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SLIDING DOOR

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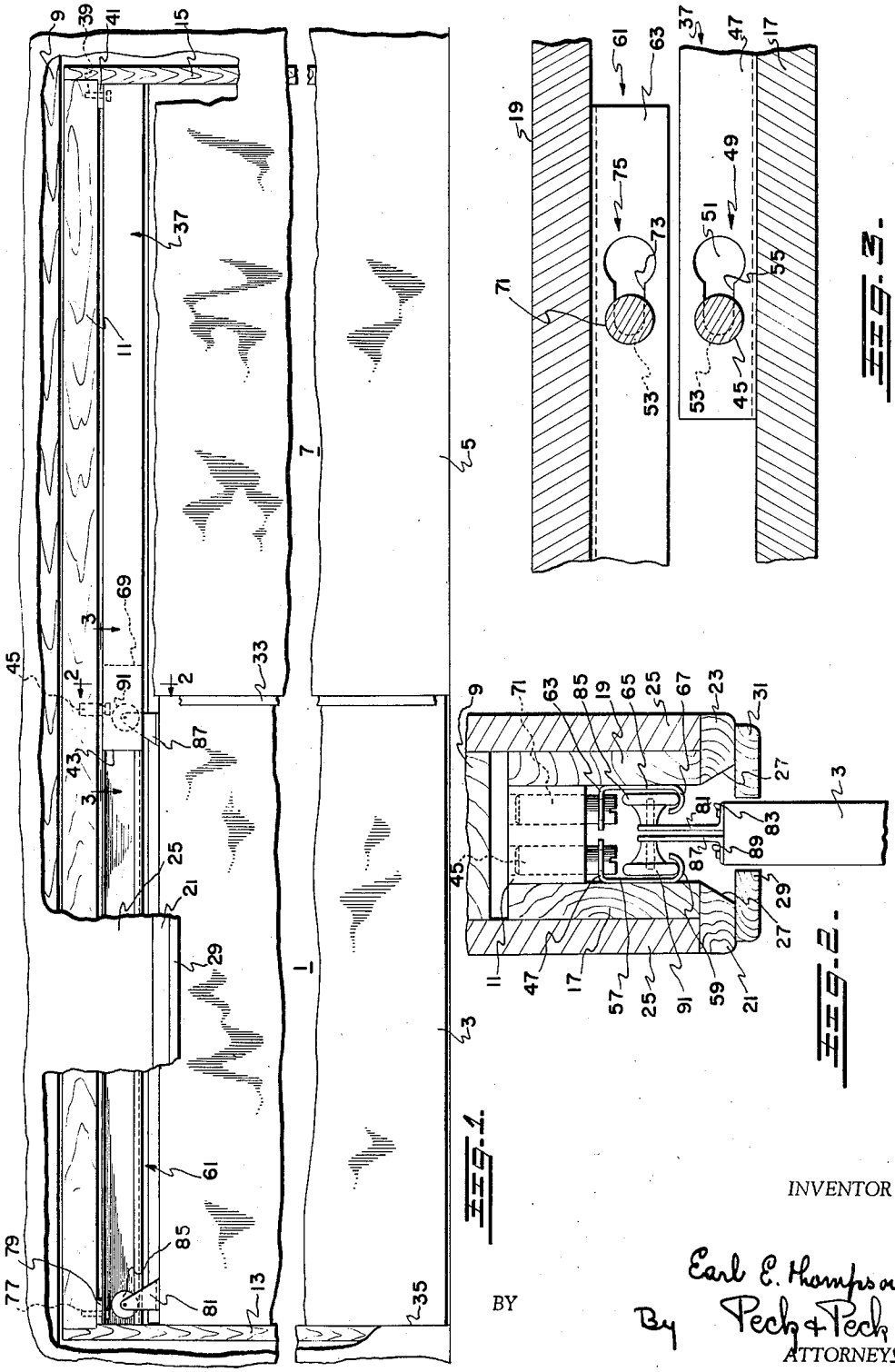


FIG. 1.

FIG. 2.

FIG. 3.

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SLIDING DOOR

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This invention relates broadly to the art of sliding doors and in its more specific aspects it relates to an arrangement whereby the track is accessible in open position of the door so that it may be adjusted to ensure the proper hanging and fitting of the doors; and the nature and objects of the invention will be readily recognized and understood by those skilled in the arts to which it relates in the light of the following explanation and detailed description of the accompanying drawings illustrating what I at present believe to be the preferred embodiments or mechanical expressions of my invention from among various other forms, arrangements, combinations and constructions, of which the invention is capable within the spirit and scope thereof.

This invention has been particularly designed for use with sliding doors which may constitute closure members between living and working areas, closets and the like. While I have mentioned certain specific applications of use of the sliding door it is to be understood that it is within my contemplation to use this sliding door in many applications beyond those set forth.

Sliding doors of the character of those in which I am particularly interested usually extend, when in open position, into an opening which is provided in the wall adjacent to and in communication with the opening or entrance way which is adapted to be closed by the sliding door. It is desirable, for a variety of reasons, that such sliding doors be in alignment with the jamb at each end of the translational path of the door. Many factors tend to cause improper hanging of sliding doors so that they are not in alignment with the jambs. The doors may hang and operate perfectly for a period of time and then a wall may settle or some other action occur to cause improper hanging of the door. Arrangements for adjusting sliding doors are known however all of which I am aware of involve certain disadvantages which this invention has overcome. In the conventional sliding doors with which I am familiar a stationary track is provided and the hangers which support the door for sliding movement along the track are adjustable. In installations of this character it is possible to adjust such doors so that they will hang properly and not be out of line when the door is closed but there is no provision made for adjustment of these doors when they are open. It is often found that sliding doors are as much as a quarter of an inch out of line due to various conditions over which the installer has no control. For instance, there may be a slight movement in the wall with the result that the door does not fit or hang properly relative to the exposed jamb or the jamb which is within the wall and which is in engagement with the rear end of the door when the door is open.

When a sliding door of the character of that with which this application is concerned is installed on its tracks and is found to hang and operate perfectly, the carpenter proceeds to finish the job by putting in the stops so that the track and hanger elements are concealed from external view. It often happens that following the completion of the installation with the operating elements thereof enclosed from view and from accessibility that a slight movement occurs in the wall with the result that the door does not hang properly and is out of line with respect to the jambs. In conventional arrangements when this occurs it is necessary to remove the stops in order to gain access to the hangers for the adjustment thereof. It will be obvious that this is not only a task which damages the paint and the entire decorative appearance of the installation but also is time consuming and expensive.

I have overcome these inherent disadvantages in conventional sliding door arrangements by providing an arrangement whereby a pair of tracks are provided from which the door is supported and upon which it slides and have so mounted and arranged these tracks that they, rather than the hangers, are adjustable and the points of adjustment of such tracks are accessible without removing any of the stops or fixed elements of the installation. Thus, with the arrangement of this invention, it is unnecessary to remove the stops and other elements in order to gain access to the operating parts which are to be adjusted in order to provide for proper hanging and alignment of the door.

In order to provide this efficient, simple and foolproof adjusting arrangement I have selected parts for use in my construction which lend themselves particularly to the flexing strains to which they may be subjected. I have also simplified the adjusting operation by providing independent adjusting means, one for operation to produce aligning movement of one end of the door and the other for operation to produce aligning movement of the other end of the door. The adjustment is accomplished by adjusting an end of a selected track and not by adjusting the length of the door hangers as is conventionally done. As this specification proceeds the many advantages of this arrangement will become apparent.

I have simplified the construction and mounting of the various parts of my sliding door apparatus so that the adjustment of the tracks may be made by anyone whether a skilled carpenter or not. As a matter of fact, the design and construction whereby the adjustment may be made is so practical and efficient that the original installer of the sliding door may explain how to adjust it to the owner of the house for instance so that it may be done by the owner, even if he is unskilled, at any time during the life of the installation.

The complete adjustment of my sliding door may be made by merely tightening or loosening either one or both of a pair of lag screws. There is no need for locking such screws after adjustment because I have selected a particular type of screw which is endowed with sufficient friction so that it will remain at any point to which it may be screwed in the adjusting operation.

I have accomplished these desirable results without adding to the complexity or the expense of production or instatllation of the conventional sliding door.

With the foregoing general objects, features and results in view, as well as certain others which will be apparent from the following explanation, the invention consists in certain novel features in design, construction, mounting and combination of elements, as will be more fully and particularly referred to and specified hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a view in elevation of a sliding door assembly with parts thereof broken away and illustrating the door in closed position.

Fig. 2 is a view taken on line 2—2 of Fig. 1.

Fig. 3 is a view taken on line 3—3 of Fig. 1.

Referring to the accompanying drawings and particularly to Fig. 1 thereof wherein I have illustrated the assembly of this invention in position to close an opening which may for example be between a living room and a hall or a living room and a kitchen or bedroom, or

halls to bedrooms and closets and the like wherein, because of limited space, a hinged door may not be satisfactorily used. I have used the numeral 1 to designate the opening in a wall which may be closed by the sliding door 3 which is adapted in open position to slide behind a wall 5 into an unobstructed area 7 which is contiguous with the opening 1. The opening 1 and the area 7 in which area and opening the door 3 is adapted to operate are provided in a wall by means of a header 9 which extends across the top of and is at least as long as the combined lengths of the openings 1 and 7. The header 9 is mounted in the wall in any suitable and well known manner. I provide what I shall term a track support 11 which is fixed to the header 9 in any suitable manner to extend below said header and for the lengths of the opening 1 and the area 7. As will become apparent hereinafter, the track support represents the fixed element of the assembly from which the sliding door and its mounting assembly are operatively suspended. The opening 1 is bordered on one end by a jamb 13 which extends vertically from an end of the track support 11, to which it may be fixed, downwardly to the lower end of the opening 1 or to the floor or other supporting means for the wall in which the opening 1 is provided. An oppositely positioned jamb 15 extends vertically downwardly from the opposite end of the track support 11 to which it is affixed and defines the inner end of the area 7 in which the door operates and is disposed when it is in open position. I provide a track and hanger assembly housing which consists of a pair of members 17 and 19 which are of substantially the same length as the track support 11, one of which is fixed to each vertical side of the track support member 11 and the members 17 and 19 being of a width so that they extend a substantial distance below the track support 11, all as particularly illustrated in Fig. 2 of the drawings. Plaster stops 21 and 23 are fixed to the lower horizontal surfaces of members 17 and 19 and are of a length substantially the same as those members and the plaster stops 21 and 23 are of a width greater than the thickness of members 17 and 19 so that they extend outwardly beyond the vertical exterior surfaces of those members to provide a stop for wall plaster or the like exterior surfacing material 25. The inner vertical sides of the plaster stops 21 and 23 are cut at an approximately 30° angle as at 27 for a purpose to be hereinafter described. In completing the supporting and framing structure for the opening 1, I provide horizontal stop members 29 and 31 which are fixed to the lower horizontal surfaces of the plaster stops 21 and 23, respectively, and extend the length of the opening 1 in the wall. As will be apparent from consideration of Fig. 2 of the drawings the stops 29 and 31 are of such a width and are fixed to the plaster stops 21 and 23 in such positions that the inner vertical edges thereof are spaced apart to provide a space therebetween wherein the door may operate. I also provide a vertical stop 33 which extends along the outer vertical edge of the wall 5 to define and frame the inner vertical end of the opening 1 and also to provide an aligning gauge for the vertical forward edge 35 of the door 3.

It will be understood that the above described basic construction of the framing for the opening 1 and the area 7 is merely one example and variations may be resorted to and still fall within the spirit and scope of my invention.

I provide a track designated generally by the numeral 37 which is supported at its rear end preferably in engagement with the jamb 15 by means of a ¼" lag screw 39 which passes through a hole in the track and is screwed into the track support 11 and passes through a block 41 which functions to space the upper edge of the track 37 from the lower horizontal surface of the track support 11. The track 37 is of somewhat greater length than the length of the area 7 which is defined by the stop 33 and the jamb 15 so that the track 37 extends a distance over and above the opening 1 where its forward end is indicated by the numeral 43. The forward end of the track 37 is adjustably supported in suspended position from the track support 11 by means of a ⅝" lag screw 45 which is screwed into the track support 11 and will maintain itself in any adjusted position due to its size which causes sufficient friction with the track support to so maintain it. Adjacent to but inwardly spaced from the outer end 43 of the track 37 I provide in the upper flange 47 of the track a keyhole slot designated in its entirety by the numeral 49. In assembling the track the lag screw 45 is screwed into the track support 11 and the track 37 is positioned so that the head of the lag screw will enter the circular opening 51 in the keyhole slot 49 whereupon the track is slid rearwardly so that the circumferential slot 53 in the head of the lag screw will enter the slot 55 which is in communication with the circular opening 51 in the keyhole slot. When the head of the lag screw is fixed in the slot 55 as described the track 37 will be in position with its rear end against the jamb 15 whereupon it may be fixed in stationary position at this rear end by screwing the lag screw 39 through the spacing block 41 and into the track support 11. The track 37 is formed with the upper flange 47, a web 57 and a lower upwardly curved flange 59 which forms the track for the door rollers as will be hereinafter pointed out in detail.

I provide a further track indicated generally by the numeral 61, and this track 61 is of the same construction as the track 37 and involves an upper flange 63, a web 65 and a lower curved flange 67. The track 61 when in operative door supporting position is fixed to the track support and extends from the jamb 13 over and above the opening 1 in the wall where its rear end 69 is over the area 7 into which the door 3 is adapted to slide when the door is in open position. It will thus be apparent that a rear end portion of the track 37 overlaps with a forward end portion of the track 61 and these overlapping sections of the tracks are, of course, laterally spaced with respect to one another. The track 61 is adjustably mounted adjacent to but forwardly spaced from its rear end 69 in the same manner as the track 37, however the adjustable mounting of the track 61 is completely independent from the adjustable mounting of the track 37 and involves a ⅝" lag screw 71, the head of which is mounted in the slotted portion 73 of a keyhole slot 75 which is formed in the flange 63 of the track 61 in exactly the same manner as the keyhole slot 49 is formed in the track 37. The adjusting lag screws 45 and 71 for tracks 37 and 61, respectively, are positioned side by side as is clearly illustrated in Fig. 3 of the drawings so that they are accessible when the door 3 is in open position and disposed within the area 7 behind the wall 5. At its opposite or forward end the track 61 is mounted in position suspended from the track support 11 by means of a ¼" lag screw 77 which extends through the track and a spacing block 79, this stationarly mounting construction being exactly the same as that used for the inner end of the track 37.

The tracks 37 and 61 are formed of any suitable metal which may have a very slight flexing characteristic to accommodate the bending stresses which are imparted to them when the adjustments are made to produce alignment of the sliding door. It is preferable, though not necessary, that the metal from which the tracks are made be of a gauge on the order of 1/16".

On the upper edge of the door 3 adjacent the forward vertical edge thereof I fix an upstanding suspension hanger or bracket 81 by means of screws or the like 83. The suspension hanger 81 mounts a roller 85 at the upper end of the suspension hanger, the roller being suitably journaled to rotatably extend therefrom in a direction toward the interior surface of the door 3. A further suspension hanger or bracket 87 is fixed by means of screws 89 or the like to the upper edge of the door 3 adjacent the opposite or rear end thereof, and the suspension bracket 87 is of similar construction to the aforementioned suspension hanger 81 and in a similar

manner rotatively mounts a roller 91 which extends from the suspension hanger in a direction opposite to the direction in which the aforementioned roller 85 extends so that the roller 91 extends in a direction toward the exterior surface of the door 3.

In the installation of my sliding door assembly the track support 11 having been fixed in position supported from the header 9, and the pair of tracks 37 and 61 having been mounted in operative side-by-side position by means of the stationary lag screws 39 and 77 and by means of the adjusting lag screws 45 and 71 and the housing members 17 and 19 as well as the plaster stops 21 and 23 having been installed in the positions as described, a sliding door 3 with its suspension hangers 81 and 87 affixed to the upper edge thereof as described may be mounted in slidable operative position suspended from the tracks by inserting the door with the suspension bars and rollers upwardly into the tracks with the door at an angle, such angle being permitted by the angled inner vertical surface 27 of the plaster stop 23. The roller 89 is disposed in the track 61 while the roller 91 is positioned within the track 37. With the door slidably supported from the tracks as described, the stops 29, 31 and 33 may then be applied to complete the assembly.

As I have hereinabove pointed out, it often happens that a sliding door of this general character becomes misaligned due to movements in the wall or for various other reasons and it has heretofore been necessary to remove the stops and/or other framing and mounting elements in order to adjust the alignment of the vertical end edges of the door with the jambs 13 and 15 and with the vertical intermediate gauge stop 33. I have provided this unique structure and mounting arrangement whereby the vertical alignment of the door may be adjusted with the door in open position and without requiring the removal of any of the stops or other framing and mounting elements. As a matter of fact, I have so simplified this adjusting and mounting arrangement that a person who is completely unskilled in carpentry or mechanics may easily operate the adjusting means so that the door will hang properly.

With the door 3 in open position and in order to align the vertical forward edge 35 thereof with the jamb 13 the lag screw 45 is turned which moves track 37 either up or down. Thus, when the door is closed the vertical position of roller 91 will be either further up or further down to thereby align the forward end 35 of the door with the jamb 13.

When the forward edge 35 of the door is out of alignment with stop 33 when the door is open it is only necessary to turn lag screw 71 up or down which in turn raises or lowers track 61 and roller 85 which allows the door to pivot on roller 91 so that the forward edge of the door may be properly aligned with stop 33.

It will be recognized that the adjusting lag screws 45 and 71 are accessible when the door is open and positioned in the area 7 for the adjuster need only angle the screw driver to miss the track whereby the selected lag screw may be easily turned.

It will now be appreciated that I have provided an adjusting mechanism whereby the door may be aligned to hang properly when it is in either open position or closed position and that the adjusting mechanism for the door when open is independent of that for the door when closed.

I claim:

1. Mounting means for a sliding door, including a pair of tracks mounted in laterally spaced substantially parallel relation and having adjacent end portions in overlapping side by side relation, a support for said tracks, a door suspension hanger adapted to be fixed to the upper edge of a door adjacent each end thereof and each hanger mounting an element adapted to be received in and guided by the tracks to slidably support the door, and one element being mounted in one track and the other element being mounted in the outer track, and independently adjustable means connected with said one end portion of each track and with said support to suspend the tracks from the support in adjusted vertical positions with respect thereto for adjusting the vertical alignment of the door.

2. Mounting means for a sliding door, including a pair of tracks mounted in laterally spaced substantially parallel relation and having adjacent end portions in overlapping side by side relation, a support for said tracks, a door suspension hanger adapted to be fixed to the upper edge of a door adjacent each end thereof and each hanger mounting a roller, one roller being mounted in one track and the other roller being mounted in the other track to thereby slidably suspend the door from said tracks, each of said tracks being fixed at the end opposite to said one end portion to said support and independently adjustable means connected with said one end portion of each track and with said support to suspend the tracks from the support in adjusted vertical positions with respect thereto for adjusting the vertical alignment of the door.

3. Mounting means for a sliding door, including a pair of tracks mounted in laterally spaced substantially parallel relation and having adjacent end portions in overlapping side by side relation, a support for said tracks, a door suspension hanger adapted to be fixed to the upper edge of a door adjacent each end thereof and a roller mounted on each hanger and each roller extended from the hanger in an opposite direction, one roller being mounted in one track and the other roller being mounted in the other track to thereby slidably suspend the door from said tracks, each of said tracks being fixed at the end opposite to said one end portion to said support and independently adjustable means connected with said one end portion of each track and with said support to suspend the tracks from the support in adjusted vertical positions with respect thereto for adjusting the vertical alignment of the door.

4. A sliding door assembly including in combination, a wall having an opening therein and provided with an unobstructed area therein in communication with the opening, a sliding door adapted to extend across and close the opening and to slide into the unobstructed area when in open position and mounting means for said sliding door including a pair of tracks and a support therefor, one of said tracks extending across and beyond the top of the opening and the other of said tracks extending across and beyond the top of the unobstructed area, the axes of the tracks being substantially parallel but laterally displaced and the tracks having end portions in overlapping side by side relation, a door suspension hanger fixed to the upper edge of the door adjacent each end thereof and each hanger mounting a roller, one roller being mounted in one track and the other roller being mounted in the other track to thereby slidably suspend the door from said tracks, and adjustable means connected with said end portions of the tracks and with said support to suspend the tracks from the support in adjusted vertical positions with respect thereto for adjusting the vertical alignment of the door.

5. A sliding door assembly including in combination, a wall having an opening therein and provided with an unobstructed area in alignment and communication with the opening, a sliding door adapted to extend across and close the opening and to slide into the unobstructed area when in open position, and mounting means for said sliding door including a pair of tracks and a support therefor, one of said tracks extending across the top of the opening and the other of said tracks extending across the top of the unobstructed area, the axes of the tracks being substantially parallel but laterally displaced and the tracks having end portions in overlapping side by side relation, a door suspension hanger fixed to the upper edge of the door adjacent each end thereof and each hanger mounting a roller, one roller being mounted in one track and the

other roller being mounted in the other track to thereby slidably suspend the door from said tracks, and adjustable means connected with said side-by-side end portions where they extend over the opening and with said support said means being accessible when the door is in open position for adjustment to suspend the tracks from the support in adjusted vertical positions with respect thereto for adjusting the vertical alignment of the door.

6. A sliding door assembly in accordance with claim 5 wherein said adjustable means comprises lag screws, one being rotatably fixed to each track and extending therethrough and into said support.

7. A sliding door assembly in accordance with claim 5 wherein the opposite end of each track is stationary and fixed to said support and said adjustable means comprises lag screws, one being rotatably fixed to each track and extending therethrough and into said support.

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