Aug. 14, 1962 C. A. TUCKER ETAL 3,048,882

VERTICALLY ADJUSTABLE SLIDING DOOR HANGER

Filed Jan. 23, 1961

FIG. 1.

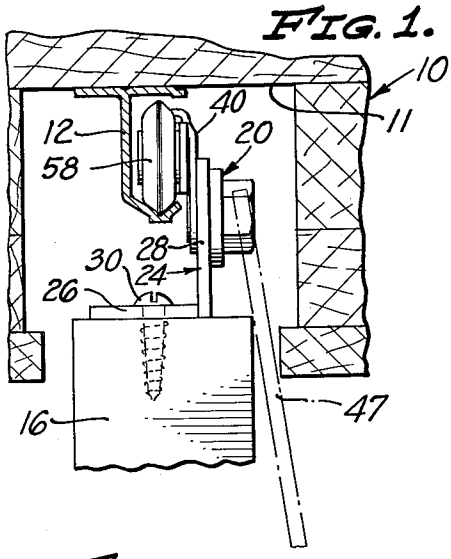


FIG. 2.

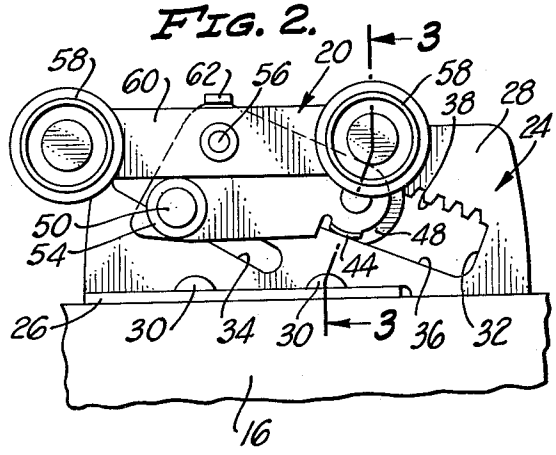


FIG. 3.

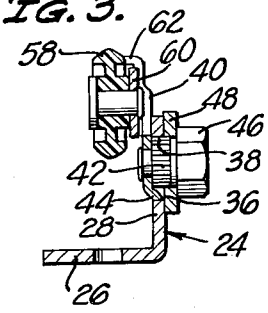


FIG. 4.

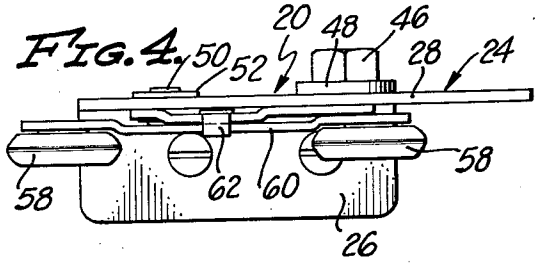


FIG. 5.

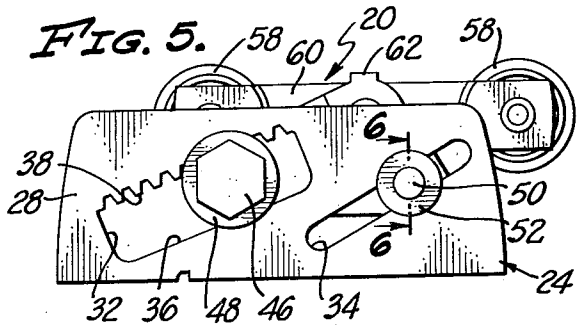
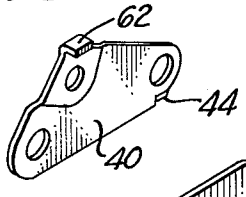


FIG. 7.



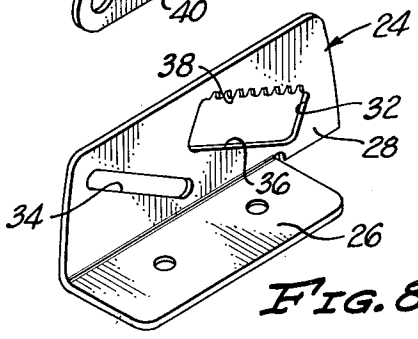
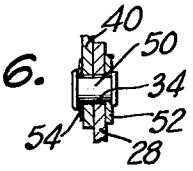


FIG. 8.

FIG. 6.



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3,048,882

VERTICALLY ADJUSTABLE SLIDING DOOR HANGER

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The present invention relates to a vertically adjustable sliding door hanger and a primary object of the invention is to provide a sliding door hanger of simple construction which may be mounted on a sliding door simply and easily without drilling any hole in the door for an adjustment bolt, or the like, which may readily be adjusted to raise or lower the door even in a pocket-type of installation, which may be adjusted by means of a wrench pivoting about a horizontal axis at a point adjacent the track for supporting the door, which is self locking so that no separate locking means for maintaining the desired adjustment is necessary, which may be adjusted to raise or lower the door at any time after the installation of the door has been completed without removing the door stops, which may be adjusted through a wide range so that carpeting can be laid under the door after the original installation of the door without trimming the door or removing the door stops, and the like.

More particularly, an important object of the invention is to provide a vertically adjustable sliding door hanger which includes a mounting member having means thereon for attachment to the door, a hanger member having means thereon for engagement with a track, an inclined rack on one of the members, a pinion rotatably mounted on the other of the members about a transverse horizontal axis and meshed with the rack, and inclined guide means on the members and generally parallel to the rack for guiding the members for relative movement along an inclined adjustment path generally parallel to the rack.

Another object is to provide a vertically adjustable sliding door hanger of the foregoing nature wherein the angles of inclination of the rack, the guide means and the adjustment path from the horizontal are relatively small, and in any event less than 45°, and wherein the guide means has friction means associated therewith for frictionally resisting relative movement of the members along the adjustment path. With this construction, the hanger will automatically maintain its adjustment without any separate locking means, which is an important feature.

Another object is to provide a sliding door hanger of the foregoing nature wherein the inclined rack is formed by a toothed edge of an inclined rack slot in one of the members, the pinion on the other member being disposed in the rack slot and being meshed with the rack formed by one edge thereof.

Another object is to provide an inclined guide means comprising an inclined guide slot in one of the members spaced from and generally parallel to the rack slot, the guide means also including a guide element movable in the guide slot.

A further object is to provide a sliding door hanger wherein the angle of inclination of the guide slot from the horizontal exceeds the angle of inclination of the rack therefrom, and wherein the track engageable means on the hanger member is adjacent the guide slot. With this construction, the greater inclination of the guide slot results in a greater vertical range of travel for the track engageable means than would be the case if the guide slot were exactly parallel to the rack.

Yet another object of the invention is to provide a sliding door hanger wherein the means for frictionally resisting relative movement of the members along the inclined

adjustment path is frictionally engageable with the member in which the guide slot is formed adjacent the edges of the guide slot.

Still another object is to provide a nut for rotating the pinion which may readily be turned with a wrench, or the like, even in a pocket-type installation.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will be evident to those skilled in the art in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail hereinafter and illustrated in the accompanying drawing, in which:

FIG. 1 is a transverse sectional view of a pocket-type sliding door installation including an overhead track having a sliding door hung therefrom by vertically adjustable sliding door hangers of the invention;

FIG. 2 is a side elevational view of a vertically adjustable sliding door hanger of the invention;

FIG. 3 is a sectional view taken along the arrowed line 3—3 of FIG. 2;

FIG. 4 is a top plan view of the vertically adjustable sliding door hanger of the invention;

FIG. 5 is a side elevational view of the vertically adjustable sliding door hanger of the invention, taken from the opposite side from FIG. 2;

FIG. 6 is a fragmentary sectional view taken along the arrowed line 6—6 of FIG. 5;

FIG. 7 is an isometric view of a hanger member of the invention; and

FIG. 8 is an isometric view of a mounting member of the invention.

Referring to FIG. 1 of the drawing, the numeral 10 designates a pocket-type header structure provided therein with a pocket 11 containing an overhead track 12 from which is hung a door 16 by two vertically adjustable sliding door hangers 20, only one being visible. The two hangers 20 are identical so that only one will be considered.

Each hanger 20 includes a mounting member 24 which, as best shown in FIG. 8, includes a horizontal flange 26 and a vertical flange 28. The horizontal flange 26 is seated on the upper end of the door 16 and is secured thereto by two screws 30, as shown in FIGS. 1 and 2. Thus, the hanger 20 is simply and easily attached to the door 16, which is an important feature.

The vertical flange 28 of the mounting member 24 is provided therein with spaced, generally parallel, inclined rack and guide slots 32 and 34, the rack slot being provided with a smooth edge 36 and being provided with a toothed edge forming a rack 38. Preferably, the guide slot 34 makes a slightly greater angle with the horizontal than the rack slot 32 for a reason to be explained. As will be discussed hereinafter, the angles of inclination of the rack and guide slots 32 and 34 from the horizontal are relatively small so as to render the hanger 20 self locking. The angles of inclination of the rack and guide slots 32 and 34 from the horizontal are less than 45°, and are preferably in the range of from 20° to 30°. Merely by way of example, the angle of inclination of the rack slot 32 from horizontal may be a little more than 20° and the angle of inclination of the guide slot 34 from the horizontal may be approximately 30°. However, while it is important that the angles of inclination of the rack and guide slots 32 and 34 be relatively small, and in any event less than 45°, it will be understood that the exact values mentioned are not critical.

The hanger 20 also includes a hanger member 40 which is generally triangular in elevation and which bears against the vertical flange 28 of the mounting member 24 above the horizontal flange 26 of the latter. One of the lower apices of the hanger member 40 is provided therethrough

with an opening in which is journaled a pinion 42. This pinion is disposed in the rack slot 32 and is meshed with the rack 38, meshing engagement between the pinion and the rack being maintained by a tab 44 on the hanger member 40 which is slidable along the smooth edge 36 of the rack slot 32. Formed integrally with the pinion 42 on the opposite side of the vertical flange 28 from the hanger member 40 is a nut 46 by means of which the pinion may be rotated, as with a wrench 47, FIG. 1, to cause relative movement of the mounting and hanger members 24 and 40 along an inclined adjustment path generally parallel to the rack and guide slots 32 and 34, the exact angle of inclination of the adjustment path from the horizontal being determined by the exact angles selected for the rack and guide slots. Preferably, a washer 48 is inserted between the nut 46 and the vertical flange 28 of the mounting member 24.

The other lower apex of the generally triangular hanger member 40 is provided with an opening therethrough for a guide element or pin 50 which is slidable in the guide slot 34. The guide pin 50 is headed at both ends and inserted under the head at one end thereof is a washer 52 which frictionally engages the vertical flange 28 of the mounting member 24 on opposite sides of the guide slot 34 therein. Under the head at the other end of the guide pin 50 is inserted a spring washer 54 which resiliently urges the washer 52 into frictional engagement with the mounting member 24.

As will be apparent, the washer 52 frictionally resists relative movement of the mounting and hanger members 24 and 40 along the inclined adjustment path as the pinion 42 is rotated by means of the nut 46. This frictional resistance, coupled with the relatively small inclinations of the rack and guide slots 32 and 34, makes the hanger 20, in effect, self locking. In other words, the mounting and hanger members 24 and 40 will remain in the relative positions to which they are adjusted without any separate locking means, which is an important feature.

The upper apex of the generally triangular hanger member 40 is provided therein with a hole for a pivot pin 56 which pivotally connects to the hanger member 40 a track engageable means comprising two wheels 58 respectively rotatably mounted on the ends of a rocker arm 60, the pivot pin 56 pivotally connecting the midpoint of the rocker arm to the hanger member. With this construction, uniform weight distribution between the two wheels 58 is assured.

The hanger member 40 terminates at its upper apex in a tab 62 which projects over the rocker arm 60 above the pivot pin 56 and which thus limits pivotal movement of the rocker arm relative to the hanger member.

Considering the operatoin of the hanger 20 of the invention, it will be apparent that all that is necessary to adjust the door 16 vertically is to rotate the pinion 42 in the proper direction. This can be done very easily by means of the wrench 47 in a single operation at any time after the door installation has been completed. Since the hanger 20 automatically maintains the desired adjustment, it is not necessary to actuate any separate locking means. Also, since the hanger 20 can be adjusted with the door 16 in place, it is not necessary to remove any door stops, loosen any screws, or the like.

As previously mentioned, the angle of inclination of the guide slot 34 from the horizontal is preferably slightly greater than the angle of inclination of the rack slot 32. This feature, coupled with the fact that the pivot pin 56 for the rocker arm 60 is located generally above the guide pin 50, means that the pivot pin 56 moves vertically, as the pinion 42 moves along the rack 38, through a greater range than would be the case if the guide slot 34 were parallel to the rack slot 32, or were inclined at a lesser angle than the rack slot. With the particular structure shown, which is shown approximately full scale, the hanger member 40 may be adjusted vertically relative to the mounting member 24 through a range of more than one-half inch. With this range of vertical adjustment, it is possible to lay carpeting under the door 16 at any time subsequent to installation of the doors, and the carpeting can be accommodated by the adjustable hanger 20 without any trimming of the door.

Although an exemplary embodiment of the invention has been disclosed for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

We claim:

1. In a vertically adjustable sliding door hanger, the combination of:

(*a*) a mounting member having means for attachment to a door;

(*b*) a hanger member having means for engagement with a track;

(*c*) one of said members having an inclined main slot therein;

(*d*) one edge of said main slot being provided with teeth constituting a rack;

(*e*) a pinion rotatably mounted on the other of said members and disposed in said main slot and meshed with said rack;

(*f*) inclined, interengageable guide means on said members for guiding said members for relative movement along an inclined path generally parallel to said rack;

(*g*) said guide means including an inclined guide slot in one of said members spaced from and generally parallel to said main slot and including a guide element on the other of said members movable in and engageable with the edges of said guide slot; and

(*h*) said guide means further including the edge of said main slot which is opposite said rack and further including another guide element engageable with and movable along said opposite edge of said main slot and carried by that one of said members other than the one in which said main slot is formed.

2. In a vertically adjustable sliding door hanger, the combination of:

(*a*) a mounting member having means for attachment to a door;

(*b*) a hanger member having means for engagement with a track;

(*c*) said mounting member having an inclined main slot therein;

(*d*) one edge of said main slot being provided with teeth constituting a rack;

(*e*) a pinion rotatably mounted on said hanger member and disposed in said main slot and meshed with said rack;

(*f*) inclined, interengageable guide means on said members for guiding said members for relative movement along an inclined path generally parallel to said rack;

(*g*) said guide means including an inclined guide slot in said mounting member spaced from and generally parallel to said main slot therein and including a guide element on said hanger member movable in and engageable with the edges of said guide slot; and

(*h*) said guide means further including the edge of said main slot which is opposite said rack and further including another guide element engageable with and movable along said opposite edge of said main slot and carried by said hanger member.

3. In a vertically adjustable sliding door hanger, the combination of:

(*a*) a mounting member having means for attachment to a door;

(*b*) a hanger member having means for engagement with a track;

(c) said mounting member having an inclined main slot therein;

(d) one edge of said main slot being provided with teeth constituting a rack;

(e) a pinion rotatably mounted on said hanger member and disposed in said main slot and meshed with said rack;

(f) inclined, interengageable guide means on said members for guiding said members for relative movement along an inclined path generally parallel to said rack;

(g) said guide means including an inclined guide slot in said mounting member spaced from and generally parallel to said main slot therein and including a guide element on said hanger member movable in and engageable with the edges of said guide slot;

(h) said guide means further including the edge of said main slot which is opposite said rack and further including another guide element engageable with and movable along said opposite edge of said main slot and carried by said hanger member; and

(i) an adjusting element directly connected to and rotatable about the axis of rotation of said pinion.

4. In a vertically adjustable sliding door hanger, the combination of:

(a) a mounting member having means for attachment to a door;

(b) a hanger member having means for engagement with a track;

(c) said mounting member having an inclined main slot therein;

(d) one edge of said main slot being provided with teeth constituting a rack;

(e) a pinion rotatably mounted on said hanger member and disposed in said main slot and meshed with said rack;

(f) inclined, interengageable guide means on said members for guiding said members for relative movement along an inclined path generally parallel to said rack;

(g) said guide means including an inclined guide slot in said mounting member spaced from and generally parallel to said main slot therein and including a guide element on said hanger member movable in and engageable with the edges of said guide slot;

(h) said guide means further including the edge of said main slot which is opposite said rack and further including another guide element engageable with

and movable along said opposite edge of said main slot and carried by said hanger member; and

(i) friction means operatively connected to the guide element first mentioned, and frictionally engageable with said mounting member adjacent said guide slot therein, for frictionally resisting relative movement of said members along said path.

5. In a vertically adjustable sliding door hanger, the combination of:

(a) a mounting member having means for attachment to a door;

(b) a hanger member having means for engagement with a track;

(c) said mounting member having an inclined main slot therein;

(d) one edge of said main slot being provided with teeth constituting a rack;

(e) a pinion rotatably mounted on said hanger member and disposed in said main slot and meshed with said rack;

(f) inclined, interengageable guide means on said members for guiding said members for relative movement along an inclined path generally parallel to said rack;

(g) said guide means including an inclined guide slot in said mounting member spaced from and generally parallel to said main slot therein and including a guide element on said hanger member movable in and engageable with the edges of said guide slot;

(h) said guide means further including the edge of said main slot which is opposite said rack and further including another guide element engageable with and movable along said opposite edge of said main slot and carried by said hanger member; and

(i) the inclination of said guide slot from the horizontal exceeding the inclination of said main slot therefrom.

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