April 8, 1969 E. HALPERN 3,436,864

DOOR SUPPORT AND GUIDANCE MECHANISM

Filed May 4, 1966 Sheet 1 of 2

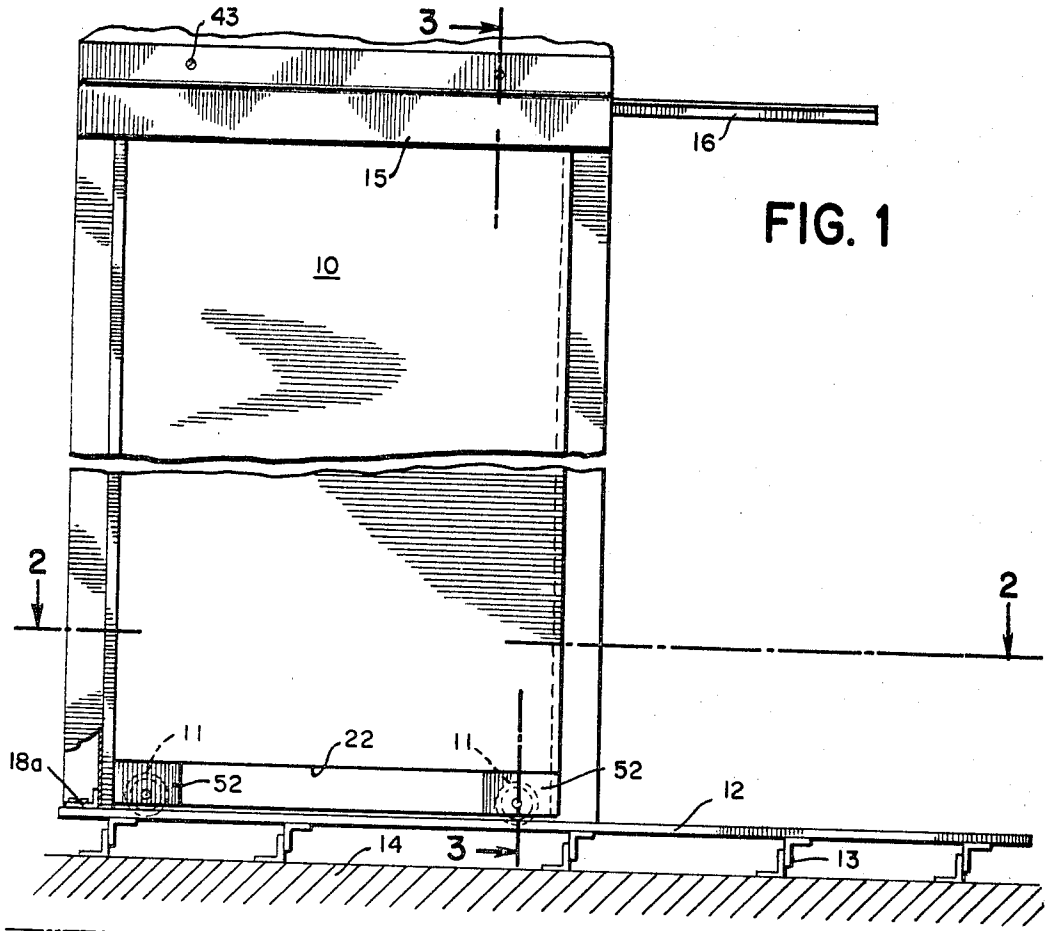

FIG. 1

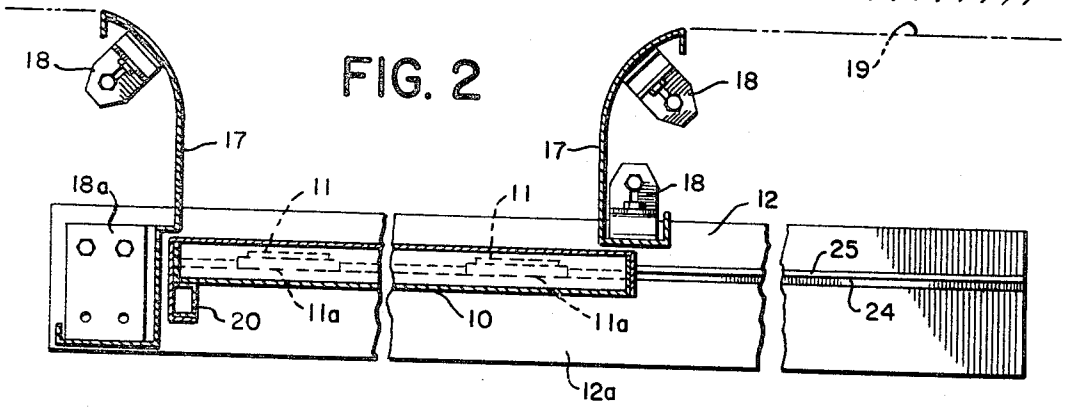

FIG. 2

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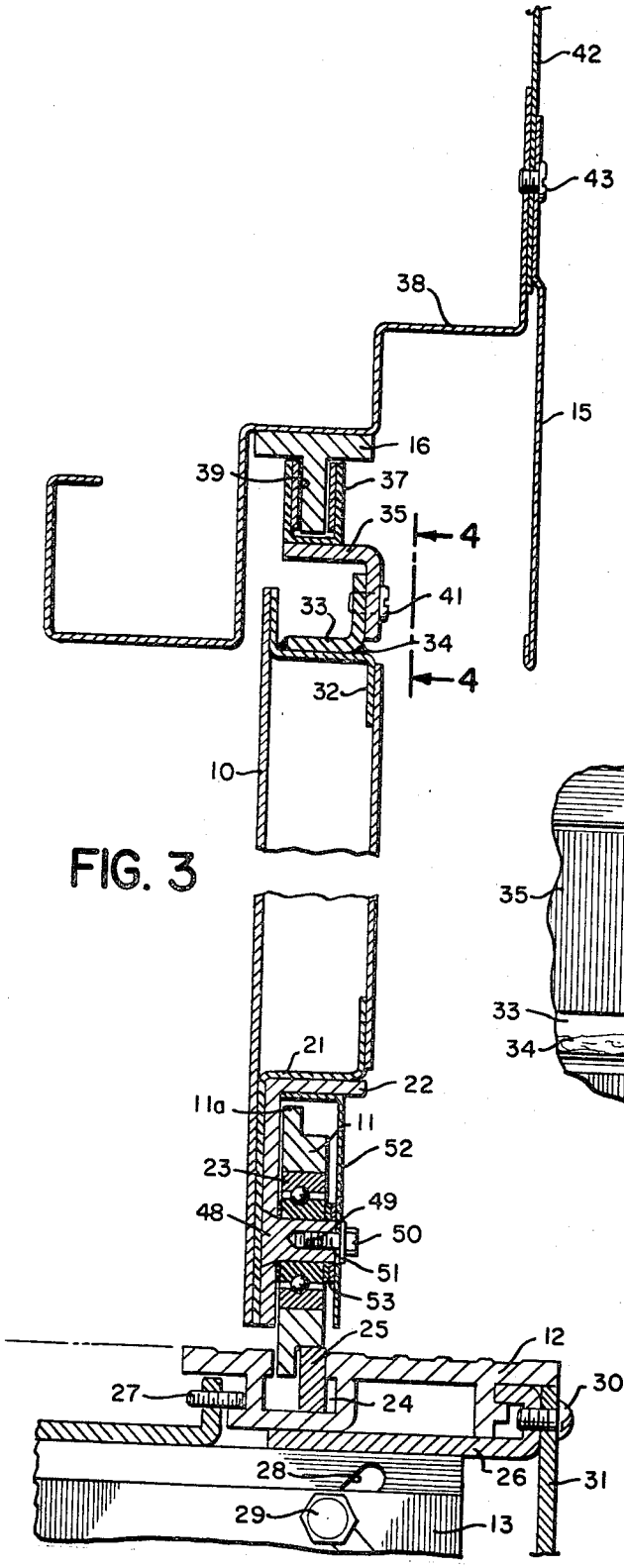
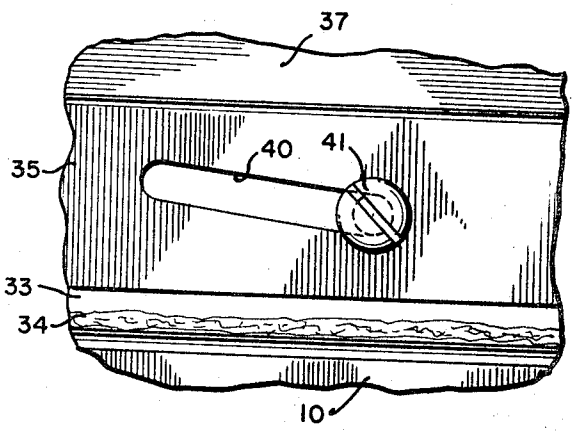


FIG. 3

FIG. 4



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DOOR SUPPORT AND GUIDANCE MECHANISM

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2 Claims

ABSTRACT OF THE DISCLOSURE

A door is supported on rollers at its base by means of a slotted floor sill, the sill is supported on vertically adjustable bracket means. Vertically adjustable guide means are provided on the upper edge of the door for cooperating with a fixed track.

The present invention relates to means for supporting the base of doors at their base, and guiding the upper edge of the doors, particularly to such means provided in elevator doors.

Heretofore, sliding doors used, for example, in elevators, were supported by suspending them at the top and guiding them at the base. The suspension hardware for such doors was relatively complex in order to support adequately the weight of the door. It was not uncommon to use a heavy track member in conjunction with equally heavy rolling hangers at the top area of the door. The heavy track was necessary in order to prevent excessive deflections of the track due to the weight of the door, because such deflections may result in jamming instances of the door as the latter moves along its path between the closed and open positions. In conjunction with the use of such heavy track and hanging hardware, extensive construction was required to fasten the track in place so that it is safely supported by the building structure or wall. The arrangements heretofore used for supporting the doors did not take into consideration the fact that the floor sill itself supports a sturdy and reliable means for sustaining the door. The present invention utilizes the structure. Since floor sills are, generally, present at the base of the door frames, it is not necessary to provide a separate member in the form of a track or rail for supporting the doors. The floor sills, moreover, are structurally adequate to support the doors, since they are specifically designed to withstand heavy loads such as may be passed over them for transfer into the elevator car. Furthermore, floor sills are normally equipped with slots which may be used for guiding the door along a specifically designated path. Through the application of the floor sill, therefore it is possible to dispense with the overhead track and door hanging hardware.

It is therefore an object of the present invention to provide means by which floor sills support and guide sliding doors.

Another object of the present invention is to provide means by which sliding doors operate with ease and move between their open and closed positions in a smooth manner.

A further object of the present invention is to provide means by which sliding doors are accurately guided along their path between the open and closed positions.

A still further object of the present invention is to provide means by which the guidance members for the sliding doors may be adjusted to compensate for the possible manufacturing and construction variations.

Other objects and features appear in the following description and specification taken in conjunction with the drawing in which:

FIGURE 1 is a front view showing the door in conjunction with its supporting and guiding mechanism;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1, and shows the door in relation to the floor sill and the door frame;

FIGURE 3 is a sectional side view taken along line 3—3 of FIGURE 1, and shows, in detail, the means and mechanism for supporting and guiding the door;

FIGURE 4 is a front view taken along line 4—4 of FIGURE 3, and shows the adjustment mechanism for compensating manufacturing and construction variations possible in the assembled parts as well as in their installation.

Summary of the invention

In accordance with the present invention, a door support comprises a door operating in conjunction with a slotted floor sill, characterized by means for supporting the door at its base, the support means being associated with the slot in the door sill. The door is provided with means for guiding the upper edge of the door to maintain the door balanced and upright in all positions of the door. The floor sill and the means for guiding the upper edge of the door are provided with leveling means.

As shown in the drawings, the sliding door **10** is supported by the wheels **11** riding in a groove present in floor sill **12**. The floor sill **12** is held in position by the sill supports **13**. These supports comprise L or angle-shaped members fastened together, and serve to retain the sill at a fixed distance above the building floor **14**. The supports **13** are situated along the length of the sill, and they are spaced so that the deflection of the sill at any point does not exceed the tolerable amount. A sill bracket is, generally, interposed between the floor sill and the supports **13**.

To maintain the sliding door in an upright and stable position, the upper edge of the door is guided by means of a slot and T-member arrangement which is located behind cover plate **15**. The T-member **16** extends along the entire path of the door.

The relationship of the sliding door to the floor sill and its surrounding environment, is illustrated in FIGURE 2. The edge of the sill facing the elevator shaft is denoted by **12***a*. The groove in the sill which contains the wheels **11** of the sliding door, is designated by **24**. The door frame **17** overlaps the sliding door **10**, and serves as the border of the opening to the elevator shaft or passenger car. The door frame **17** is held in position by means of brackets **18**. These brackets assure that the door frame is properly located to provide adequate clearance spaces between the sliding door and the frame. The brackets also ascertain that the door frame is joined to the building wall **19** so that a smooth and continuous surface is realized at the junction between wall and door frame. The sliding door **10** possesses a non-vision wing **20** which serves to cover the space between the elevator car and the door so that passengers entering or leaving the car do not have a visible view into the interior of the elevator

shaft. Bracket 18*a* locates the door frame with respect to the non-vision wing, and maintains that part of the door frame properly fixed in position.

The details of the assemblies by means of which the door is supported and guided, is shown in FIGURE 3. The door **10** is typically of sheet metal construction. At the lower edge of the door, a Z-shaped member **21** joins the two panels of the door and forms the bearing mounting for the wheels **11**, in conjunction with the side of the door facing passengers waiting for the arrival of the elevator car. An L-shaped member **22** abuts the Z-shaped member **21**, and serves to reinforce that section of member **21** and the door panel which forms the support for wheels **11**. The wheels **11** are freely rotatable by means of ballbearings **23**.

Within the groove or slot **24** normally present in the floor sill **12**, resides a member **25** of rectangular cross-section. This member **25** serves as track upon which the wheels **11** ride. The wheel **11** includes a flange **11***a* situated within the space between member **25** and an edge of the slot **24**. The flange **11***a* assures that the wheel and hence the door are confined to move along the slot **24** in the floor sill. The floor sill **12** is located on the support **13** by means of the sill bracket **26**. Through the application of screw **27**, the sill is properly aligned to assure an accurately situated path for the door **10**. The sill bracket **26** is fixed to the support **13** which is made adjustable through means of the slots **28** and the bolt **29**. Thus the height of the sill **12** above the building floor **14** may be varied by changing the relative position of the two L-shaped members which constitute the support **13**. The slots **28** and bolt **29** allow the two L-shaped members to be fastened together in different relative positions.

The sill bracket **26** has also a threaded hole to hold a screw **30** from which a fascia plate **31** may be suspended.

The side panels of the door **10** are joined at the top edge by the Z-shaped member **32**. Fixed to this Z-shaped member **32**, is an L-shaped member **33**. The two members may be joined together by means of, for example, welds **34**. A second L-shaped member **35** is attached to the member **33** by means of the screw **41**. L-shaped members **33** and **35** are situated with respect to one another so as to form, in combination, a U-shaped member. To the top of L-shaped member **35**, is fixed the member **37** which is also U-shaped. The member **37** provides a slot within which track **16** rides. Track **16** is fixed to the header **38** which is, in turn, mounted to the door frame and serves as a structural support for the track.

Track **16** in combination with the slot associated with member **37**, serves to guide the upper edge of the door **10** as the latter moves between its closed and open positions. Therefore, track **16** in conjunction with floor sill **12** fully confine the door and guide it accurately along its path. The weight of the door is transmitted to the wheels **11**, and therefore the door rolls along its designated path with ease and in a smooth manner. To provide for low frictional effects between track **16** and the U-shaped member **37**, as the latter slides along the track with the door, the internal walls of member **37** are lined with bearing material **39**. This bearing material has a well-finished surface as well as lubricating properties. Therefore, by lining the walls of the slot, formed by member **37**, with such bearing material, a well-operating non-sticking guidance mechanism is obtained for the top of the door.

L-shaped member **35** is made adjustable with respect to member **33** to permit alignment of the U-shaped member **37** with respect to track **16**. Such an adjustment feature is desirable to compensate for the manufacturing variations in the structural members as well as for any non-parallelism that may exist between floor sill **12** and the track **16**. The adjustment is made possible by providing slots **40** in member **35** one of which is shown in FIGURE 4 and a tapped hole in member **33**. The slot **40** is inclined with respect to the edges of member **35** and, accordingly the member **35** may be raised or lowered in relation to the top edge of the door. Depending on the height of member **35** above the top edge of the door, the screw **41** may be located at any position along the length of the slot. In the configuration of FIGURE 4, member **35** is at its highest position. As member **35** becomes lowered, the position of screw **41** moves along the slot toward the left. When member **35** is at its lowest position, screw **41** passes though both left ends of the slot.

Although the same adjustment feature could be realized by providing merely vertical slot in the member **35**, the arrangement of FIGURE 4 is the preferred one. By inclining the slot, in the manner shown, rather than providing it entirely vertical, favorable load-carrying capabilities of the members are obtained. If, for example, the slot was vertical, there would be a tendency for member **35** to slip downward in time due to the upthrust of the door. Such slippage tends to occur, in general, even though screw **41** is thoroughly tightened in place. Creepage tends to relieve the stresses generated by the initial tightening action, and this results in a reduction of the frictional forces which hold the member **35** in position. By inclining the slot as shown in FIGURE 4, only a small component of the total load is transmitted for support by the frictional forces, and accordingly less reliance is placed on the tightening action of the screw **41**. The inclination of the slot, therefore, provides a simple way in which to retain the member **35** in a stable position.

The details for the wheel support are shown in FIGURE 3 and comprise an axle **48** provided with a threaded aperture **49** adapted to accommodate a screw **50**. A washer **51** is interposed between the head of the screw and the cover plate **52**. Separators **53** are located between the cover plate and the wheel **11**. By this means, the wheel is rotatably mounted turning on the ball bearings **23**. It will be realized that this illustrative means of support may be varied depending upon the existing conditions.

The guidance and track members above the upper edge of the door, are concealed through means of cover plate **15**. The latter is attached to the upper fascia plate **42** by means of screw or fastening device **43**. Fascia plate **42** serves the same function as fascia plate **31** which has already been described. At the same time, the function of cover plate **15** is similar to that of fascia plate **42**, with the exception that the cover plate is intended for the specific task of masking the structural mechanism above the upper edge of the door and for easy removal and servicing the guidance hardward. Depending on the area between floors within elevator shaft, one or more fascia plates may be used to cover up that area.

I claim:

1. An elevator door construction including a movably mounted door having an adjustably mounted U-shaped guide supported on the upper edge of said door, a door frame having a fixedly mounted track member partially disposed in said U-shaped guide and slidably engagable with bearing material on the internal side walls of said U-shaped guide, said U-shaped guide on said door being mounted on a pair of adjustable L-shaped members connected by fastening means disposed in an inclined slot in one of said L-shaped members, said door having a flanged wheel mounted on the base thereof, a floor sill having a track member for said door wheel to roll on and a slot for receiving said flanged portion of said door wheel, said floor sill being mounted on a bracket supported by a pair of L-shaped members having oppositely inclined slots and fastening means extending through said slots to selectively adjust the position of said bracket and said sill in the vertical direction.

2. The elevator door construction of claim **1** wherein the first of said L-shaped members is fixedly mounted

on said door and the second L-shaped member has said U-shaped guide fixedly attached thereto and has an inclined slot for adjustably connecting said second L-shaped member to said first L-shaped member by said fastening means.

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U.S. Cl. X.R.

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