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DOOR REINFORCEMENT MEANS

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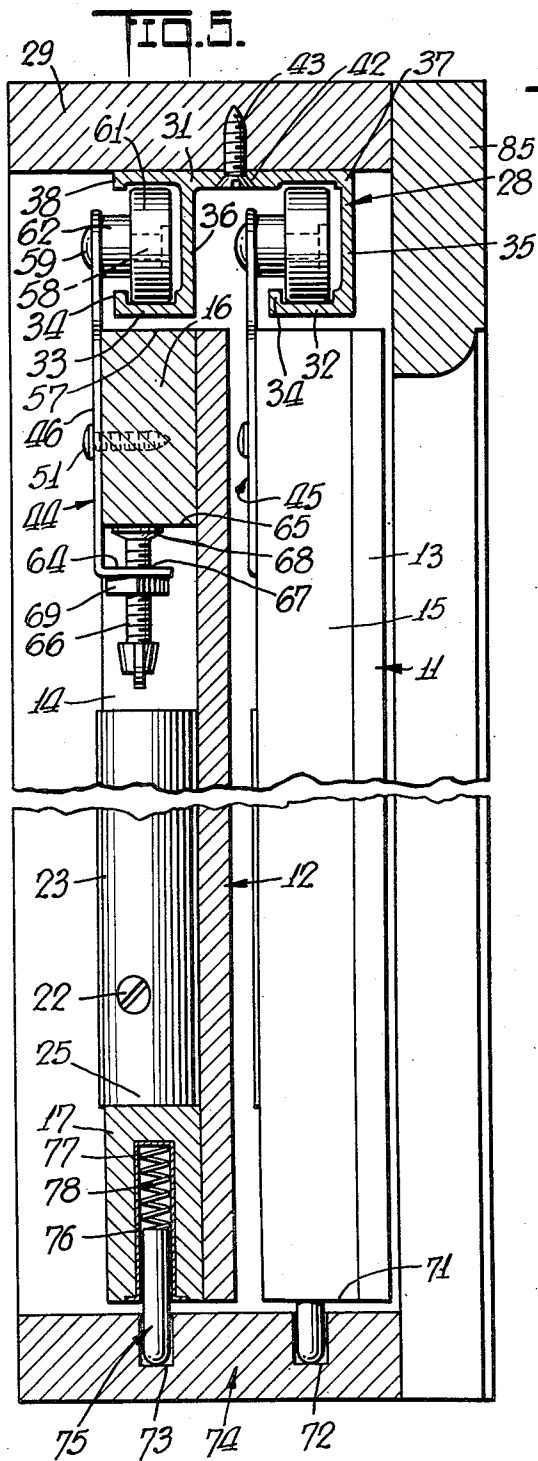
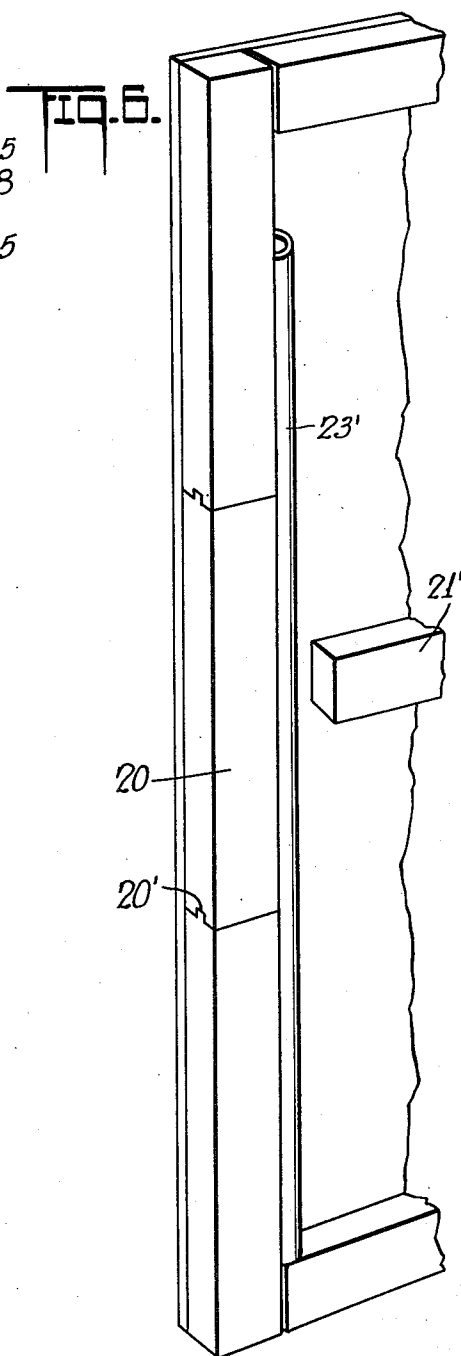
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1 Claim. (Cl. 20—38)

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This invention relates to door assemblies, more particularly of the overhung sliding type.

Where wooden doors used in sliding door assemblies are of thick, heavy construction, in addition to being awkward to transport and mount, the warpage inherent in wooden doors would tend to cause the doors both to bow and to twist longitudinally.

As the thick door is relatively non-flexible, the twisting thereof would cause it to bind in its track and jam. Where the assembly comprises a plurality of doors slidable in parallel planes, the bowing of the doors would cause them to jam as they were moved past each other, unless such planes of movement were relatively widely spaced. This, however, would be impractical for the resultant gap, even when the doors were closed, in addition to being unsightly in appearance would expose the contents of the room or closet in which the assembly is mounted, to dirt, dust and insects.

If to overcome the rigidity of the thick wooden door it is made of thin flexible stock, such door, in addition to being difficult to handle, would have a greater tendency to bow due to warpage with the resultant difficulties above set forth.

As the frame in which the door assembly is mounted may not be exactly rectangular due to initially poor construction or to settling of the building, and as the doors themselves may not be exactly rectangular, unless some means are provided to mount the doors to permit ready adjustment thereof so that their side edges can be made to lie substantially flush with the associated door jamb when the doors are closed, an unsightly gap will result between the jamb and the door edge, the disadvantages of which have been previously set forth.

Where such adjustable mounting means cause the upper edge of the door to be substantially spaced from the track on which it is mounted, the maximum length of the opening in which the door is installed is not available for entry and in addition the relatively large space between the upper edge of the door and the track would provide an undesirable gap.

It is accordingly among the objects of the invention to provide a sliding door assembly which has but few relatively inexpensive parts none of which is fragile or likely to become out of order and which may readily be assembled in a relatively short time by even an unskilled carpenter, which assembly is simple to install and readily adjustable both during and after in-

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stallation and the doors of which are of relatively light weight construction and will not jam in their tracks even after long continuous use and which will not bow and which doors substantially completely seal the opening in which they are installed without gaps.

Another object is to provide a bracket for slidably mounting doors on a track which bracket has but few relatively inexpensive parts none of which requires precision in the manufacture thereof and which may readily be mounted on and removed from said track and from said doors, which brackets will suspend said doors with the upper edge thereof closely adjacent the track and which may readily be adjusted to tilt the door or to raise and lower the same with but a simple operation without the need for any special tools.

Another object is to provide a track for sliding doors, which track is relatively simple to manufacture and may readily be installed by even an unskilled worker, which will securely retain a roller thereon without likelihood of dislodgement and which will suspend a plurality of doors so as to slide in closely adjacent parallel planes.

According to one aspect of the invention, the sliding door assembly comprises a door having a horizontal track positioned above the upper edge thereof and aligned therewith. Means are provided associated with said door and mounted near the upper lateral edges thereof respectively pivotally and slidably to mount said door on said track with at least one of said means being pivotally mounted on said door.

More specifically said means comprises a bracket having a portion extending above the upper edge of said door and carrying means slidably mounted on said track, said portion being pivotally mounted with respect to said track and said bracket having means associated therewith to adjust the pivotal movement thereof.

In a preferred embodiment the means slidably mounted on said track comprises a stud affixed at one end to said portion and extending over said track, said stud carrying a roller rotatably mounted on its free end and riding on said track. The means to adjust the pivotal movement of said bracket comprises a tongue extending laterally beneath a transverse strip affixed to the upper edge of the door and having a screw threaded therethrough and abutting against said strip.

According to another aspect of the invention, the door comprises a rectangular panel of rela-

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tively thin wood stock having reinforcing strips along each of the edges thereof, with the strips along the top and bottom edges of the door being straddled by and spaced from the strips on the side edges of the door. Means are provided to prevent bowing of the door which may comprise a tubular member affixed to each of the side strips respectively and resting against the panel.

According to still another aspect of the invention, the track comprises a metal strip having parallel spaced rails extending longitudinally thereof each with an upstanding lip at the free end thereof, and spaced from the strip by vertical flanges desirably formed integral with the rails and the mounting strip.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a rear view of a sliding door assembly mounted in a frame therefor,

Fig. 2 is a transverse sectional view taken along line 2—2 of Fig. 1,

Fig. 3 is a view similar to Fig. 1 on a larger scale with parts broken away,

Fig. 4 is a transverse sectional view taken along line 4—4 of Fig. 3,

Fig. 5 is a longitudinal sectional view on a larger scale with parts broken away, taken along line 5—5 of Fig. 1, and

Fig. 6 is a fragmentary perspective view on a larger scale of another embodiment of the invention.

Referring now to the drawings, the sliding door assembly shown in Fig. 1, comprises a plurality of identical doors, illustratively two in number designated by the numerals 11 and 12.

Each door comprises a substantially rectangular panel 13 preferably of relatively thin wood such as plywood. Affixed preferably to the rear face of the panel along each of the edges thereof respectively are reinforcing strips 14, 15, 16 and 17 preferably of wood of greater thickness than panel 13. Although the reinforcing strips may be nailed or screwed to the panel 13, they desirably are glued thereto in order that no nail or screw heads will be exposed on the front face of panel 13.

Preferably, as shown, strips 14 and 15 extend substantially the entire length of the panel and strips 16 and 17 are straddled by strips 14 and 15 with the ends 18 of strips 16 and 17 being spaced from strips 14 and 15 by a small gap 19.

Where the door, as shown in Fig. 6, corresponding parts of which have the same reference numerals primed as doors 11 and 12, is of relatively great length, the elongated side strips would tend to warp prior to installation and be difficult to handle and when installed would tend to expand and contract along the entire length thereof with resultant warpage of the door. It is preferred therefore to form such side strips by utilizing a plurality of shorter length sections 20 having coacting tenon and mortise joints 20' securely to retain the wood sections together yet permit slight expansion and contraction thereof.

Desirably an additional reinforcing strip 21 is positioned on the rear face of panel 13 extending transversely thereacross substantially midway between strips 16 and 17 and is affixed to the panel in the manner previously described.

Affixed to strips 14 and 15 respectively as by nails 22 are reinforcing members 23 and 24, each preferably comprising a rigid metal tube which, as shown, lies against the rear face of panel 13 with the lower ends 25 of members 23

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and 24 resting against strip 17 and with the upper ends 26 of said members 23 and 24 being spaced from strip 16 as at 27.

Means are provided slidably and pivotally to mount the doors 11 and 12 so that they may move in adjacent parallel planes on a track 28 extending substantially the width of the frame or casing in which the assembly is to be mounted and affixed to the horizontal top piece or lintel 29 thereof.

Although any suitable track could be used in the embodiment herein, as shown in Figs. 1, 3 and 5, the track desirably is of extruded metal and comprises an elongated, flat mounting portion or strip 31 illustratively having two spaced parallel, horizontal rails 32 and 33 extending longitudinally thereof. The rails, each of which has an upstanding lip 34 at the free end thereof, are desirably spaced from mounting portion 31 by vertical flanges 35 and 36 respectively, formed integrally with the rails and the mounting portion, with the flange 35 being aligned with edge 37 of the mounting portion 31 and with the free end of rail 33 being aligned with the edge 38 of the mounting portion 31.

As shown in Fig. 5, the rails 32 and 33 are spaced sufficiently to provide access to longitudinally aligned openings 42 in mounting portion 31 along the middle thereof so that screws 43 which secure the track 28 to lintel 29 may readily be inserted therein.

The means slidably and pivotally to mount the doors 11 and 12 desirably comprises a pair of mounting brackets 44 and 45 corresponding parts of which have the same reference numerals primed.

Each bracket desirably comprises a plate 46 preferably of sheet metal having an opening 47 and an arcuate slot 48 therein, said slot being the portion of the circumference of a circle having opening 47 as its center. As shown in Fig. 3 the brackets 44 and 45 are pivotally mounted near the upper lateral edges of the door preferably to the reinforcing strips 14 and 15 respectively by means of screws 49 extending through openings 47 so as to move in a plane parallel to the face of panel 13 with the pivotal movement of the brackets being limited by means of screws 51 extending through arcuate slots 48 and secured in reinforcing strip 16. As shown in Fig. 3, the heads of screws 49 and 51 are of larger diameter than the diameter of opening 47 or the width of slot 48 so as to retain the plate 46 on the door.

In order to facilitate the initial fastening of the plate to the door and also to obviate the need for removing screws 49 and 51 in order to detach the plate from the door, opening 47 and arcuate slot 48 each has a slot 52, 53 associated therewith respectively and extending transversely of the plate 46, each of said slots 52, 53 terminating in an enlarged opening 54 and 55 respectively of greater diameter than the diameter of the head of the screws 49 and 51.

Thus with screws 49 and 51 in opening 47 and arcuate slot 48 respectively, to remove the plate it is merely necessary to loosen the screws and slide the plate transversely of the door with the transverse slots therein riding along the associated screws 49 and 51 until the heads of the screws are aligned with enlarged openings 54 and 55 and thereupon pull the plate away from the door.

Plate 46 has a portion 56 extending above the upper edge 57 of the door which mounts a lateral projection rigid therewith illustratively positioned between opening 47 and arcuate slot 48. The

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projection extends over the top 57 of the door with the free end thereof adapted to ride on either rail 32 or 33.

Preferably the projection comprises a stud 58, affixed at one end as by heading as at 59 to the plate 46 and rotatably mounting a roller 61 at its free end which is headed securely to retain the roller thereon. The roller is desirably spaced from the plate by a collar 62 preferably rigid with the stud, and rides on one of said rails 32 or 33, the upstanding lip 34 of the latter preventing dislodgment of said roller.

Although plate 46 could be pivoted by merely loosening screws 49 and 51, rotating the plate as desired about screw 49 and thereupon tightening the screws, as the screws might loosen after repeated use of the door which would cause the doors to drop by reason of their weight, it is preferred to provide additional means for adjusting the position of plate 46 which will securely retain the latter in adjusted position regardless of the loosening of screws 49 and 51.

To this end the plate 46 desirably has a laterally projecting tongue 64, preferably integral therewith at its lower edge remote from opening 47, which tongue extends beneath the undersurface 65 of strip 16. A thumb screw 66 is desirably threaded into an opening 67 in tongue 64 and preferably has a rotary cap 68 secured to its free end which engages undersurface 65. A lock nut 69 is desirably provided on thumb screw 66 to retain the latter in any position of adjustment.

As shown in Figs. 1 and 5, the lower edges 71 of the doors are also slidably mounted. To this end a track, comprising a plurality of parallel longitudinal grooves illustratively two in number designated by the numerals 72 and 73, is provided in the door sill 74. Although the lower edges 71 of the doors could ride in said grooves it is preferred to position such lower edges slightly above said grooves and provide a plurality of guide pins 75 illustratively two in number affixed to the undersurface of the strip 17 of the doors near each edge thereof which pins ride in such grooves.

Although the pins could be rigidly affixed to such strips 17, in the preferred embodiment herein, they are slidably mounted in a sleeve 76 affixed as by force fit in a bore 77 in said strip and normally urged downwardly by a coil spring 78. With such construction as the lower ends of the spring urged pins 75 will always ride on the floor of the grooves, the door will not shake or vibrate when pushed.

To install the sliding door assembly, the track 28 is affixed to the lintel 29 as previously described. A pair of brackets 44 and 45 are then placed on each of the rails 32 and 33 by merely inserting the rollers 61 thereof through the recess 79 formed between the beveled end 81 of the track 28 and the door jamb 82, and sliding the brackets along the associated rails 32 and 33.

Door 11 is then placed in upright position with its pins 75 positioned in groove 72 in door sill 74 and thereupon hung on brackets 44 and 45 riding on rail 32 by inserting the heads of screws 49 and 51 which preferably have been previously inserted in the strips 14, 15 and 16 and thereupon sliding the brackets so that the screws will be in openings 47 and arcuate slots 48 respectively and the screws 49 and 51 are then tightened. This procedure is thereupon repeated for door 12.

With the doors thus mounted, the thumb screws 66 will be positioned in the gaps 27 formed

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between the upper ends of tubes 23 and 24 and strip 16 so that ample room will be available to adjust the brackets.

By reason of the door construction thus described, it is light in weight and easy to transport and install and once mounted may readily be moved. Although the reinforcing strips give the relatively thin doors adequate rigidity for durability, the gaps 19 afford some flexibility and even if the doors should twist due to warpage, and the guide pins 75 should press against the side walls of grooves 72 and 73, by reason of the flexibility of the doors inherent with the construction described, they will only resiliently press against such groove walls and hence will not bind and may readily be moved, which would not be the case if the doors should be of thick wood construction and would tend to set in such warped condition.

The tendency of wooden doors to bow due to warpage would, in the case of sliding doors, cause the front and rear doors to press against each other and jam unless so widely spaced as to form an unattractive gap therebetween and inadequately seal the closet. The need for such spacing is, however, obviated by the tubular members 23 and 24, which will prevent bowing of the doors yet not impair the flexibility thereof.

Such flexible door construction also enables the two guide pins 75 to be used at the lower edge thereof so that the side edges of the doors will be adequately supported against lateral displacement in the event of pressure thereagainst which might cause jamming of the sliding mechanism. In the absence of such flexible door construction and where but one guide pin is used so that if the door should twist due to warpage, the pin would act as a pivot to prevent jamming of the door in the grooves, it is apparent that the side edges of the doors could readily be displaced laterally of the grooves with the disadvantages above set forth.

With the brackets herein described in the event the door jambs should not be vertical or if the door itself should be out of line it is a relatively simple matter to tilt the door so that the lateral edge thereof will lie flush against the door jamb. To this end it is merely necessary to loosen screws 47 and 51 of one of the brackets illustratively bracket 44 as shown in Fig. 3 and turn thumb screw 66 thereof.

As thumb screw 66 is rotated, for example, to move into tongue 64, the latter will ride down on screw 66 and hence plate 46 will pivot on stud 58 and screw 49 in a clockwise direction. As the horizontal position of stud 58 is fixed by reason of the rail 33 such pivoting action will lower the associated side edge S of the door, the other edge of which will pivot on stud 58 of bracket 45. If the door is initially in a vertical position the above adjustment will tilt the door in one direction and by rotating thumb screw 66 so as to move out of tongue 54, the door may be tilted in the opposite direction. It is apparent that to adjust the door by tilting it as above described, but one bracket need be adjusted. Where it is desired to raise or lower the door while still retaining it in a vertical position, the thumb screw 66 of both brackets must be turned. Once the door has been adjusted as desired, screws 49 and 51 are then tightened securely to retain the brackets in adjusted position.

As the adjusting screws 66 are beneath the reinforcing strip 16 on the rear of the door, they

are concealed from view and the upper edge of the door may be as close to the track 28 as possible depending upon the degree of adjustment required. Thus, if the door is to be hung with the top thereof in a horizontal position, the brackets may be adjusted so that the upper edge of the door is spaced from the undersurface of the track only sufficiently to provide clearance for free sliding of the door.

With this construction the door can be substantially as large as the opening in which it is to be fitted with only the width of the track intervening between the top of the door and the lintel. Consequently free access is provided to substantially the entire length of the closet and but a narrow decorative molding 85 is required to conceal the track.

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

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

A sliding door comprising a substantially rectangular panel of a single sheet of relatively thin wood stock, reinforcing strips along each of the edges thereof and affixed to the same face thereof, the strips along the top and bottom edges of said door being straddled by and spaced from the strips along the side edges of said door, a rigid

member of tubular stock affixed to each of said last named strips respectively and resting on said panel, the lower ends of said tubular members resting on the bottom strip and the upper ends of said members being spaced from said top strip.

ARTHUR SHECTMAN.

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