key members 53 will be disposed within the J-shaped channels 38 of the upper sections 50, partially to block the said channels adjacent the outer longitudinal edges thereof. The channels 38 of said upper sections 50 are blocked at a point longitudinally inwardly spaced from the end of legs 60 by lugs 60' formed by portions of the wall 34 surrounding the rib 39 which have been struck out to project into the said channel.

Lights 61, which may comprise glass, plastic or the like, are secured to the panel frames prior to the final assembly thereof, as previously described. For this purpose, strips of U-shaped vinyl or other packing or gasket material 62 are cut and mitered in lengths corresponding to the inner periphery of the frames.

The gaskets 62 include a central branch 63 and extending, generally parallel legs 64, adjacent the ends of which there are formed outwardly directed flanges 65. Prior to assembly of the frame, the mitered gasket sections are forced over the lights 61, with the legs 64 embracing the outer peripheral and adjacent portions of the lights. The frame sections 50, 51, 52 upon assembly, will embrace the outer gasket surfaces, causing a tight sealing of the lights in the panel frames.

In the case of the side sections 52, the gasket 62 will be secured with the branch 63 of the gasket resting against inturned lips or walls 46, 47, and the gasket flanges 65 lying in sealing position adjacent the ends of legs 42, 43. In the case of the top and bottom sections 50, 51, the branch 63 of the gasket will be centrally contacted by an inwardly directed reinforcing rib or wall 39, and the flanges 65 will be sealed against the ends of legs 32, 33.

The panels 30, 31 are provided with upwardly extending roller brackets 70 adjacent the corners of the said panels. Ball bearing rollers 71, preferably having nylon rims, are rotatably secured to brackets 70 by shafts 72, the rollers 71 being offset laterally form the brackets so that when the rollers are suspended in a track, the panels will tend to hang substantially in a vertical plane.

The upper door frame 19 is generally U-shaped in cross section, as may best be seen from FIGURE 3. A pair of parallel tracks 80, 81 extend the length of the frame 19, the said tracks being laterally and vertically spaced apart.

The sill 20 is disposed vertically beneath the upper frame 19 and comprises an upper track or step 90 and a lower track or step 91. A first longitudinally extending, partially closed guideway 92 is provided adjacent and extending above the upper step 90, the said guideway being defined by the step 90, the forward wall 93 of the sill 20, upper guideway wall 94, and a lip 95 directed toward but terminating in spaced relation to the step 90. A second longitudinally extending, partially closed guideway 96 is provided adjacent the outermost part of the lower step 91, the said second guideway having a bottom defined by portions of step 91, a substantially vertical side wall 97, a top wall 98 comprising a portion of the upper step 90, and a lip 99 directed toward and terminating in spaced relation to the lower step 91. The portions of the first and second guideways extending above the upper and lower steps, respectively, generally resemble, in cross section, an inverted J. The upper exposed surfaces of the steps 90, 91 and the top walls 94, 98 of the guideways 92, 96 are preferably inclined toward the inner or rearward edge 100 of the sill 20 so that water impinging upon any upward exposed surface of the sill will tend to drain toward the said inner edge 100.

The sill 20 is provided with outer and inner foot portions 101, 102, adapted to rest on the upper face of the lower framing wall 12, or the tub edge where the installation is to such construction. The feet 101, 102, together with resilient gasket 103 carried in channel 104 beneath the sill 20, assure a water-tight sealing fit of the sill so that water will not be able to pass beneath the said sill.

Before final installation of the sill 20, between the side jambs 15, guide blocks 110 must be endwisely slid into engaged position within the guideways 92, 96. The guide blocks 110 are preferably fabricated of nylon or a similar material which offers a low coefficient of friction and great resistance to wear when slid against aluminum or a like metal. The guide blocks are generally J-shaped in vertical cross section and include an upper, horizontally extended branch portion 111, a downwardly directed leg 112, a laterally extending portion 113, and an upwardly directed offset lip or flange 114. Two guide block members 110 are provided for each of the tracks or steps 90, 91, the offset flanges 114 of the blocks riding in the guideways 92, 96 of the upper and lower steps, respectively. It will be readily recognized that once the sill has been secured between jamb pieces 15, with the guide blocks 110 seated as above described, the blocks may be slid longitudinally along the sill 20, but the flange 114, due to its confinement in the guideways 92, 96, will limit relative lateral movement of the blocks and sill.

Installation of the panels 30, 31, is best understood by referring to FIGURES 3 and 6. The panel 30 must first be installed on overhead track 80 by seating the rollers 71 on the said track, such seating being most easily accomplished if, in addition to being lifted, the panel 30 is inclined slightly to the horizontal. With the rollers 71 riding on the track 80, the lower edge of the panel is swung toward the sill until the panel is aligned in a substantially vertical plane. The panel is next canted sidewise, as shown in FIGURE 6, while being maintained in a vertical plane, using one of the rollers 71 as a fulcrum point for such sidewise canting. As a result of the last mentioned canting, one of the lower marginal edges of the panel 30 will be elevated from the sill 20, permitting one of the guide blocks 110 which ride in guideway 92 to be slid along the step 90 to a position beneath the elevated guide block receiver pocket P formed in the channel 38 of the lower frame member of the panels by the legs 60 and lugs 60'. The panel 30 may then be lowered and returned to its normal position where the guide block 110 will be trapped in its working position in receiver pocket P. A block 110 is installed on the pocket P located at the opposite

lower edge of the panel **30** in similar manner, this time canting the panel in the opposite direction by using as a fulcrum the roller **71** not used in the installation of the first guide block.

The panel **31** is installed in like manner on overhead track **81**, the guide blocks **110** which have their upwardly extending, offset portions **114** riding in guideway **96** being employed in this instance.

It should be noted that considerable vertical clearance between the top of blocks **110** and the wall **34** in the lower panel frame members is provided, so that in the event the sill **20** is not aligned in precise parallelism with the upper tracks **80**, **81**, a measure of relative movement of these parts is permitted, so that the panels will not bind as they are slid along the tracks. Relatively small lateral clearances of blocks **110** in the pockets P is provided, such clearance being sufficient, however, to permit the blocks to move freely upwardly and downwardly in pockets P, as heretofore described.

It will be observed that in sliding the panels, there is no metal to metal contact, thereby assuring exceptionally smooth operation and minimizing wear. Knobs K may be affixed to the outer surface of the panel frames for further facilitating the sliding thereof.

It will be readily recognized that by providing a sill structure wherein all the upper surfaces are unobstructed and preferably inclined inwardly, or to the tub side of the enclosure, water impinged upon the sill will drain freely, and there will be no substantial accumulations of water and, accordingly, no formations of slime or mineral deposits, as found where conventional sliding doors are used in an environment where there will be exposure to water. Such free draining of the sill structure is accomplished while providing full support against lateral deflection of the lower marginal edges of the panels with respect to the sill.

Moreover, the wiping action of the guide blocks **110** sliding over the steps of the sill **20** as the panels move, will tend to dislodge droplets not drained from the upwardly faced or inclined surfaces and will tend to make the sill self-cleaning, in a measure, with the use of the panels.

Further, should cleaning of the sill be found necessary, the operation may be readily accomplished since all upper, visually exposed surfaces of the sill are readily available for cleaning by a damp rag or the like. In contrast, the upper sill surfaces of conventional sliding doors utilizing U-shaped channel members cannot be thoroughly cleaned without considerable difficulty.

A further advantage of the above described sliding closure assembly is the ease with which the panel members may be mounted within the guide and support mechanism as compared with closure structures heretofore known.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is:

1. A closure structure comprising a horizontally disposed upper track, a panel guided for linear sliding movement along said track, a sill disposed beneath said track in parallel spaced relation thereto, the upper surface of said sill being sloped laterally with respect to the horizontal, a partially closed guideway formed longitudinally of said sill, said guideway terminating in a lip directed toward and spaced from said upper surface of said sill, at least one independent guide member slidably carried by said sill, said member including an offset portion adapted to ride in said guideway, said panel including, adjacent the lower marginal edge thereof, guide receiver means loosely telescoped with said guide members to secure the latter to said panel against substantial lateral and longitudinal movement with respect to said lower marginal edge, said guide means being insertible endwise into telescoped relation with said receiver means.

2. A sliding closure structure comprising a horizontally disposed upper frame member having a pair of laterally spaced apart tracks, a panel member guided for linear sliding movement along each said track, a sill disposed in parallel spaced relation beneath said tracks, said sill including longitudinally extending upper and lower, laterally sloping drainage steps, a first partly closed guideway adjacent the uppermost inclined edge of said upper drainage step, said guideway terminating in a lip directed toward and spaced from said upper drainage step, a second partly closed guideway having a top wall portion defined by an extension of the lower inclined edge of said upper drainage step, said second guideway terminating in a lip directed toward and spaced from said lower drainage step, upper and lower independent guide means slidably mounted on said upper and lower steps, respectively, said guide means including an offset portion adapted to ride in said guideways and downwardly directed portions gravitationally resting on said steps, each said panel including adjacent the lower marginal edge thereof guide receiver means surrounding said guide means and permitting relative vertical shifting movement of said guide means with respect to said panel, said guide means being insertible endwise into engagement with said receiver means.

3. A sliding closure structure comprising an upper frame member having a pair of laterally spaced apart tracks, a pair of panel members arranged to be suspended one on each said track for linear sliding movement therealong, a sill arranged to be disposed in parallel spaced relation beneath said tracks, said sill including longitudinally extending upper and lower drainage step portions, first and second partially closed guideways extending substantially the entire length of said sill adjacent said upper and lower step portions, respectively, each said guideway including top and side wall portions terminating in a lip directed toward and spaced from one of said step portions, independent guide means arranged to be slidably mounted in said guideways, said guide means including offset portions insertible endwise into said guideways, and guide receiver means adjacent to the lower marginal edges of said panel members arranged to be seated over said guide means and providing a vertically shiftable connection therewith, whereby said parts are loosely interfit.

4. A sliding closure structure comprising an upper frame member having a pair of laterally spaced apart tracks, a panel member suspended from each said track to be slidable therealong, a sill adapted to be disposed in parallel spaced relation beneath said tracks, said sill including longitudinally extending, laterally sloping upper and lower drainage step portions, a first partly closed guideway adjacent the uppermost inclined edge of said upper drainage step, said guideway terminating in a lip directed toward and spaced from said upper drainage step, a second, partly closed guideway having a top wall portion defined by an extension of the lower inclined edge of said upper drainage step, said second guideway terminating in a lip directed toward and spaced from said lower drainage step, independent guide means mounted on said upper and lower step portions for sliding movement therealong, offset portions on said guide means riding in said guideways and limiting lateral movement of said guide means with respect to said sill, said guide means including portions extending laterally from said guideways and guide receiver means loosely seated over said extending portions of said guide means and comprising vertically extending pockets carried by said panel members adjacent the lower marginal edges thereof.

5. A device in accordance with claim 4 wherein said steps are inclined in the same direction and said upper step is sloped toward said lower step.

6. In a sliding closure structure including an upper frame member having a pair of laterally spaced apart tracks and a panel member suspended from each said track for longitudinal sliding movement therealong, said

panel members including vertically extending pockets defined by the lateral walls of said panels adjacent the leading and trailing lower marginal edges of said panels, a sill structure including longitudinally extending upper and lower step portions, first and second longitudinally extending guideway means adjacent said upper and lower step portions, respectively, and guide means including offset portions slidable within said guideway means, said guide means including extending portions slidable within said pockets in a vertical plane and downwardly directed portions gravitationally resting atop said step portions, said downwardly directed portions wiping against the upper faces of said step portions as said guide means slide along said guideway means.

7. A device in accordance with claim 6 wherein said steps are sloped for drainage toward the lateral marginal edge of said sill adjacent said lower step portion, said second guideway means is disposed in a plane beneath the lowermost inclined edge of said upper step, and the uppermost portion of said second guideway means comprises a portion of said upper step.

8. A sliding closure structure comprising an upper frame member having a track, a panel member slidably suspended on said track, a sill disposed parallel to and vertically beneath said track, a guideway formed on said sill and including lateral retaining walls extending along said sill, at least one guide block slidably mounted within said guideway and including a portion extending without said guideway, and a guide block receiver member on said panel loosely engaging said extending portion of said guide block, said panel and said guide block being relatively movable in the plane of said panel and being insertible endwise into said panel.

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