Feb. 9, 1954 C. B. LE BON III 2,668,317

GUIDE DEVICE FOR A SLIDING DOOR

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Fig. 1.

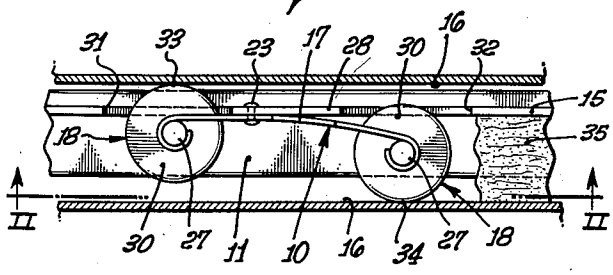


Fig. 3.

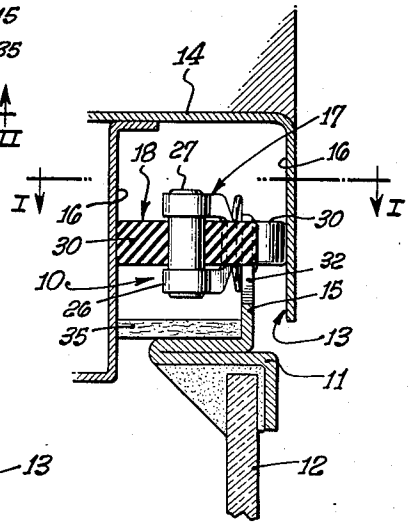


Fig. 2.

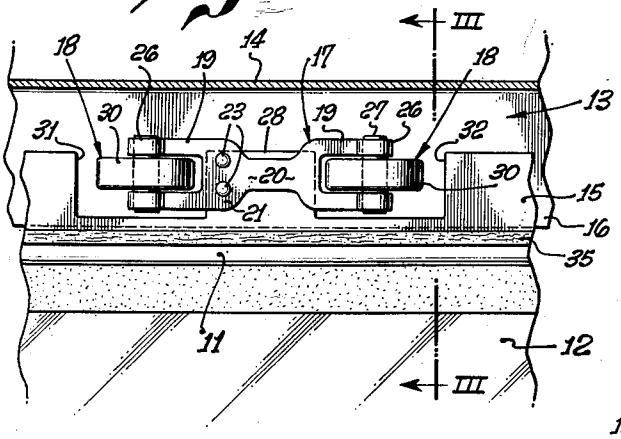


Fig. 4.

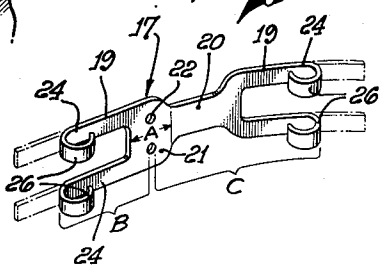
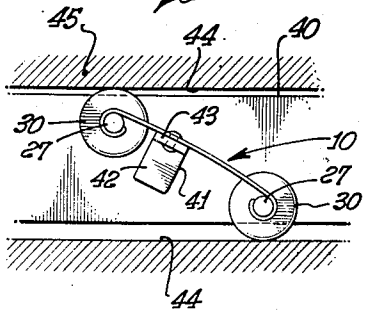


Fig. 5.



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GUIDE DEVICE FOR A SLIDING DOOR

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2 Claims. (Cl. 16—91)

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This invention relates to sliding doors and more particularly to a guide device for maintaining a sliding door in a selected door plane and for resiliently resisting movement of the door out of the selected plane.

Specific advantages are secured both in operation and in closure of a door when a sliding door is maintained in a selected door plane with respect to a door frame. These advantages include ease and facility of movement of the door from open to closed position, proper cooperative interengagement of the door and weather strip means carried by the door frame to effect a tight weather seal, and reduction to a minimum of wear upon said weather strip means.

Prior sliding door construction included track means for guiding and supporting a sliding door at either top or bottom and groove means in a door frame for guiding the opposite portion of the door. Such guiding groove means obviously required suitable clearance or tolerance between the portion of the door extending into the groove and the walls of the groove. In some instances, rollers were mounted within the groove for antifrictionally facilitating the sliding movement of the door. Lateral play in such prior constructions was resisted only by weather strip means or by actual contact of the door against the wall of the groove. Obviously, such prior construction permitted rattling and vibration of a door, misalignment of the door with a selected door plane thereby causing greater difficulty in operation of the door, and loss of tight weather seal. This invention contemplates a guide device which achieves the advantages mentioned above while obviating the disadvantage of prior constructions.

It is, therefore, an object of this invention to provide a means for maintaining a sliding door in a selected vertical plane whether the door is being moved into open or closed position or is at rest.

An object of this invention is to provide a guide device for resiliently and yieldably resisting movement of a sliding door out of a selected plane of door movement.

Another object of this invention is to provide a guide device for sliding door which will normally maintain the door in a selected plane of the door frame for proper cooperation therewith so that wear on weather stripping material carried by the door frame will be reduced to a minimum.

Still another object of this invention is to provide a top guide device for a sliding door which will virtually eliminate rattling and vibration of

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a door with respect to an associated head member of a door frame.

This invention contemplates a novel form of guide device for sliding doors utilizing a one-piece integral resilient member adapted to be vertically disposed and to carry a pair of wheel and axle assemblies longitudinally spaced and rotatable about vertical axes, said wheels being adapted to respectively engage opposite walls of a downwardly facing groove provided in a head member of a door frame.

An important object of this invention is to design and provide a top guide device for sliding doors wherein a one-piece integral member of flat metal stock is designed to most effectively use the metal of said member so as to provide a simple efficient manner of resiliently mounting a pair of wheel and axle assemblies upon a top rail of a door.

Generally speaking, a guide device for sliding doors contemplated by this invention comprises three units; namely, two wheel and axle assemblies and a one-piece integral resilient member of flat stock curved along its longitudinal axis providing a mounting for said wheel and axle assemblies and a mounting for said device on the top rail of a door. The resilient member includes oppositely directed fork-like end portions adapted to receive and to carry wheel and axle assemblies and an intermediate asymmetrically arranged portion of reduced width integrally connecting said fork-like portions so as to provide a selected resilient flexibility between the spaced wheel and axle assemblies. The resilient member includes an anchor portion offset from the transverse center line of the member for securing the member to a top rail of a door to provide oppositely extending arms of selected flexibility and resiliency for spring loading said wheels against associated walls of a groove formed in a head member of a door frame.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings.

In the drawings:

Fig. 1 is a sectional view taken in the horizontal plane indicated by the line I—I of Fig. 3 and shows generally a top view of a fragment of a sliding door and guide device embodying this invention.

Fig. 2 is a side view taken in a vertical plane indicated by the line II—II of Fig. 1.

Fig. 3 is a transverse sectional view taken in the plane indicated by line III—III of Fig. 2.

Fig. 4 is a perspective view of a metal blank

forming the plate-like member of this invention, the phantom lines at each end indicating the fork elements extended prior to forming axle mountings.

Fig. 5 is a virtually top plan view of a guide device embodying this invention mounted on a sliding door in different manner.

The drawings illustrate an exemplary installation of a guide device generally indicated at 10 embodying this invention. In Figs. 1–3, the guide device 10 may be carried on top rail 11 of a steel framed sliding glass door 12. The rail 11 may be partially received within a downwardly facing groove 13 provided on a head member 14 of a door frame.

The door frame is illustrated as being formed of steel framing and includes usual construction (not shown) of side jambs and bottom sill arranged to provide with a head a rectangular door opening. The bottom sill may carry a longitudinally extending track for guiding wheel and axle assemblies carried by the bottom rail of the sliding door. The track on the sill, together with the downwardly facing groove 13 in the member of the frame cooperate to define a selected door plane or planar zone in which it is desired that the sliding door be moved or be at rest.

The top rail 11 of the door 12 may include a longitudinally extending upstanding flange or rib 15 normally positioned at one side of a vertical plane longitudinally bisecting the groove 13. The rib 15 extends upwardly between the opposed internal wall surfaces 16 of groove 13.

Adjacent opposite ends of the top rail may be mounted two of the guide devices 10, only one of said guide devices being illustrated for brevity since the other is identical. Each guide device comprises a virtually three-piece assembly of a single integral elongated resilient member 17 of thin strip material formed to carry at each end a wheel and axle assembly 18. The shape and configuration of the flat blank (illustrated in Fig. 4 by extended phantom lines) may be provided by stamping or punching member 17 from suitable thin flat stock of virtually uniform thickness and preferably of spring metal having desired resilient characteristics. The member 17 is preferably slightly curved along its longitudinal axis.

The member 17 includes oppositely directed fork-like end portions 19, each end portion 19 being of virtually the same width. An intermediate portion 20 integrally joins said fork-like end portions 19 and is preferably formed of reduced width as compared to the width of end portions 19.

The intermediate portion 20 may join one fork-like end portion 19 by and through an anchor portion 21 having the same width as the adjacent end portion 19 and having a relatively greater longitudinal dimension A than that by which the opposite end portion 19 is joined to the intermediate portion 20. There is thus provided at the anchor portion 21 sufficient metal in width and length which may be perforated to provide spaced holes 22 for rivets 23 which may secure the member 17 to rib 15. The anchor portion 21 lies to one side of the transverse center line of the member 17 and it will be noted that the fork-like end portions 19 are asymmetrically arranged with respect to the rivet accommodating holes 22 to form a short, relatively stiff arm B and a long, more flexible arm C, the purpose of which will be later described.

Each fork-like end portion 19 includes a pair of spaced parallel longitudinally extending elements 24 each of uniform width. End sections of each pair of elements 24 may be curled inwardly with a selected constant radius on the same side of member 17 and about a transverse axis so as to provide aligned axle mountings 26 on each end portion 19. The inwardly curled end sections terminate in spaced relation to the opposed portion of elements 24 to provide sufficient space whereby opposite ends of an axle 27 of a wheel and axle assembly 18 may be pressed into the aligned axle mountings 26.

The axle 27 of each assembly 18 is nonrotatably carried by axle mountings 26 and each axle carries a wheel 30 thereon adapted to be received between elements 24 of a fork-like end portion 19. The wheel 30 may carry an internal antifriction bushing (not shown) upon which is mounted the material forming the wheel, said material being preferably rubber, synthetic rubber or rubber composition.

The assembled three-piece device 10 may be operatively mounted on the top rail 11 of a sliding door by riveting said member to a rib portion 28 with the transverse axis of the member vertically positioned so that the axes of the wheel and axle assemblies 18 are also vertically disposed and the wheels 30 lie in a virtually horizontal plane. A pair of longitudinally extending spaced slots 31 and 32 formed in rib 15 and defining the rib portion 28 are adapted to accommodate, without interference, the longitudinally spaced wheel and axle assemblies 18. When secured to rib portion 28, the arm B of member 17 lies virtually parallel to rib 15 while the longer arm C curves diagonally across the rail 11. The longitudinal curvature of the member 17 causes the wheels 30 to be resiliently urged against the opposed respective walls 16 of groove 13 for contact as at 33 and 34 respectively.

When the installation is made on an exterior sliding door, the rib 15 is normally positioned adjacent to the inner side of the door. Thus wind loads or laterally acting force components pressing against the door from the outside are resiliently resisted by the shorter and less flexible arm B, arm B including that part of the wide anchoring portion 21 which lies on the same side of holes 22. The more flexible arm C which includes the narrower intermediate reduced portion 20, resiliently restrains interior laterally acting force components, which may press outwardly against the door, the latter components being normally of less force magnitude than those acting against the outside of the door.

Normally, the guide devices 10 maintain the top rail of the door in the selected door plane or planar zone and will act to return the door to normal position by the resilient character of the metal member 17. The anti-frictionally mounted wheels 30 of suitable rubber material also afford some resilient resistance to laterally acting force components while at the same time providing a quiet, virtually noiseless guiding action when the door is slidably moved in its selected path in the selected door plane. It will thus be apparent that an efficient effectively acting top guide device for sliding doors is provided by an inexpensive, easily fabricated three-piece assembly consisting of a pair of longitudinally spaced wheel and axle assemblies connected and carried by a single integral resilient member which is so designed as to spring load said wheels.

A strip 35 of suitable weather strip material may be carried by the top rail 11 of the door for

contact with a wall surface 16 of the groove 13. It will be noted that the wall contacted by strip 35 is the exteriorly disposed wall of the groove and that the lateral force components acting to press the strip against surface 16 are those forces of normally small force magnitude which press the door outwardly from the interior. These forces are resiliently resisted by arm C. Wear on strip 35 is thus reduced.

In Fig. 5 is illustrated an alternative method of mounting a guide device 10 upon a sliding door having greater thickness than the door illustrated in Figs. 1–3 inclusive, such a door, for example, being a double glazed door.

A top rail 40 of a sliding door may carry an angle section bracket 41 having a horizontally disposed leg 42 secured to the top surface of rail 40 in any suitable manner as by screws, rivets, welding or bolt and nut assemblies. The vertical leg 43 of bracket 41 may be provided with spaced openings adapted to be aligned with the openings 22 of the member 17 so that member 17 may be riveted to said vertical leg 43. The bracket 41 is disposed in angular relationship with respect to the sides of rail 40 so as to position the device 10 diagonally across the top rail 40. The diagonal mounting of device 10 permits the wheels 30 thereof to resiliently bear against the opposed walls 44 of a downwardly facing groove carried by the head 45 of the door frame. The action of device 10 in this mounting is similar to that described above.

It is understood that member 17 may be formed of flat stock of resilient metal with a normally straight longitudinal axis, the member 17 being made to assume a curved configuration when installed between the walls of a groove 13 so as to spring-bias the wheels 30 against said walls.

The guide device 10 may be employed with sliding doors of metal, wood, or other construction and is simply and quickly mounted thereon even when the top rail does not include an upstanding rib as illustrated in the exemplary illustration of Fig. 5.

Various modifications and changes may be made in the construction of the guide device which may come within the spirit of this invention. All such changes and modifications coming within the scope of the appended claims are embraced thereby.

I claim:

1. A guide device for use with a sliding door comprising a one-piece elongated resilient metal member of thin strip material slightly curved along its longitudinal axis and adapted to be disposed with its transverse axis vertical, said member including oppositely directed fork-like end portions and an intermediate portion of reduced width between said end portions; an anchor portion of the width of said end portions between the intermediate portions and one of said end portions and offset from the transverse center line of the member; each fork-like end portion including spaced parallel elements; said elements including inwardly curled end sections formed on the same side of said member, curled end sections of a pair of elements being formed on a constant radius about the same axis to provide aligned axle mountings; and wheel and axle assemblies carried by said axle mountings.

2. An article of manufacture comprising: a one-piece elongated thin strip-like resilient metal member, said member including oppositely directed fork-like end portions and an intermediate portion of reduced width between said end portions; each fork-like end portion including spaced parallel elements; said elements including inwardly curled end sections formed on the same side of said member, curled end sections of a pair of elements being formed about the same axis to provide aligned axle mountings, and a securing portion between the intermediate portion and one of the end portions.

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