United States Patent [19]

Slaybaugh

[11] **3,750,334**

[45] **Aug. 7, 1973**

[54] **SLIDING SWINGING DOOR SUSPENSION**

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[73] Assignee: **Republic Industries, Inc.**, Chicago, Ill.

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[21] Appl. No.: **163,945**

[52] **U.S. Cl.** **49/177**, 49/396

[51] **Int. Cl.** **E05d 15/22**

[58] **Field of Search** 49/141, 177, 396, 49/388; 16/129

[56] **References Cited**

UNITED STATES PATENTS

3,491,483	1/1970	Miller	49/141
3,373,529	3/1968	Ingham	49/388
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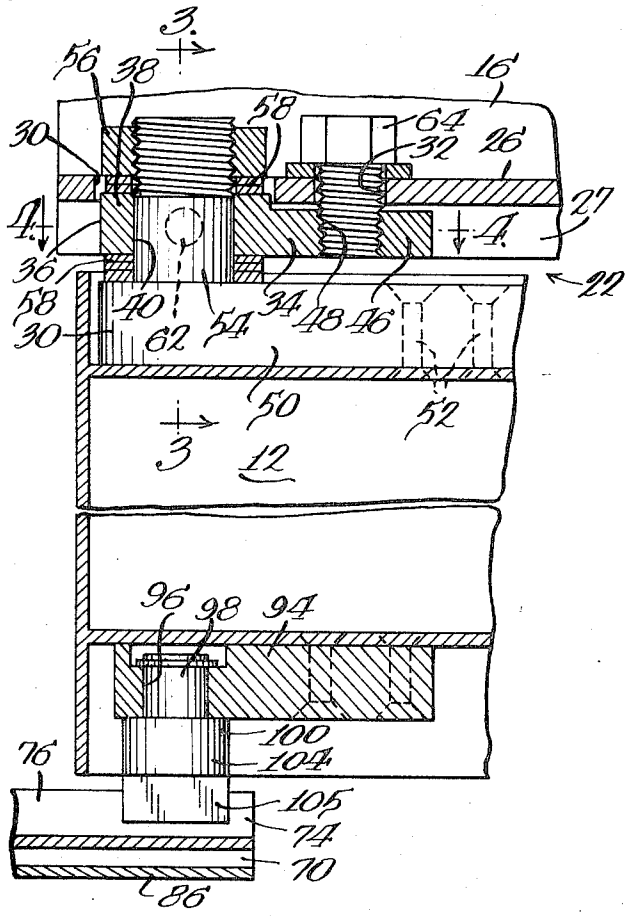
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[57] **ABSTRACT**

A hinging arrangement for a sliding, swinging door to accommodate the swinging movement thereof including provision to compensate for door sag.

3 Claims, 9 Drawing Figures



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SHEET 1 OF 2

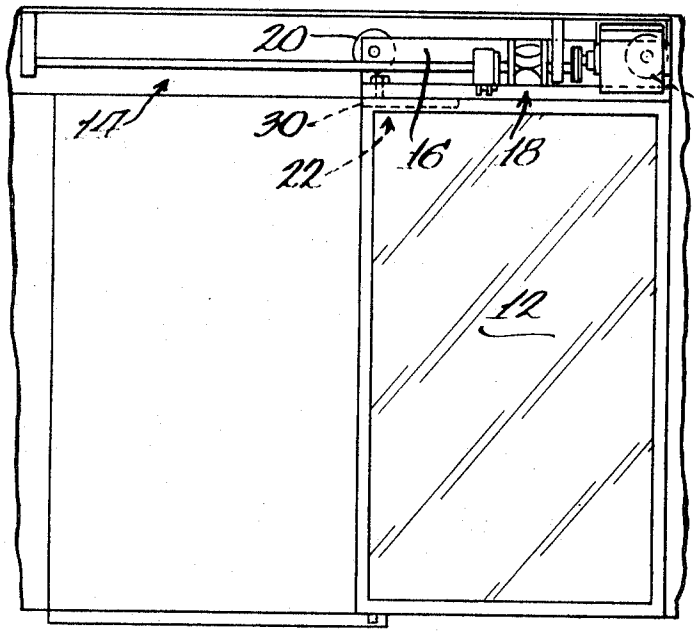


Fig. 1.

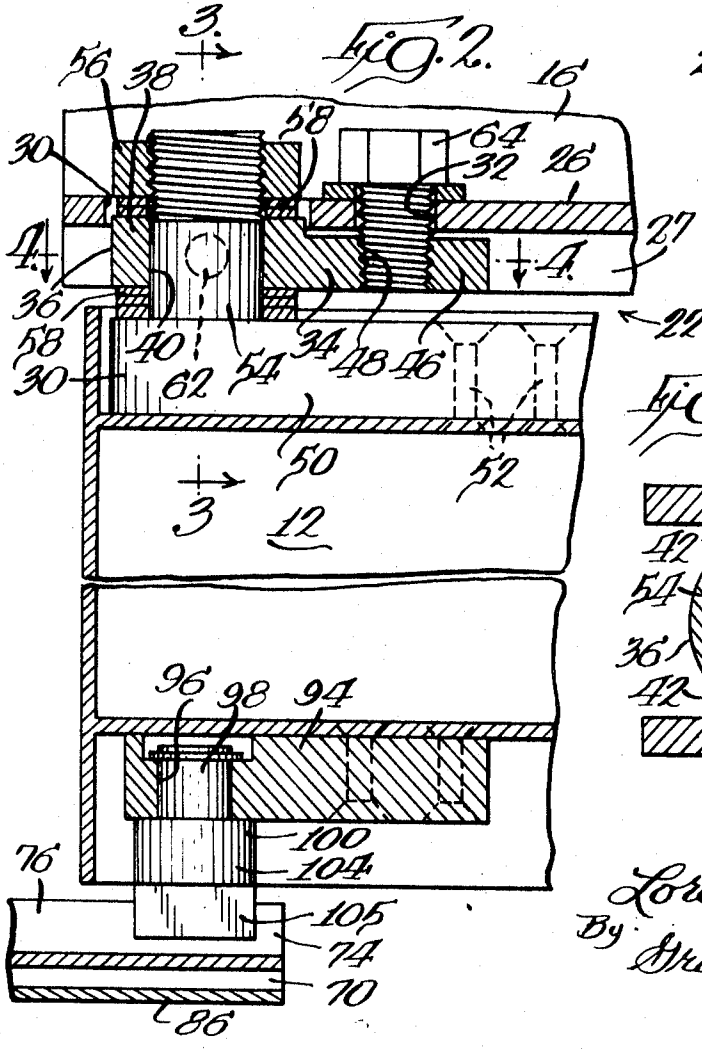


Fig. 2.

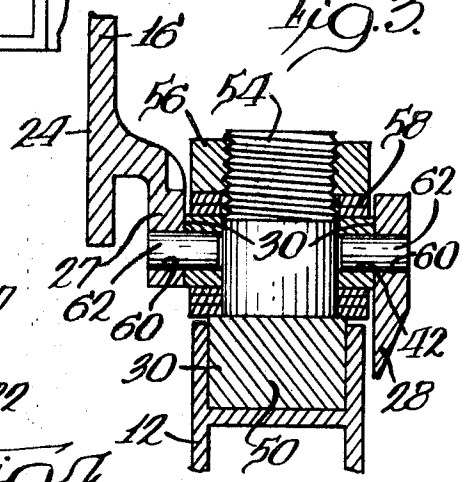


Fig. 3.

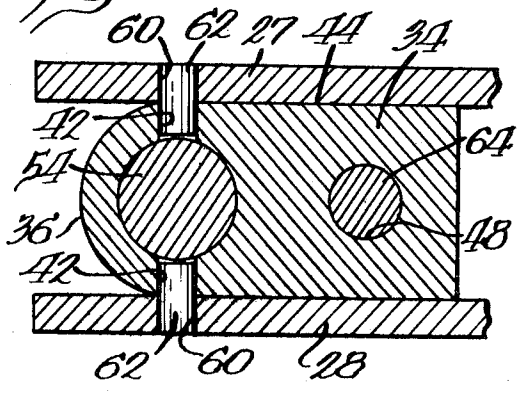


Fig. 4.

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PATENTED AUG 7 1973

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SHEET 2 OF 2

Fig. 5.

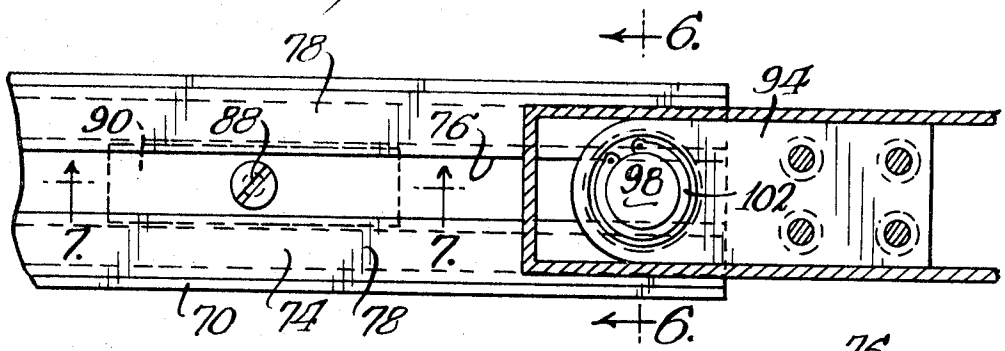


Fig. 6.

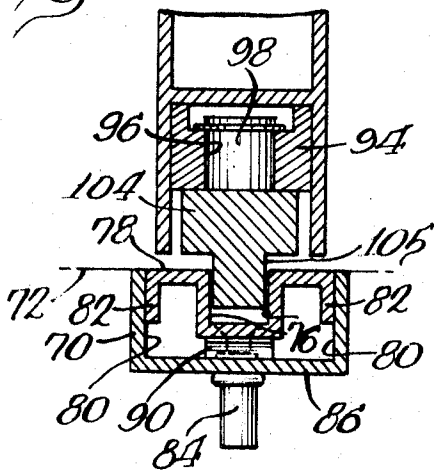


Fig. 7.

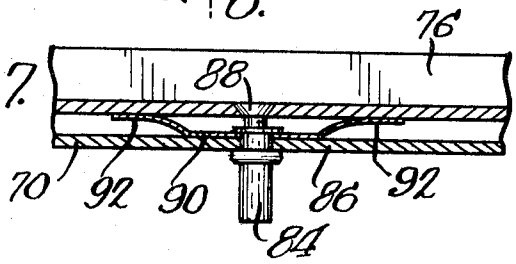


Fig. 9.

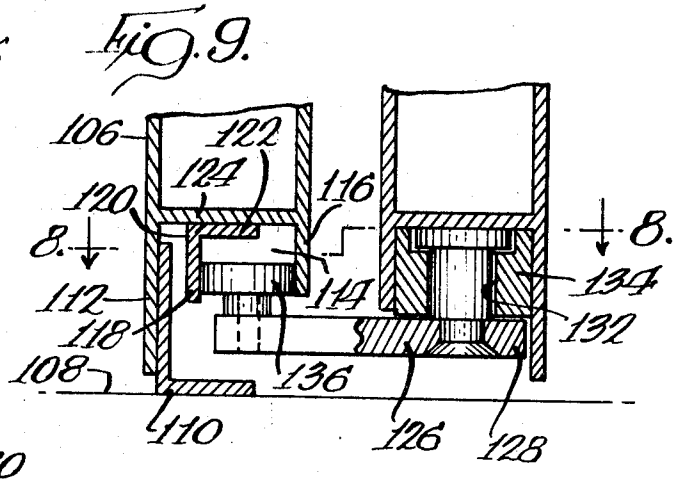
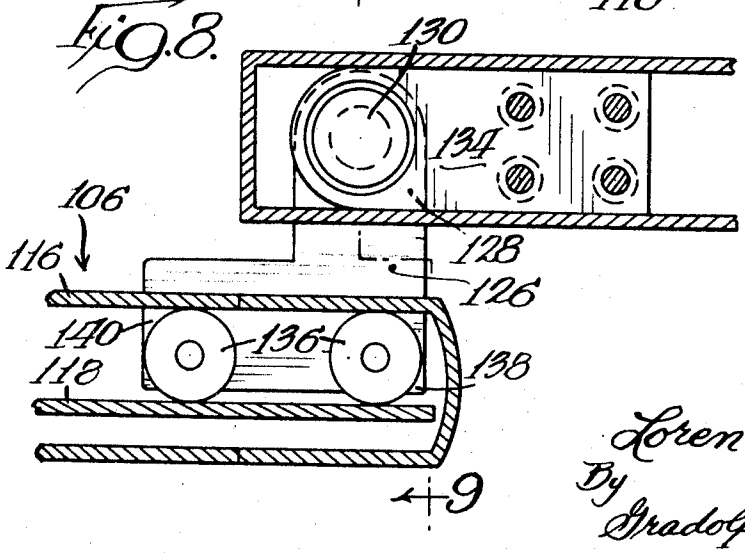


Fig. 8.



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SLIDING SWINGING DOOR SUSPENSION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a hinge for a sliding, swinging door.

2. Description of the Prior Art

In powered sliding doors, it is necessary that the door panel be mounted for swinging movement also in the event of failure of the door sliding mechanism. It is also desirable to make such provision for use of the doorway under light traffic circumstances where use of the power mechanism may not be justifiable.

To mount the door for swinging movement, a separate door frame has been provided within which the door is conventionally hinged and to which the power sliding mechanism is connected. This arrangement, however, has not been totally successful. The necessary framing is unsightly in comparison with the commonly seen unframed doors. Furthermore, the bottom frame member must either be recessed in the floor or not. If it is not, the frame presents a tripping hazard in the swininging mode of use; if it is, the relatively wide slot to accommodate the frame presents a tripping hazard in the sliding mode of use.

Unframed doors, however, present problems in suspension. By virtue of the unbalanced suspension, a strong cantilever support is required to prevent the door sagging, dropping the free corner and causing the interference with either of the door's movements.

U.S. Pat. No. 3,491,483 offers one solution to this problem. The door is carried by a trolley overlying the top edge of the door. A deep socket is formed in the style of the door and an elongated post extends from the trolley into the socket. Sag is prevented simply by making the trolley and pin rigid and neavy enough to prevent sagging, bending, or deformation. The difficulty with this approach is that it demands the presence of a massive style.

SUMMARY OF THE INVENTION

This invention differs from previous practice in that it recognizes the inevitability of sag and provides relatively simple adjustable means to tilt the hinge axis of the door to compensate for it, and eliminates the requirement of any style or vertical door framing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of a sliding door assembly with a door panel thereof arranged for swinging operation;

FIG. 2 is an enlarged longitudinal vertical section through the door panel hinge of FIG. 1;

FIG. 3 is a section taken along the line 3—3 of FIG. 2 looking in the direction of the arrows;

FIG. 4 is a section taken along the line 4—4 of FIG. 2 looking in the direction of the arrows;

FIG. 5 is a top plan view of the floor track assembly and the bottom pivot of the door panel;

FIG. 6 is a section taken along the line 6—6 of FIG. 5 looking in the direction of the arrows;

FIG. 7 is a section taken along the line 7—7 of FIG. 5 looking in the direction of the arrows;

FIG. 8 is a horizontal section through the bottom part of a door taken along the line 8—8 of FIG. 9 looking in the direction of the arrows illustrating a trackless form of bottom pivot optional to that of FIG. 5; and

FIG. 9 is a section taken along the line 9—9 of FIG. 8 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a sliding swinging door unit 10 embodying the present invention. It includes a door panel 12 to the right adapted to slide to the left to open the doorway it closes and a header 14 containing a trolley 16 and mounted on a track (not shown) supporting the door panel 12. The header includes mechanism 18 to move the trolley on the track for sliding movement of the door. The trolley 16 extends substantially the width of the door panel and has rollers 20 at its ends directly engaged on the track. The door panel supporting hinge structure 22 is at one end of the trolley —the left end as illustrated— with the normally closed door extending toward or beyond the other end of the trolley.

In FIG. 3, the trolley 16 is shown in transverse section in the vicinity of the hinge pivot. Overall, it is L shaped with a vertical web 24 which carries the rollers 20 and a horizontal web 26 (FIG. 2) beneath which the door panel 12 is suspended. The horizontal web in turn has two, spaced, downwardly extending flanges 27 and 28, flange 28 extending lower than flange 27 to constitute a door stop.

The hinge pivot suspension 22 of the door is particularly illustrated in FIGS. 2, 3 and 4. On the vertical axis of hinging, the horizontal web 26 of the trolley 16 has a large diameter hole 30 formed therein spanning the web from flange 27 to flange 28 and a hole 32 of smaller diameter spaced longitudinally therealong in the direction of the free edge of the door.

A rocking plate 34 underlies the two holes 30 and 32. The plate closely spans the flanges 27 and 28 and terminates at its inner end 36 in a semicircle. The semicircle defines a short upstanding integral tubular boss 38 having a large diameter hole 40 therethrough defining the gudgeon of the door pivot. The plate has an aligned pair of bores 42 extending horizontally in from the side edges 44 of the plate 34 to the hole 40.

The end 46 of the plate 34 opposite the gudgeon is of reduced thickness in comparison with bossed portion and has a threaded hole 48 extending vertically therethrough spaced from the gudgeon 40 in the direction of the free edge of the door.

A door arm support 50 is secured by appropriate through-fastenings 52 to support the door panel 12. The door arm support possesses a relatively large diameter threaded stud 54 extending upwardly therefrom constituting the pintle of the door pivot. The support is the sole support of the door.

The pintle 54 is extended up through the gudgeon 38 and a nut 56, preferably of the lock nut type, secures the door to the plate 34. Needle bearings 58 are interposed between the support 50 and plate 54 and between the plate and the nut 56 to ensure freedom of swinging movement and to prevent the nut loosening.

The rocking plate is mounted for rocking movement to the flanges 27 and 28 of the trolley 16. To this end, opposite bores 60 are formed through the flanges, and pins 62 extend through these flanges bores 60 into the rocker plate bores 42.

A cap screw 64 is extended downwardly through the hole 32 in the horizontal web 26 of the trolley 16 and is threaded into the tapped hole 48 in the rocker plate.

From the foregoing it will be appreciated that simple yet effective means have been provided here fore hingedly supporting a door from an upper corner only. The pintle **54** of the hinge is sturdy and is large in diameter. The gudgeon is similarly so. The rocker plate is carried by the pins **62** and the angular position of the plate is established by the adjusting cap screw **64.** The thin end **46** of the plate is thin to establish a space between it and the web **26** of the trolley above it when the plate is generally horizontal such that that end of the plate can be rocked up to compensate for the sagging tendency inherent in a cantilevered suspension and for wear that might occur between the pintle and gudgeon. Hole **38** in the horizontal web **26** of the trolley is large enough to clear the bossed gudgeon comfortably to permit such rocking adjustment.

Break-away detent means will be provided to hold the door closed for normal sliding movement but to permit emergency (or intended) swinging exit passage, but as such expedients are well known and play no part in this invention, none has been illustrated.

The bottom hinging corner must, of course, be supported against the lateral thrust implicit in pushing the door open in swinging fashion. FIGS. **2, 5, 6** and **7** illustrate one means of handling this problem.

A U-shaped track housing **70** is set into the floor **72** to be flush with the surface thereof under the line of movement of the door in sliding mode. The track **74** proper is contained within the housing. In section, the track includes a relatively narrow, central groove **76,** flats **78** extending outward from the upper edges of the groove to the housing walls **80,** and guide flanges **82** extending downward from the outer edges of the flats adjacent the housing walls **80.**

The housing has internally threaded screw receptacles **84** extending downwardly from the center line of the floor **86** thereof. Screws **88** extend through the bottom of the track groove **76,** through a spring clip **90** and into the receptacles **84** to secure the track within the housing.

The spring clips **90** are spring steel strips with upbent ends **92** and a central perforation for the screws **88.** The spring ends bear against the track **74** urging it up against the screws **88.** Thus, the track can be adjusted to an exact position and an exact parallelism with respect to the door and its sliding motion regardless of floor irregularities or misalignments.

The bottom corner of the door under the top hinged corner carries a block **94** in similar fashion as the foor arm support **50.** A countersunk bore **96** extends vertically therethrough. The bore rotatably contains the shaft **98** of a pivot pin **100.** A snap ring **102** within the countersink secures the pin to the block **94.** The operative end of the pivot pin is a short cylinder **104** of relatively large diameter ground down on opposite sides to provide flats **104** as the longitudinal sides of a substantially rectangular block proportioned to fit in the track groove **76.**

FIGS. **8** and **9** illustrate another approach to the problem where the swinging sliding door is to be associated with a second stationary door **106.** In this instance, the stationary door may be secured to the floor **108** by a bracket **110** on the inside wall of a bottom, H-shaped flange member **112.**

A downwardly facing guide channel **114** spaced above the floor is provided under the bottom edge of the stationary door by the outside lower leg **116** of the H-shape frame member **112** and one leg **118** of an angle strip **120** secured by its other leg **122** to the underside of the web **124** of the frame member **112.** An L shaped bracket **126** connects the stationary door and the sliding door. On one leg **128,** the bracket mounts an upstanding, headed pivot pin **130** which is contained in a countersunk bore **132** in a block **134** essentially similar to and mounted like block **94** of FIG. **2.**

A pair of upstanding rollers **136** are mounted to the bracket, one at the apex thereof and the other at the end of the other leg **140.** The rollers are engaged in the guide channel **114.** Thus, the rollers ride in the guide channel for sliding operation of the door, and the door is rotatable on the pivot pin for swinging movement while at the same time, the pivot pin holds the foot of the door against lateral pressures.

I claim:

1. A supporting assembly for a sliding swinging door to constitute the sole support thereof comprising a trolley for moving said door in the sliding mode having a pair of spaced vertical members and a horizontal member interconnecting said vertical members, a vertical pintle extending upward from an upper corner of said door, a gudgeon plate contained between said vertical members and above said door, horizontal transverse pivots interconnecting said vertical members and said plate for pivotal movement on the axis of said pivots, said plate having a vertical aperture intersecting said pivoting axis receiving said pintle pivotally and supporting said door, and means adjustably interconnecting said horizontal member and said plate at a point horizontally displaced from said pivoting axis for supporting said plate at an adjustable angle.

2. The combination as called for in claim **1** wherein said aperture intersects said pivoting axis and is located adjacent one end of said plate, said adjustable means comprises a screw engaging the other end of said plate and said other end of said plate extends from said pintle to overlie said door in its closed position.

3. The combination as called for in claim **1** wherein said pintle is mounted to a horizontal top door support member, said door being characterized by the absence of a structural stile.

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