Feb. 4, 1969 E. HALPERN 3,425,162

DOOR HANGER AND TRACK CONSTRUCTION

Filed May 4, 1966

Sheet 1 of 3

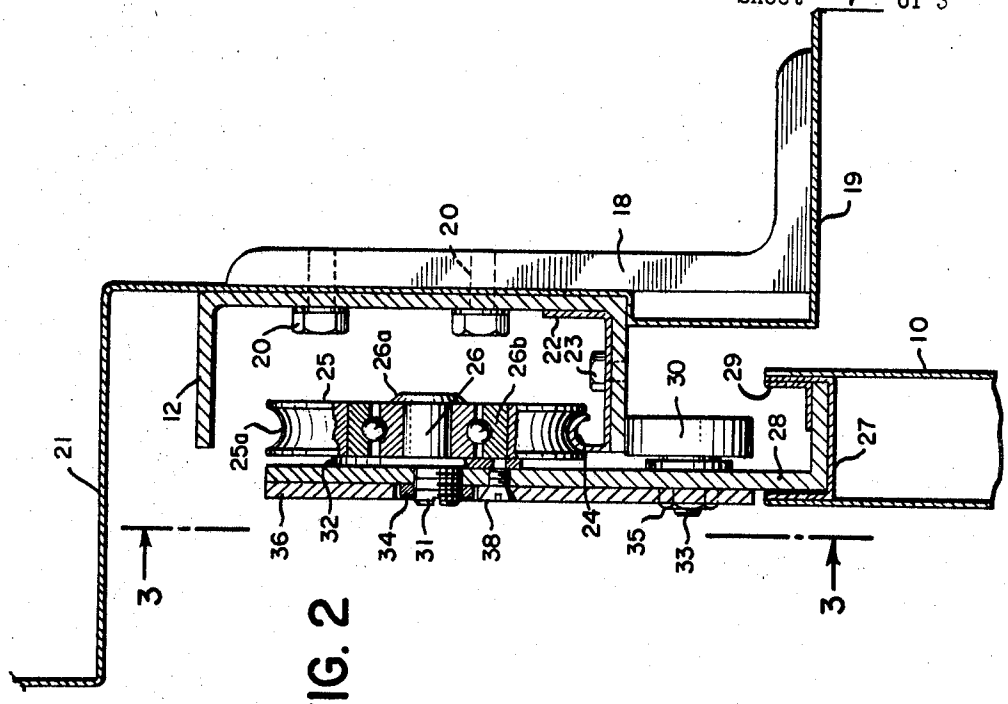

FIG. 2

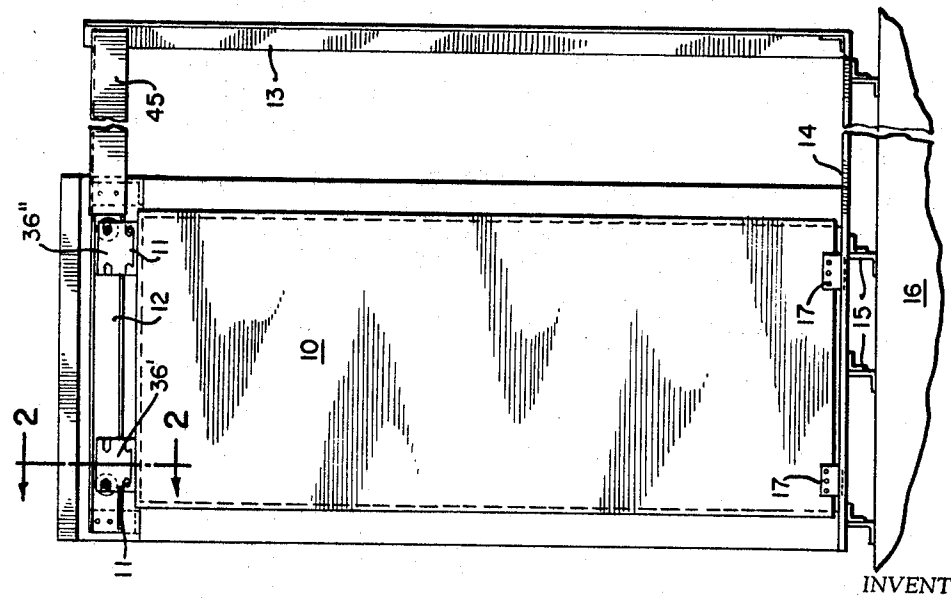

FIG. 1

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Filed May 4, 1966 Sheet 2 of 3

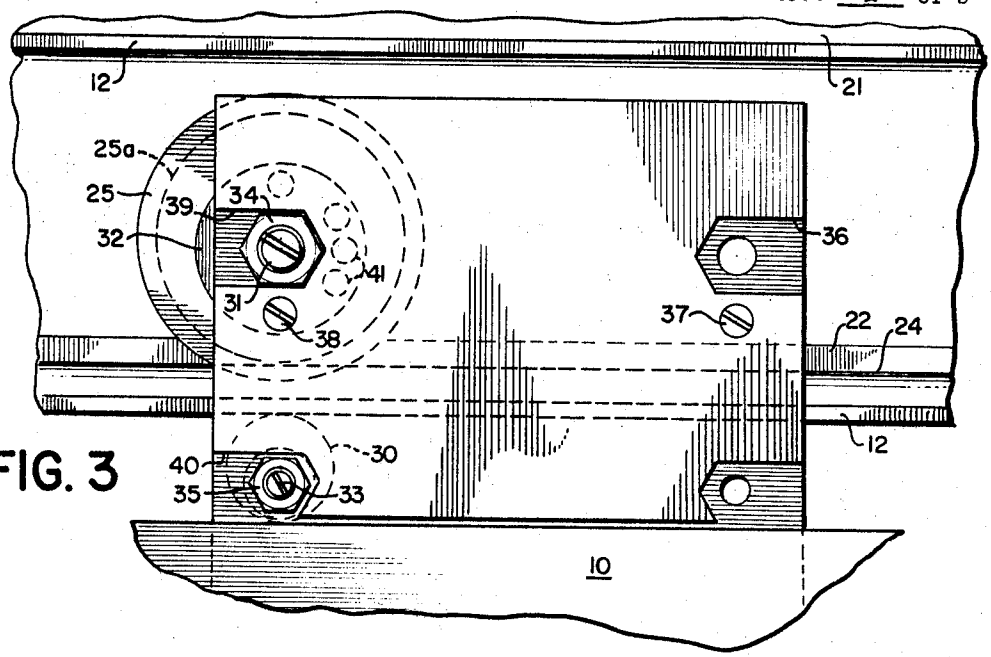
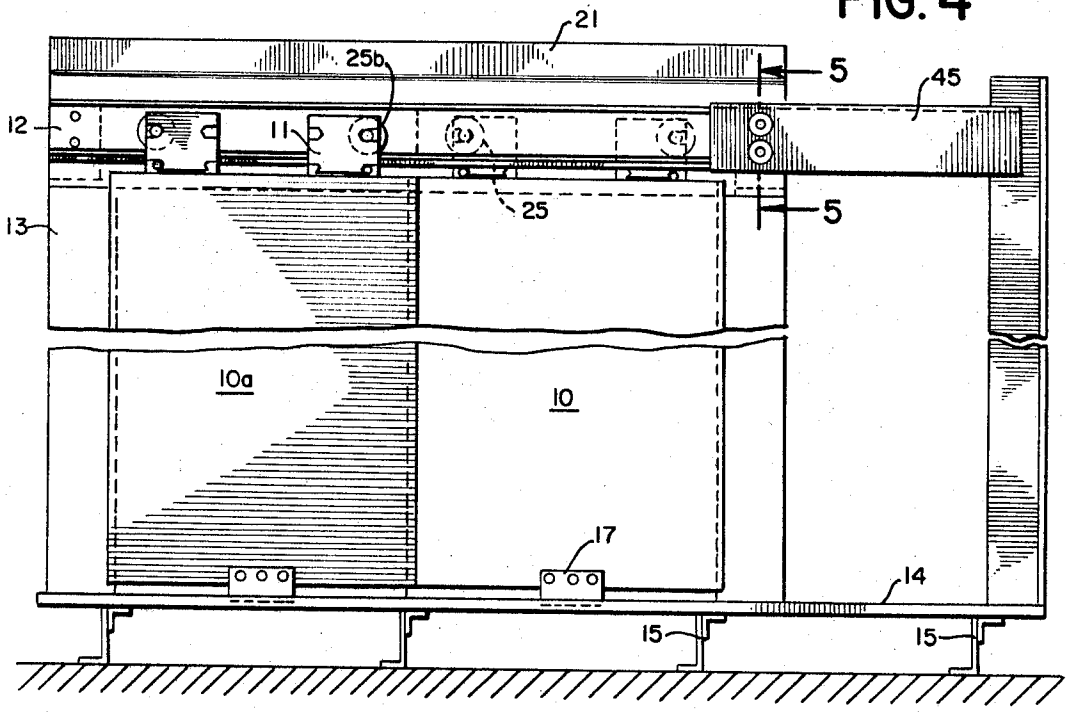


FIG. 3

FIG. 4



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Filed May 4, 1966 Sheet 3 of 3

FIG. 5

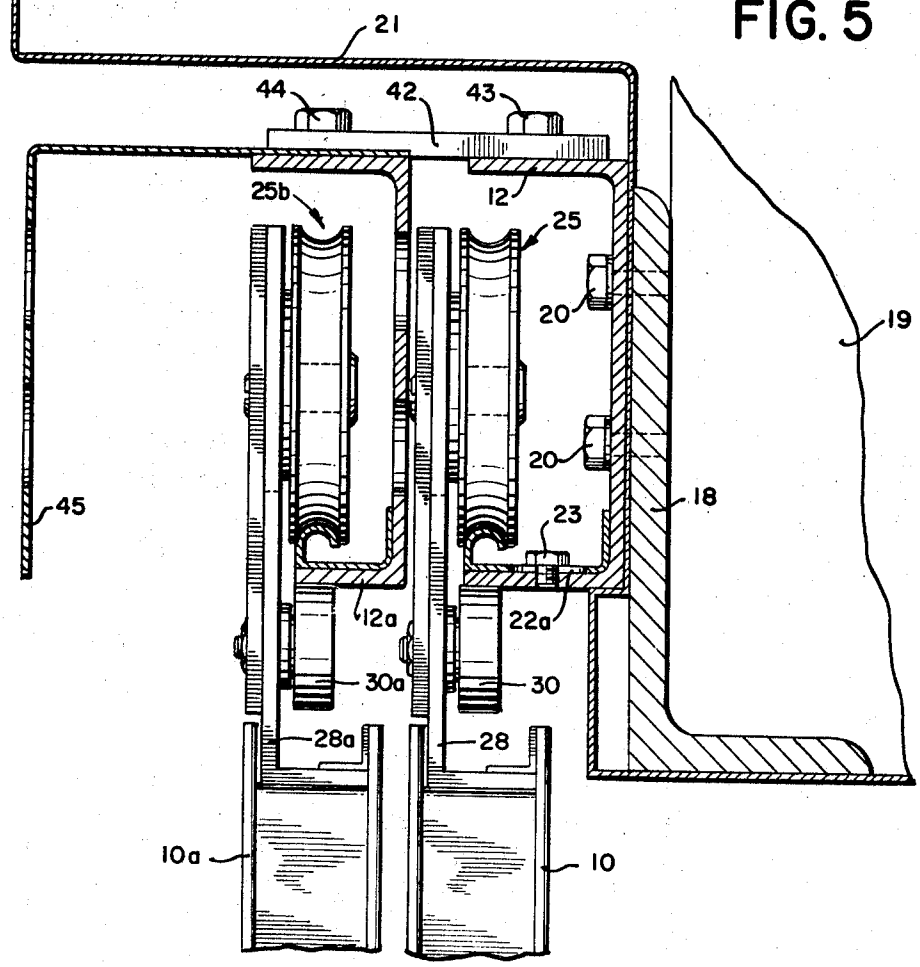
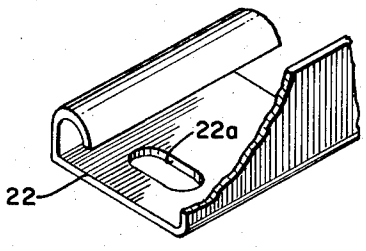


FIG. 6



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United States Patent Office 3,425,162
Patented Feb. 4, 1969

3,425,162

DOOR HANGER AND TRACK CONSTRUCTION

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Filed May 4, 1966, Ser. No. 554,253
U.S. Cl. 49—425 5 Claims
Int. Cl. E05d *13/02, 15/06*

ABSTRACT OF THE DISCLOSURE

A hanger for elevator doors is characterized by a hanger plate which is supported by a shaft having an eccentric axle. A hanger rotatable on the axle glides on a track located within a channel. A collar having a plurality of circumferentially spaced holes for receiving fasteners is interposed between the axle and the hanger plate. The hanger plate has an aperture which can be brought into registration with the holes in the collar by rotation of the shaft. A locking plate having cut-outs for the fastening means is fixed to the hanger plate. A relatively small adapter is mounted outside the door frame in proximity to the door jamb for supporting the track.

The present invention relates to means for hanging doors and guiding them along tracks and particularly to said means utilized in connection with elevator doors.

In the construction of elevator doors, it is desirable to have available means for varying the level of the doors to compensate for the variations attributable to manufacturing and installation tolerances. By being able to adjust the level of the door, it is possible to install the latter with assurance that it operate in a smooth manner while in service. Jamming or poor operation of the doors often results because of the absence of such adjustability features. Heretofore, this adjustability of the elevator doors was accomplished through the application of shims at the proper locations. The shimming process is a trial-and-error one, and it involves much tedious labor. The adjustability feature was also accmoplished through such means and devices as disclosed in Patents No. 3,065,826 and 3,105,272 to Tucker. In the latter, the adjusting means are not of a positive locking type which can be relied upon to hold its set position because they are designed to depend largely on frictional effects. In addition, the track means heretofore utilized in connection with door hanger constructions were cumbersome, difficult to assemble and expensive.

It is therefore an object of the present invention to provide means for adjusting the level of hanging doors in a positive-locking manner.

Another object of the present invention is to provide means which assures that the door suspended from hangers riding on track, cannot become derailed while in service.

Still another object of the present invention is to provide a unitary, integral track means for the hanger assembly utilizing a minimum number of operating parts.

A further object of the present invention is to provide a hanging door construction by means of which the hanging hardware for the door may be assembled independently from the associated track support.

A yet further object of the present invention is to provide means adapted for hanging two-speed doors whose levels may be adjusted independently of one another.

A still further object of the present invention is to provide a more economical adapter by which the doors and associated hanging hardware are supported by the door frame.

Other objects and advantages of the present invention

appear in the following description and specification accompanied by drawings in which:

FIGURE 1 is a front view showing the installation of a single-speed door with hangers and track assembled in place;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1, and shows the construction of the hanger elements as well as the track associated with hangers;

FIGURE 3 is a front view taken along line 3—3 of FIGURE 2, and shows the means by which the hangers are locked in place after they have been adjusted to the desired position;

FIGURE 4 is a front view showing an installation with two-speed doors with the hangers and track assembled in place;

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 4, and shows the constructional details for hanging two-speed doors.

FIGURE 6 is a framentary view showing the slotted construction of the track by which the position of the track is made adjustable.

A hanger for elevator doors is characterized by a hanger plate mounted on a shaft having an eccentric axle assembly. The hanger plate has at least one aperture. The axle assembly comprises a section upon which a hanger is freely rotatable. The hanger is movable on a track located within a channel. A collar is interposed between the section on which the hanger is freely rotatable and the hanger plate. The collar has a plurality of circumferentially spaced holes for receiving a fastener assembly. Rotation of the shaft, brings an aperture in the hanger plate into registration with one of the holes in the collar. A locking plate having cut-outs for the fastening means is fixed to the hanger plate to prevent in advertent loosening of the fastening means. A relatively small adapter is mounted outside the door frame in proximity to the door jamb for supporting the track.

FIGURE 1 shows the arrangement of the track and hangers with respect to the door. The door **10** is supported by two hangers **11** situated at the top of the door. The hangers are, in turn, suspended from the chanel **12**. A vertical strut **13** supports and retains channel **12** in position. The base of the door extends towards the floor sill **14** which rests upon supports **15**. The latter maintain the floor sill above the building floor **16** at the proper distance. For the purpose of levelling and aligning the floor sill accurately, the supports **15** are made adjustable to allow for variations in their heights and hence in the distance that the floor sill is situated with respect to the building floor. The base of the door **10** may be guided by a slot which generally prevails in the floor sill. Guidance members **17** fixed to the base of the door, extend into the slot of the floor sill, and thus confine the door to move along the directed path.

The manner in which the hangers of the door are situated on the track, is illustrated in FIGURE 2. Channel **12** is fastened to the adapter **18** which is fixed to the door frame **19**. The adapting member **18** may contain threaded holes to hold bolts **20** used to fasten the channel member **12** in place. Sheet metal structure **21** is interposed between channel **12** and adapter **18** to form the support for fascia plates used to cover the area within the elevator shaft between floors. Fascia plates are a requirement of the building codes for the safety of passengers.

Integral with channel member **12** is a track **22** for the hangers of the door. This track fastened to the channel member by means of bolts **23**, has one of its edges shaped in the form of a bead **24**. Track **22** has a slot **22*a*** rather than merely a hole through which bolt **23** passes. This permits the track to be adjustable with respect to channel **12**. The arrangement is shown in FIGURE 6. Door

hanger 25 has a groove 25*a* shaped to match the curvature of the bead. Hanger 25 is a wheel that is freely rotatable, through bearings 26*b*, about the axle 26. The latter has, at its end, a shoulder 26*a* to prevent the hanger from sliding off the axle. In view of its rotatable property, the hanger rides freely along the bead 24 when the door is moved correspondingly. The weight of the door is transmitted to the hanger 25 which, in turn, transmits it to the channel member 12 by means of track 22.

The side panels of the door 10 are joined at the top through means of the channel member 27. A hanger plate 28 is situated within the channel 27. Angle member 29 serves to fix in place, hanger plate 28. It is the function of the hanger plate to support the axle 26 as well as related hardware. The axle of roller 30, for example, is also supported by the hanger plate. By bearing on the lower surface of channel 12, roller 30 assures that hanger 25 remains in contact with bead 24 at all times. In this manner, there is no danger that the hanger may become derailed.

Axle 26 is eccentrically located with respect to the threaded shaft 31. The bearing collar between the threaded shaft 31 and axle 26 serves as a bearing surface against which hanger 25 may rest or rotate. Axle 26, collar 32, and shaft 31 are all fixed to one another, and may be formed by, for example, machining a single, solid piece of stock. These parts may also be integrally formed through other manufacturing processes including forging.

Since axle 26 is situated in an eccentric manner with respect to shaft 31, the rotation of the latter causes hanger plate 28 to be raised or lowered with respect to bead 24. This makes possible, therefore, the raising and lowering of the door, since the door is coupled to the hanger by means of the plate 28. Accordingly, the door may be levelled and its position may be varied in the desired manner. Roller 30 is similarly mounted in an eccentric fashion with respect to the shaft 33. In this way roller 30 may be raised or lowered correspondingly to hanger 25. Thus, regardless of the amount that hanger 25 is raised or lowered, roller 30 may be raised or lowered by an equal amount. The surface of roller 30, therefore, may always be brought to bear against the underside of channel 12, and this feature prevents hanger 25 from becoming derailed in any one of its possible positions. The eccentricity of roller 30 with respect to its shaft 33, is evident form FIGURE 3.

After threaded shaft 31 has been turned so that hanger 25 is in the desired position, the shaft and hence axle 26 is fastened in place by tightening lock nut 34. By tightening the lock nut in place, the shaft and axle assembly is firmly held by hanger plate 28. Thus collar 32 bears against one side of the plate 28, while lock nut 34 bears against the other side of the plate. The shaft assembly of roller 30 may be similarly fixed in position through the tightening of lock nut 35. The shaft 33 is threaded so that the lock nut may be turned firmly against the hanger plate 28.

To prevent the lock nuts 34 and 35 from becoming loose while in service, locking plate 36 is mounted onto the hanger plate 28. The locking plate has cut-outs which match and coincide with the peripheral shape of the locking nuts. Accordingly, when locking plate 36 is fastened in place by means of screws 37 and 38, cut-outs 39 and 40 pass directly over the nuts and prevent them from turning inadvertently. In this manner, the shafts 31 and 33 are always held tightly in place.

In order to not rely solely on friction to hold hanger 25 in the desired position, the collar 32 has a number of holes 41 spaced around its face. Screw 38 which is held in a threaded hole in the hanger plate 28, extends also into the holes 41, and thus secures the hanger axle 26 in place. The number and spacing of the holes 41 are such as to allow for varying adjustments of the door height. Thus, in the absence of holes 41, the entire weight of the door would have to be supported by the frictional forces generated between collar 32 and hanger plate 28 due to the tightening of nut 34 on threaded shaft 31. This results from the fact that axle 26 is eccentric with respect to shaft 31, and therefore hanger 25 which supports the weight of the door, tends to rotate the axle about the shaft. Although friction prevailing between the surface of collar 32 and plate 28 may, initially, prove adequate, creepage effects within shaft 31 as well as the stressed surface will tend to reduce, in time, the frictional forces available for supporting the door. Through the application of holes 41, therefore, axle 26 is securely locked in place after the door has been adjusted to the desired level, and screw 38 has been inserted in the appropriate one of holes 41. Experience has shown that 4 or 5 holes 41 suffice to cover the range of required leveling positions.

The locking plate 36 has cut-outs that are identical to those of 39 and 40, and the hole for screw 38. All of these cut-outs and holes are symmetrically located, and therefore they allow the locking plate to be used for either the left side (position 36′) or right side (position 36″) of the door as shown in FIGURE 1. By making the locking plate interchangeable, in this manner, it is not necessary to manufacture two types of locking plates. Screws 37 and 38 serve two separate functions. They prevent collar 32 from turning, and hold the locking plate 36 in place. FIGURE 3, therefore, shows screw 37 because the latter aids in holding the locking plate even through it is not used for locking a collar 32 in this particular configuration.

When the hangers are used in conjunction with two-speed doors, the arrangement that prevails is shown in FIGURES 4 and 5. In this case two doors (10 and 10*a*) must be suspended. The elements and procedures for hanging door 10, in this situation, is identical to that already described. To hang the door 10*a*, the coupling plate 42 is fastened to channel 12 by means of bolt 43. Channel 12*a* is, in turn, fastened to the plate 42 by means of bolt 44. The hole in plate 42 through which bolt 44 passes, is slotted to permit adjustment in the position of channel 12*a*. The principle for this slotted construction is similar to that illustrated in FIGURE 6 for the track. Channel 12*a* is identical to channel 12 with the exception that holes for bolts 20, are not required in channel 12*a*. All other elements associated with the hanging of door 10*a* are also indentical with those of door 10. Thus, hanger 25*b*, roller 30*a* and hanger plate 28*a*, for example, are identical to the corresponding members 25, 30 and 28, respectively. The only essential difference that may be observed in the hanging hardware for the two doors 10 and 10*a*, is the bolt 23. Through the application of this bolt, it is possible to isolate channel 12 from all of the elements associated with the hanging of the doors. This particular feature is useful for allowing different work groups to engage in the installation of the elevator doors. Member 45 serves to cover the hanging hardware of the doors. This angular member is held by channel 12*a* and the coupling plate 42.

The configuration of FIGURE 4 is referred to as a two-speed system to distinguish it from FIGURE 1 which is a single-speed system. In FIGURE 4 the doors open towards the right, and door 10*a* is required to travel twice the distance that door 10 travels, in order to be situated under member 45 where they are in their open positions. Since they arrive at this destination at approximately the same time, door 10*a* must travel at approximately twice the speed of door 10, and hence the system is named "two-speed." In FIGURE 1, only one door is used, and therefore the system is designated as a "single-speed" one.

Center-opening doors may also be utilized for purposes of opening and closing door passages. In center-opening doors two single cooperating doors are synchronized to move in opposite directions when opening or closing. When closed, these doors meet at the center of the door passage, and for this reason they are designated "center-opening doors." When open, on the other hand, the doors are situated on opposite sides of the door frame. To hang such

center-opening doors, the arrangement of FIGURES 1 and 2 is applied separately to each one of the two single co-operating doors.

An additional feature of the present invention is the design by which a reduction in length of the adapter **18** is made possible. Heretofore, a relatively thick header was provided extending the full length of the path of travel of the doors. The construction was costly and cumbersome. In accodance with the present invention, however, an adapter **18** is provided and the door is trimmed by means of the narrow member **21**. This construction obtains all of the benefits of the prior art but is far less costly and easier to construct and erect.

While this invention has been described in some detail, it will be understood that this description is merely illustrative and variations and modifications may be made without departing from the spirit thereof or the scope of the following claims.

I claim:

1. A door hanger and track construction characterized by a hanger plate mounted on a shaft, the hanger plate having at least one aperture, an axle assembly eccentrically located with respect to the shaft for supporting the door hanger, the axle assembly comprising a section upon which a hanger is freely rotatable, and a collar interposed between said section and the hanger plate, the collar having a plurality of circumferentially spaced holes adapted for receiving a fastener assembly, said holes being registrable with said other aperture in the hanger plate upon rotation of the shaft.

2. The invention as defined in claim **1** including a door jamb wherein a relatively small sized adapter is mounted

outside the door frame in proximity to the door jamb for supporting track.

3. The invention as defined in claim **1**, wherein a locking plate is fixed to said hanger plate, said locking plate having cut-outs for said fastener and preventing inadvertent turning of said fastener.

4. The invention as defined in claim **1**, wherein the axle assembly rides on a track, said track having slots through which fasteners pass to fix said track in place, said slots allowing said track to be adjustably positioned.

5. The invention as defined in claim **4** wherein the said track is a substantially L-shaped channel member provided with an apex adapted to slideably engage wheels and said fastener means for fastening said channel track to said door frame.

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U.S. Cl. X.R.

49—409; 16—105