July 17, 1951 E. M. TRAMMELL, SR 2,561,079

SLIDING DOOR ASSEMBLIES

Filed Nov. 21, 1946

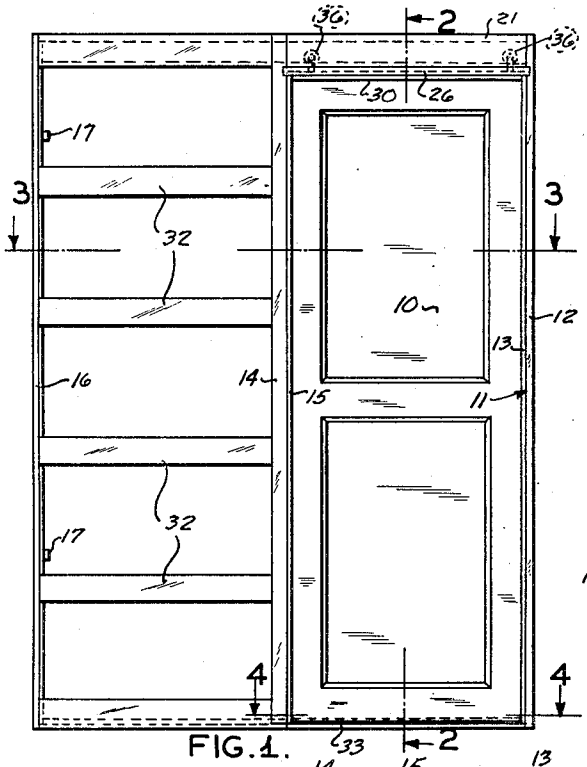


FIG. 1.

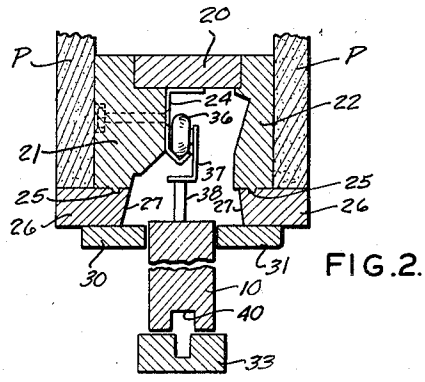


FIG. 2.

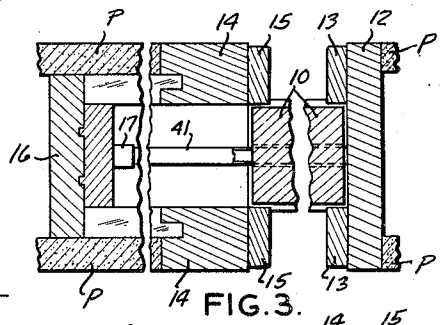


FIG. 3.

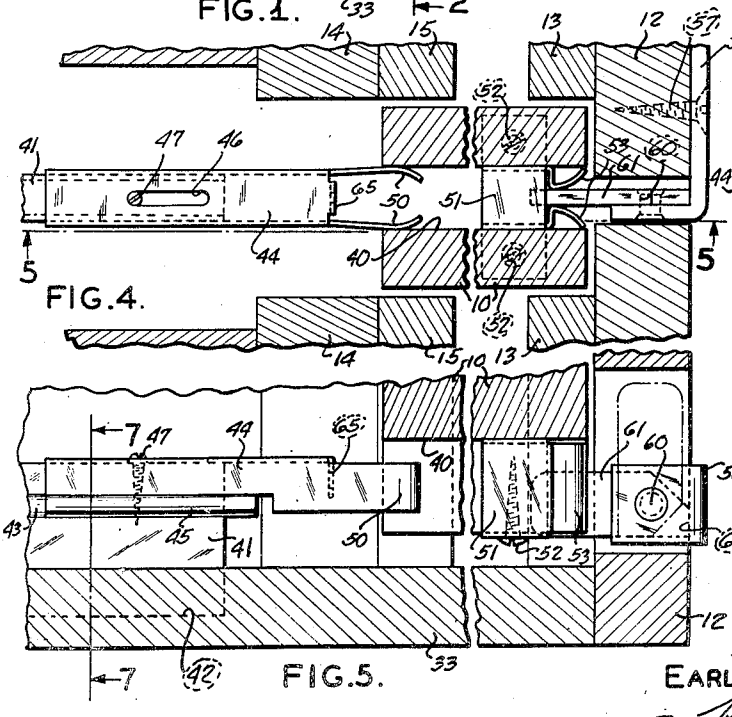


FIG. 4.

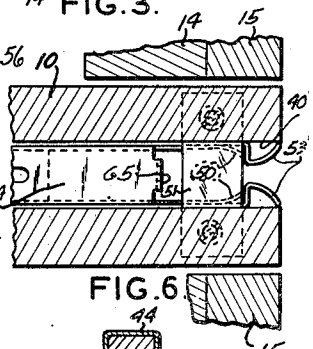


FIG. 6.

FIG. 5.

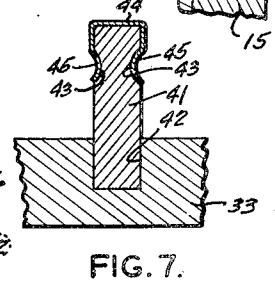


FIG. 7.

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SLIDING DOOR ASSEMBLIES

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7 Claims. (Cl. 20—19)

1

This invention relates to improvements in sliding door assemblies, and more particularly to improved framed door units, accessories and hardware items for use in and on track-supported doors. The present developments are particularly, but not exclusively, identified with sliding door assemblies which are or may be manufactured and distributed as complete framed units. The current improvements are of particular value in connection with interior sliding doors, such as those used in interior partitions.

The shortcomings of prevalent sliding door assemblies have prevented their widespread adoption for residential usage. Among the recognized difficulties with this type of door, are the noise of operation, the likelihood of rattling, due to vibration, air currents, etc., particularly when the door is in closed position, and the lack of any satisfactory provision for constraining the lower margins of the door to a rectilinear path of travel. The present invention accordingly has as a primary objective, the elimination of each of the several noted difficulties and disadvantages.

A further and important object of the invention is realized in an improved door frame unit, which is or may be completely fabricated as an item of millwork, at the situs of production, and is so proportioned and designed as to maintain the requisite rigidity and original angularity of its elements, not only during shipment and distribution, but after the unit is set into the wall.

Still further important objectives of the present development consist in the provision of door guiding means along the lower margin of the door, and which are of such nature that they offer no obstruction to the lower surface of the doorway, and which serve the dual functions of a door guide during periods of operation, and as a combination of retractible agencies enabling, when desired, lateral movement of the door from its normal plane of operation as a great convenience incident to hanging and removal of the door.

A still further and important objective of the present improvements is attained in the provision of a plurality of hardware items which are or may be sold separately, each as an article of manufacture, and of substantial utility in sliding door installations of a variety of forms.

The foregoing and numerous other objects will more clearly appear from the following detailed description of a presently preferred embodiment, taken in connection with the accompanying drawing, in which:

2

Fig. 1 is a side elevational view of an assembled door frame ready for installation, for example, prior to plastering, in a partition or interior wall;

Fig. 2 is a fragmentary, vertical, transverse sectional view, considerably enlarged, and as taken along line 2—2 of Fig. 1;

Fig. 3 is a greatly enlarged horizontal sectional view, considerably foreshortened, and as taken along line 3—3 of Fig. 1;

Fig. 4 is an enlarged foreshortened horizontal section as taken along line 4—4 of Fig. 1;

Fig. 5 is a fragmentary section in a vertical plane, as taken along line 5—5 of Fig. 4;

Fig. 6 is a fragmentary sectional view taken in a horizontal plane, and showing a fixture installed in connection with a bottom door groove, and with the door in open position, and

Fig. 7 is a fragmentary section in a vertical plane as viewed along line 7—7 of Fig. 5.

Referring now by characters of reference to the drawing, it is preferred for interior residential installations, as in a partition between rooms, to provide a door frame which may be fabricated as a millwork product and assembled as a substantially operative unit, complete upon hanging the door. Such a frame is shown as of rectangular construction and of an interior width approximating double the width of the door 10, so as to provide for full movement thereof between open and closed positions within the frame.

As shown in Fig. 1, the door occupies the door opening normally appearing after the frame is set in the wall, in which position it will snugly abut a vertical jamb structure generally indicated at 11, and including a vertical closing stop 12 (Fig. 3), to the face of which are secured vertical bead or guide members 13. These are arranged with slightly more than working clearance with the opposite faces of the closing edge of the door. A pair of pocket jambs 14 are disposed vertically in an intermediate position, and are spaced substantially as shown by Fig. 3, with the requisite door clearance, these serving to carry guide or beading members 15 analogous to those indicated at 13. The opposite vertical framing structure of the assembly is generally indicated at 16 (Fig. 1) and is or may be similar to the closing jamb indicated at 11, and, now obviously, will serve as an abutment for the left hand margin (Fig. 1) of the door when the latter is in open position. One or any suitable plurality of door bumpers 17 may be provided so as to minimize impact effects when the door is quickly brought to full open position.

The upper margin of the frame consists of an inverted trough-like assembly, the recess within which results in a head pocket or track pocket. This is conveniently formed of three interfitted elements best appearing in Fig. 2, and including a horizontal top closure strip 20, set into undercut or shouldered portions of spaced elements forming the sides of the trough and indicated at 21 and 22. The resulting pocket structure is adapted for the reception and enclosure of the track 24, hereinafter described in more detail and supported as by stove bolts 23, the heads of which are countersunk, the bolts extending through element 21. It will be noted that elements 21 and 22 are both obliquely undercut so as to facilitate lifting and remounting of the rollers when required, incident to removal and rehanging of the door. Fitted to the elements 21 and 22 as by a tongue or bead 25 in a corresponding groove, are finishing pieces 26 each relieved along its inner margin, so as to provide downwardly divergent faces 27. These serve, as will later better appear, to permit a wider latitude of swinging movement of the door 10 out of its normal plane, incident to door hanging or removal.

Serving at times as guiding elements for the upper margin of the doors, and as trim pieces, are a pair of beading elements or strips 30 and 31. These are attached to but easily removable from the members 26, as by screws, and coact with member 26 and with the head pocket, in concealing fully or to the extent desired, the hardware of the track and hangers.

Added bracing and additional support incident to plastering-in the frame assembly are attained by the provision of a plurality of pocket cross members 32, four of which are shown at each side of the frame structure, and which bridge the elements 14 and 16, substantially as shown. These are suitably recessed laterally of the frame as to the extent of the depth of plaster P, so as to be normally fully concealed after the frame assembly is set in the wall.

Normally mounted upon a subfloor or the like, is a sole strip 33 which originally extends the full width of the frame between the jambs 11 and 15 and which may, as is recommended, be of such dimensions that the portion thereof extending into the door opening, may be cut out after the frame is set in the wall. Thus during shipping and erection this element may serve a maximum strengthening and bracing effect, and in the finished assembly so much of the sole strip may and usually will be cut away, that the remainder lies flush with the top surface of the finished floor, whereby to present no obstruction within the door opening proper, along the bottom thereof.

Certain improved and preferred forms of door track, hangers and similar top hardware, are disclosed and claimed in a copending application of George A. Conroy and Earl M. Trammell, Sr., filed concurrently herewith, bearing Serial No. 711,376, now Patent Number 2,554,294 and entitled Hanging Means for Sliding Doors. Merely for purpose of completeness, the present disclosure includes a track channel 24, along the rail 35 of which operate rollers 36 of the several hangers of the assembly, the rollers being pivotally carried by hanger plate 37 and the latter secured as by a stud 38 to the upper stile of the door. The hanger and track, as will be noted, are located in the track pocket formed by and between the elements 20, 21, and 22.

The present improvements are more particularly directed to certain guiding and anti-rattling provisions installed along the lower door margin, as a preference in substantially the locations later to be described.

The bottom rail of the door 10 is provided with a bottom groove 40 extending the full width of the door along its lower margin, and open both at the bottom and at its ends. Interfitting this groove, at all times when the door is in, or approaches open position, is a spline conveniently formed of wood, and indicated at 41, this being set into a groove 42 in the sole strip 33, the spline extending only to a point, approaching the door opening proper, that it is cleared by the door groove 40 slightly ahead of attaining full closed position of the door. The spline 41 is provided with relieved or undercut portions 43, of an arcuate section extending longitudinally over opposite sides of the spline and somewhat below its top surface, the form thereof best appearing in Fig. 7. Overlying the right hand end of the spline 41 (Fig. 4), is a retractible fixture consisting, as shown, of a slidable element 44 of inverted U-shape in section (Fig. 7), and the sides of this element being provided with depressed portions 45 of arcuate section, conforming to and interfitting the grooves 43 of the spline in order to retain the fixture in place thereon, while permitting a longitudinal movement of the fixture along the spline.

The movable piece 44 is provided with a slot 46 through which projects the head of a screw 47, the slot serving the purpose of a stop due to engagement of the head 47 alternately with the ends of slot 46, which thus acts to limit, in each direction, the sliding movement of the element 44.

It will be seen that the fixture 44 constitutes in effect an extension of the spline 41, since the fixture will serve as a guide element for the bottom of the door 10 in coaction with its groove 40. The noted effect is enhanced by extension fingers 50 which may be formed of spring metal if desired, or suitably tempered. The fingers tend slightly to diverge, although being provided with convergent ends (Fig. 4) substantially as shown. These fingers engage opposite sides of the groove 40 of the door, and their convergent ends facilitate the interfitting engagement of this portion of the fixture, with the end of groove 40 as the door approaches the fixture in opening direction.

With the door in closed position, it is particularly desirable to oppose any tendency of the lower door margin, to vibrate or oscillate laterally under the effect of air movement, or for other causes. This effect is opposed by the resilience of the fingers 50, as will be obvious from the relation of parts appearing in Fig. 4. The purposes and advantages of the retractible provisions of this fixture will be later more fully described.

Set within the groove 40, and preferably just within the right hand margin of the door 10 (Figs. 1 and 4), is a fixture consisting of a recessed mounting plate 51 secured by screws 52 which extend upwardly through the bottom face of an end portion of the lower stile or rail of the door. The plate 51 is extended to form, or serves to carry separate spring fingers 53 (Figs. 4 and 6) which converge toward and form a throat, just inwardly of the open end of the groove 40 at this side of the door. Coacting with the fixture including members 51—53, is an additional stationary fixture set in a suitable recess 54 at the bottom of the closing stop or stile of the door frame element 12. The last fixture includes an angulate mounting plate 56

positioned as by one or more screws 57, an inturned portion of the plate 57 carrying a pivot 60 about which is swingably mounted an arm 61, the arm being apertured to receive the pivot, and the arm being provided with a flat 62 which tends, as the arm is lifted or retracted, to keep the arm in a retracted relation. The location and proportions of the fixture 56—61 are such that when the arm is brought to operative position, as shown by Fig. 5, it projects scarcely, if at all, beyond the vertical bead or trim elements 13, thus minimizing or obviating any obstruction in the lower portion of the doorway proper.

The function in service, of the retractible arm 61 and the spring fingers 53, will at once be evident from Fig. 4, from which it will appear that as the door 10 approaches closed position and starts to enter the space between the bead elements 13, stationary arm 61 in coaction with the convergent fingers 53, will at once tend to center the door and to constrain it to its normal plane of movement, and to guide it in a straight line approach to the closing jamb of the frame. Similarly to the action of the spring fingers 50 in the opposite end of groove 40, the arm 61 occupying a fixed plane, the snug interfitting engagement thereof with the fixture 51—53, will tend yieldingly to center the lower door margin at this end, against movement out of the proper door plane, and thus will, as has been proven, effectively prevent rattling and the noise of unwanted vibratory effects, thus overcoming a serious shortcoming in prevailing types of sliding doors.

As will appear from Fig. 6, the fixture 51—53 will, when the door is in open position, serve to receive and coact with spring fingers 50, and the fixtures, thus related, serve to stabilize the open door against rattling and other unwanted vibration or lateral oscillation.

The advantages of the retractibility of the paired fixtures at opposite ends of the lower margin of the door when the latter is in closed position, will become evident from the copending application above referred to, from which it will appear that a door of this type is desirably moved laterally of its normal plane, i. e. swung outwardly, to enable it to be slightly lifted to bring the hangers, specifically the rollers, away from the track. For present completeness it may be noted that this is readily done by removal of one or both of elements 30 and 31, following retractive movements of the stationary fixtures described, and located along the bottom of the door.

In order to enable hanging or removal of the door, the fixture 44 normally in the extended position shown by Figs. 4 and 5, may be brought to a retracted position by first moving the door 10 fully into open position, with the door substantially concealed in the pocket of the frame. To provide for tool access, one end of the top or bridge portion of fixture 44 is downturned as shown by Figs. 4 and 5, to form a depending lip or flange 65. This element may be engaged as by a screw driver or the like, urging to the left against the flange 65. When element 44 is so moved, the fixture is in effect foreshortened, so that when the door is again brought to closed position, the normally projecting portion of member 44 is clear of groove 40.

Retraction of the fixture 56—61 is effected merely by opening the door to permit access to the arm 61. This may be readily raised to the

dotted or inoperative position shown by Fig. 5, in which relation this fixture is inoperative as a door stabilizing or guiding agency. Opposite manipulation of each of the elements 44 and 61 will of course again restore these to their operative relations with the door groove 40, and hence with the door, it being noted that restoration of fixture 44 to operative position may readily be effected by drawing flange 65 to the right (Fig. 5) as by a simple hooked instrument of any form.

It will now have become evident that assuming arm 61 to have been raised or retracted, and element 44 retracted, the door being brought to fully closed position, it may be readily swung to the right (Fig. 2) to enable the hangers to be lifted from the tracks, hence the door removed from the frame, strips 30—31 having been earlier detached for this purpose.

It is of course contemplated that some or all of the items such as the fixtures and hardware forming the present subject matter, may be sold separately and advantageously employed with various types of sliding doors, and apart from the particular framing arrangement and other combinations preferred. Accordingly, in its full scope the present invention includes such fixtures and hardware, as separate articles of manufacture.

Although the invention has been described by making, for clearness, a detailed reference to a number of the parts in their preferred forms, the detail of description is to be understood as illustrative, rather than limiting, in view of the many possible variants within the scope of the claims hereunto appended.

I claim as my invention:

1. In a sliding door assembly, a door with a bottom groove, an overhead track and door hanging means operable along the track, and of a character to permit lifting of the door upon a substantial lateral displacement thereof, a frame within which the door is movable to and between open and closed positions, interfitting means, including the grooved door portion, along the lower marginal portions of the door and frame, said means engaging with and tending to keep the door substantially within the plane of its sliding movement, and a pair of normally stationary, retractible devices substantially within said plane at the opposite ends of the lower door margin when the door is closed, and each said device including a door guide element movable out of door engagement, whereby to permit the door to be shifted out of said plane, as for facilitating hanging and removal, and spring door-centering members coacting with said door guide elements and the door groove.

2. In a sliding door assembly, an overhead track, a door provided with a bottom channel and door hanging means operable along the track, and of a character to permit lifting of the door upon a substantial lateral displacement thereof, a frame within which the door is movable to and between open and closed positions, channel interfitting means along the lower marginal portions of the frame, said means engaging with and tending to keep the door substantially within the plane of its sliding movement, said interfitting means including retractible devices located at fixed spaced points along the path of movement of the channelled lower margin of the door, and normally extending into the opposite ends of the door channel when the door is closed, the retractible devices being movable to positions out of door engagement, whereby to permit the door to be shifted out of its plane of normal movement,

as for door hanging and removal and a pair of spring elements operatively related to each of the retractible devices, and coacting therewith in centering the door when it approaches closed position.

3. In a sliding door assembly, a door with a bottom groove, an overhead track and door hanging means operable along the track, and of a character to permit lifting of the door upon a substantial lateral displacement thereof, a frame within which the door is movable to and between open and closed positions, a normally stationary spline element arranged in the region of the lower margin of the door and coacting with the door groove in normally tending to prevent lateral vibratory door movements, the spline element being accessible when the door is in or near open position, an end extension on the spline adapted for selective, normal shifting movement to a position out of door engagement such that, when the door is brought near closed position, the door may be laterally moved out of its normal plane of suspension, to facilitate hanging and removal, and a resilient, tapered nose portion on the end of the spline extension nearest the door opening.

4. In a sliding door assembly, an overhead track, a door, door hanging means operable along the track, and of a character to permit lifting of the door upon a substantial lateral displacement thereof, a frame within which the door is movable to and between open and closed positions, a spline fixed in position along the lower marginal portion of the frame but beyond the door opening, the lower portion of the door being provided with a groove engaging the spline, the spline extending over only a portion of the path of the door, a slide constituting an extension of the spline, and provided with a tapered end nearest the door opening, to facilitate interengagement of the slide and door groove, the slide being retractible from a normal, fixed operative position engaging the groove, and the spline being of such length that when the slide is retracted, the door is movable laterally of its normal position so as to facilitate door hanging and removal.

5. The combination and arrangement of elements as recited by claim 4, but further characterized in that the slide and spline are of substantially uniform width and in which the slide is movable along, and in a direction to vary the effective length of the spline, the sides of the

spline and slide having longitudinal interfitting formations through which they are kept in slidably assembled relation.

6. A fixture for installation in the region of a grooved lower stile of a sliding door, and adapted when installed, to interfix the groove and constrain the lower margin of the door to a straight line movement, the fixture including two normally stationary parts, slidably related for length adjustment of the fixture, one of said parts being fixed and the other part movable over the first said part to vary the effective length of the fixture, a resilient leading end structure of divergent character carried by the said movable part and serving at times to guide the door and fixture into alignment, and stop means to limit relative movement of the parts.

7. A slidable fixture for disposition in the region of the bottom stile of a slidable door, the fixture consisting of an inverted channeled element adapted for use over an end portion of a fixed spline as a spline extension, the channel being guidedly adjustable along and in nested relation to the spline, the channel element being provided with a top slot, side elements of the channel being provided with spline-gripping indentations serving as hold-down formations and the fixture further including a projection adapted for securement to the spline and extending through the slot, and adapted to limit the range of adjusting movement of the channel element.

EARL M. TRAMMELL, SR.

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