United States Patent [19]

Seng

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[54] **DOOR INSTALLATIONS**

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[52] **U.S. Cl.** **49/360,** 49/427

[51] **Int. Cl.** **E05f 11/54**

[58] **Field of Search** 49/360, 425–427, 49/357, 349, 199

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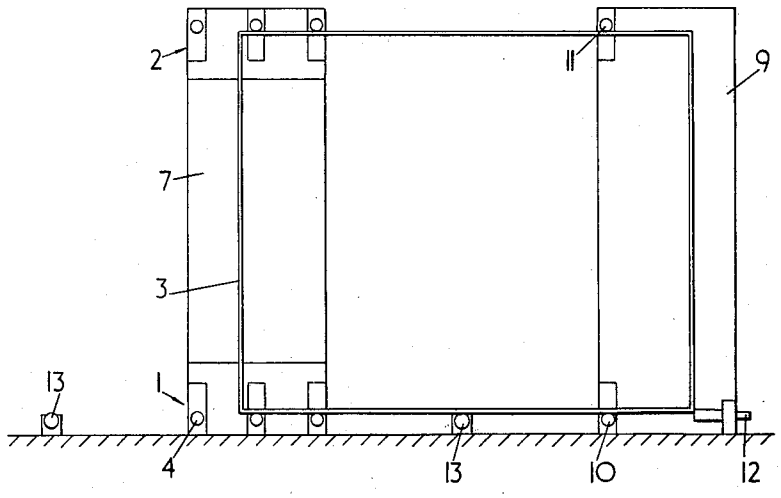
Primary Examiner—Kenneth Downey

Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

An installation having a slidable door in which there is provided preferably two fixed side elements which are horizontally spaced, with the slidable door being movable between the side elements on rollers which are mounted on said side elements to grip top and bottom portions of the door. Balancing rollers on ground level also support the door.

3 Claims, 8 Drawing Figures



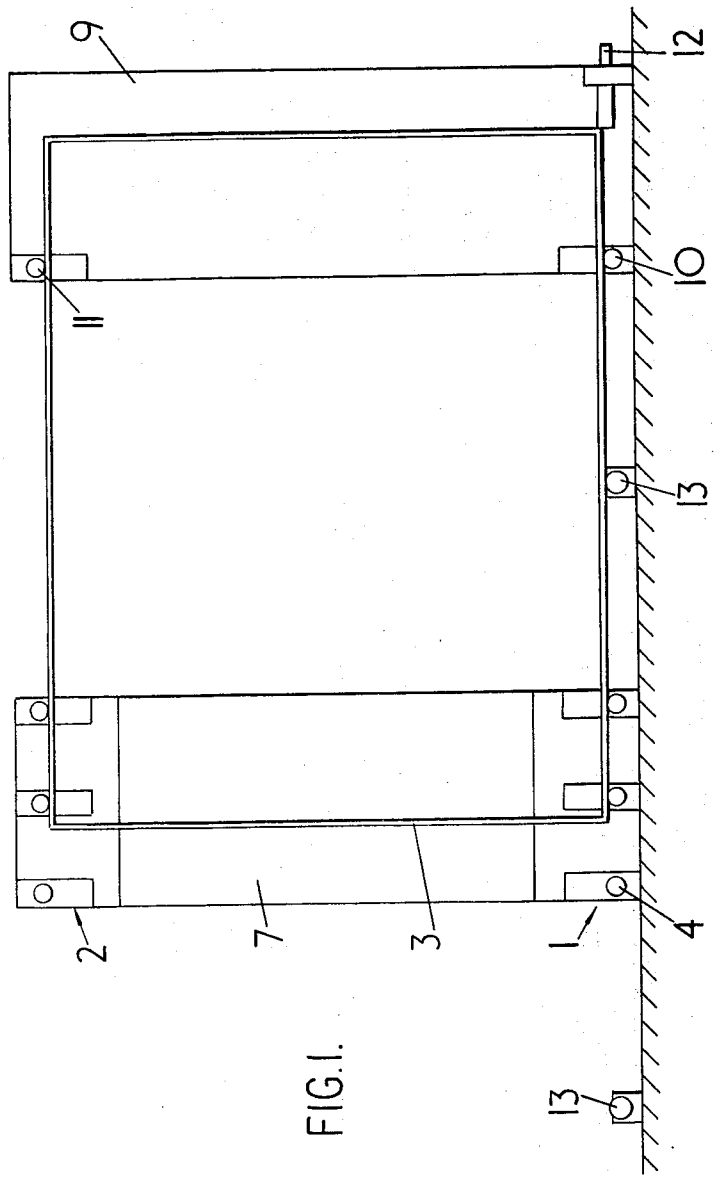


FIG. 1.

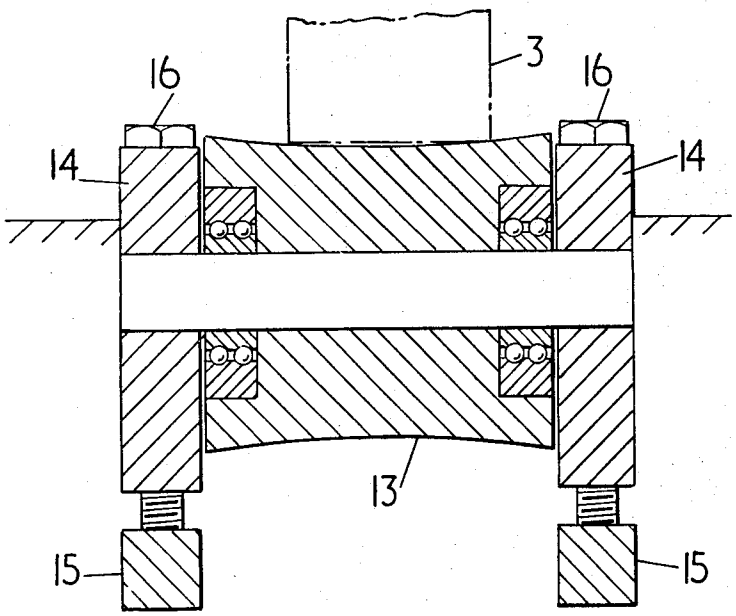


FIG. 2a.

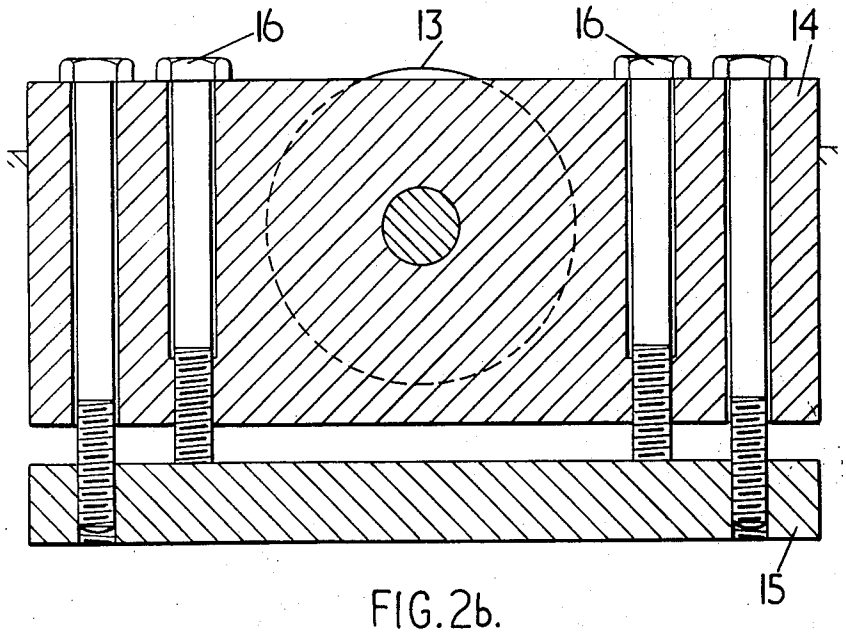


FIG. 2b.

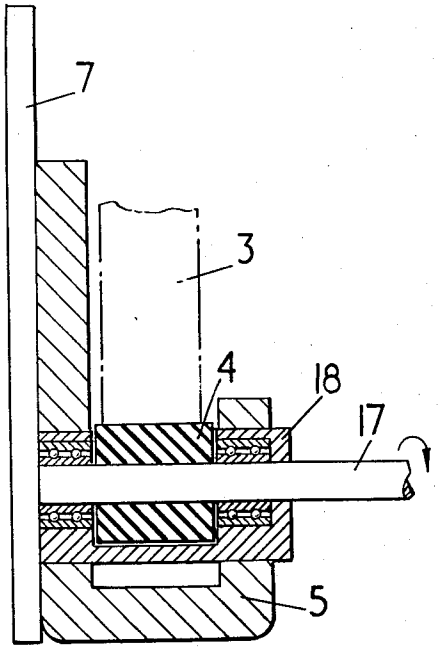


FIG. 3.

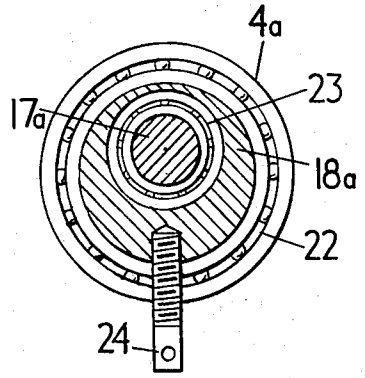


FIG. 6.

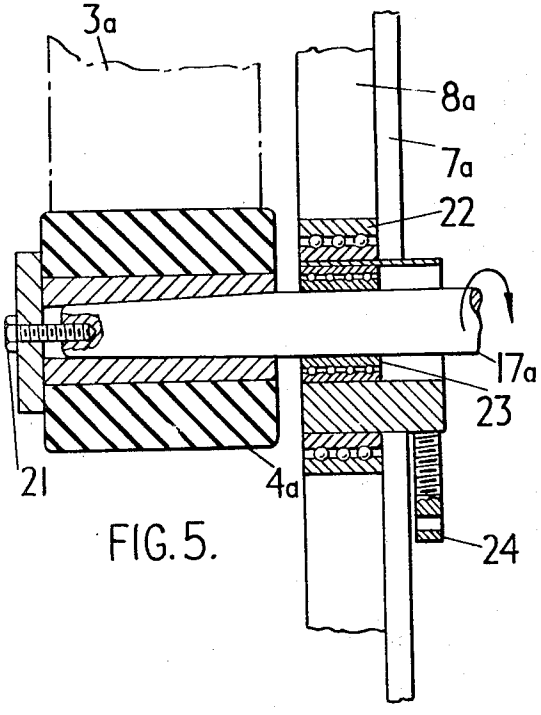


FIG. 5.

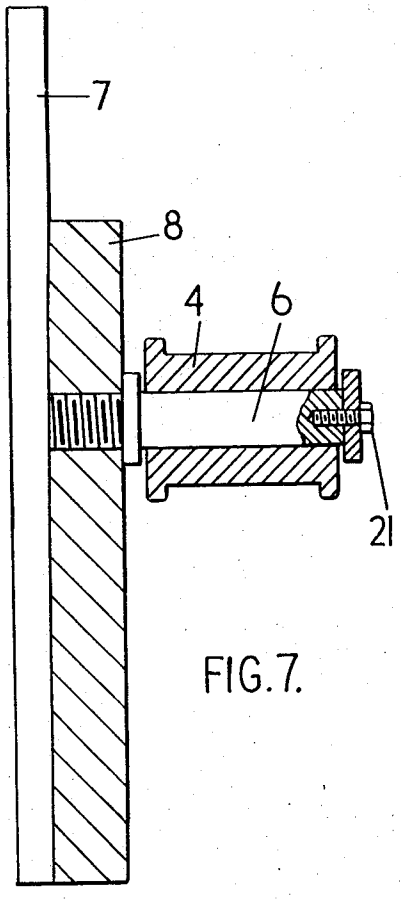


FIG. 7.

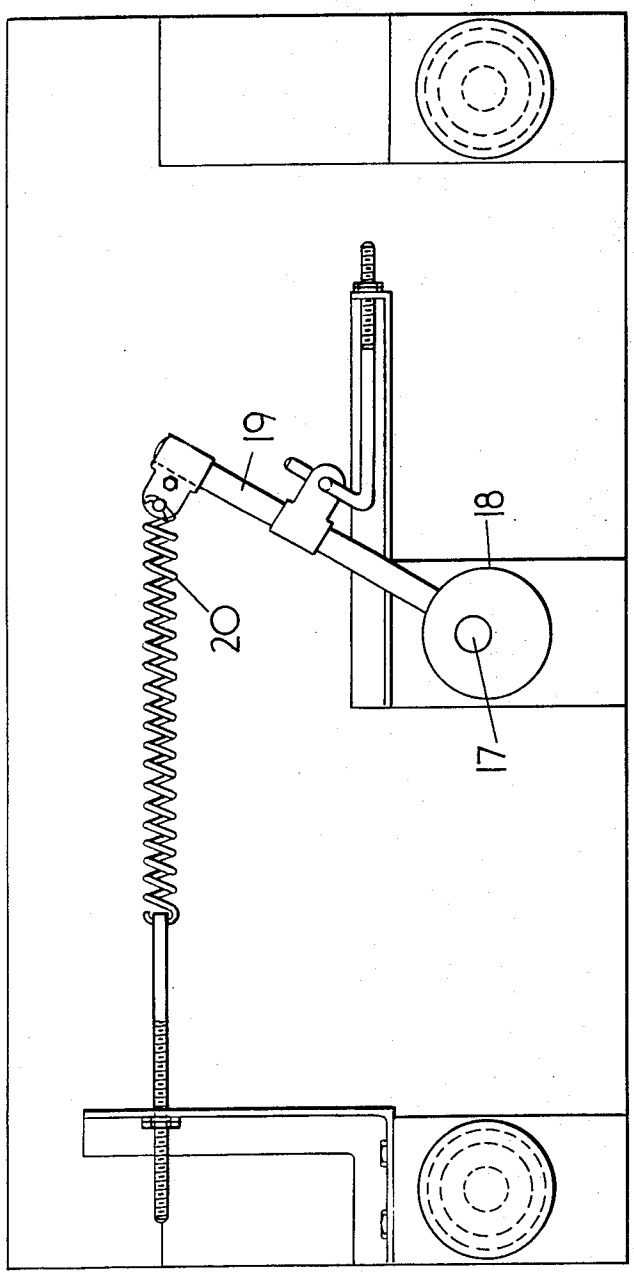


FIG. 4.

DOOR INSTALLATIONS

BACKGROUND OF THE INVENTION

This invention relates to remotely controllable sliding door installations.

PRIOR ART

Some presently used sliding door installations are impractical since they comprise an overhead rail for suspending the sliding door which provides a height limitation on vehicles passing between the installation.

Most remotely controllable installations overcome this limitation by having a guide rail or channel at ground level which easily becomes choked rendering the installation inoperable. Such an installation usually includes a safety device which stops the door movement automatically when the door meets an obstruction.

SUMMARY OF THE INVENTION

The present invention avoids the use of a guide rail and an automatic safety device as mentioned above. Thus maintenance and construction costs are lowered.

In accordance with the present invention, there is an installation having a slidable door comprising a first fixed side element for supporting an upper set and a lower set of substantially horizontal rollers for guiding and supporting the door, with said upper and lower sets of rollers respectively engaging a horizontal top part and a horizontal bottom part of the slidable door. Hence, the slidable door does not require the use of any overhead or ground railing for support.

Preferably at least one roller of said lower set of rollers is a drive roller, and a shaft of said drive roller is coupled to a remotely controllable power operated means.

There may be two, three or more rollers in each of the upper and lower roller sets.

The drive roller, usually made of or faced with rubber or other high friction material may have its shaft fixed in an eccentric sleeve and rotated by an electric motor or other power source which may be remotely controllable.

Preferably the installation may also comprise one or more balancing and/or guide rollers which engage the door when the latter is at or adjacent its closed position. Any such balancing or guide rollers may be supported on a second side element or pillar or a balancing roller may be supported directly from the ground.

Particular embodiments of the invention will now be described by way of example, with reference to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of the installation;

FIGS. 2*a* and *b* shows sectional end and side views of a balancing roller;

FIG. 3 is a partially sectioned side view of a drive roller secured to a bracket;

FIG. 4 shows a drive roller and associated eccentric sleeve which is attached to a radial arm and spring;

FIG. 5 is a partially sectioned side view of a drive roller secured to a base plate;

FIG. 6 is an end view of a drive roller having an eccentric sleeve; and

FIG. 7 is a sectioned side view of a roller on a spigot attached to a base plate.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. 1, the door installation comprises three rollers in each of a lower set 1 and an upper set 2 of rollers engageable with a door 3.

Each roller 4 in both sets 1 and 2 is mounted on a bracket 5 or a spigot 6 (see FIGS. 3 and 7 respectively). The bracket 5 is attached to a pillar 7, with the spigot 6 being fixed to a base plate 8 which is attached to the pillar 7. The door 3 is movable along each set of rollers and held between each set. A second pillar 9 has one lower and one upper guide roller 10 and 11 respectively and a spring door stop 12 is attached to the pillar 9 at ground level, to stop the door 3 when it reaches a closed position.

Instead of the spring door stop 12, a proximity control switch (using magnetism to operate the switch instead of mechanical contact) may be used to stop movement of the door 3 when it reaches a closed position.

Two door balancing rollers 13 are used in the installation each at ground level and positioned on either side of the first pillar 7. An axial section view of the roller 13 shows the roller 13 to have a concave or channeled surface which serves to correct the moving direction of the door 3. Thus, each balancing roller 13 has end diameters slightly larger than the middle diameter. Alternatively, the balancing rollers have a flat surface in axial section. One balancing roller 13 which balances the door near or at the closed position is situated about midway between the pillars 7 and 9. The other balancing roller 13 is positioned on the other side of the first pillar 7 to balance the door in the open position.

With reference to FIGS. 2*a* and *b* each balancing roller 13 is mounted between two end pieces 14 each connected with a base 15 secured at or beneath ground level. The height of the roller 13 and associated end pieces 14 may be adjusted by a screw means 16 which links the end pieces 14 with their respective bases 15.

With reference to FIGS. 3 and 4 a drive roller 4 is connected to a remotely controllable electric motor by a drive shaft 17. Partially enclosing the drive roller is an eccentric sleeve 18 which is rotatable about its axis with said axis being fixed relative to the bracket 5.

Referring to FIG. 3, the axis of the drive roller 4 and drive shaft 17 is parallel to but displaced from the axis of the eccentric sleeve 18. A section of the curved surface of the eccentric 18 is cut away to facilitate rotation of the drive roller 4 relative to the eccentric sleeve 18 and allow the drive roller 4 to contact the door 3.

A radial arm 19 (see FIG. 4) extends from the surface of the eccentric sleeve 18 and is attached at almost a right angle to a tension spring 20 which biases the eccentric sleeve 18 to rotate about its axis and tends to raise the drive roller 4 against the door 3.

The drive roller 4 may alternatively be fixed on the drive shaft 17*a* which is also connected to a remotely controllable electric motor by means of a bolt 21 (see FIGS. 5 and 6). Bearings 22 permit the eccentric sleeve 18*a* to rotate with respect to the base plate 8*a*, and bearings 23 enable the drive shaft 17*a* to rotate with respect to the eccentric sleeve 18*a*. A screw 24 is connected to a spring, with the spring being connected to the eccentric sleeve 18*a* to pull the sleeve down and

thus force the drive roller 4 upwards to maintain contact with a bottom horizontal edge of the door 3. In FIGS. 5 and 6, the drive roller is separate from, and not enclosed in the biasing means, thereby allowing free access to the roller.

The curved surface of the drive roller 4 is made from rubber or other similar material which produces high friction between the roller 4 and the door surface. The spring 20 which forces the drive roller against the door has a tension such that when the moving door meets an obstruction, the drive roller slips allowing the door to stop. No safety device is therefore necessary.

In the event of the drive motor being inoperative, the spring 20 can be released and the drive roller lowered from contact with the bottom of the door so that the door can be moved manually.

What I claim is:

1. An installation for a slidable door which comprises: a slidable door; a first fixed side element; a first set of rollers; a second set of rollers; each roller in said first and said second set of rollers having an axle which is supported on said first fixed side element; said first set of rollers engaging a horizontal top part of said slidable door and said second set of rollers engaging a horizontal bottom part of said slidable door and constituting the sole means for guiding and supporting the door; and at least one roller of said second set of rollers being a drive roller, the axle of said drive roller being coupled to a remotely controllable power operated means; a rotatable eccentric sleeve having an axis of rotation which is fixed relative to said first fixed side elemnt, said axle of said drive roller being rotatable within said eccentric sleeve; and biasing means coupled to said eccentric sleeve to bias said axle of said drive roller towards said horizontal bottom part of said slidable door.

2. An installation for a slidable door which comprises: a slidable door; a first fixed side element; a first set of rollers; a second set of rollers; each roller in said first and said second set of rollers having an axle which is supported on said first fixed side element; said first set of rollers engaging a horizontal top part of said slidable door and said second set of rollers engaging a horizontal bottom part of said slidable door; at least one roller of said second set of rollers being a drive roller; the axle of said drive roller being coupled to a remotely controllable power operated means; a rotatable eccentric sleeve having an axis of rotation which is fixed relative to said first fixed side element; said axle of said drive roller being rotatable within said eccentric sleeve; and biasing means coupled to said eccentric sleeve to bias said axle of said drive roller towards said horizontal bottom part of said slidable door; said biasing means comprising: an arm member; and a sring; one end of said arm member extending radially from an external surface of said eccentric sleeve; said spring being coupled to an opposite end of said arm member, an end of said spring being fixed relative to said first fixed element, said spring and said arm member rotating said eccentric sleeve to move said axle of said drive roller towards said horizontal bottom part of said slidable door.

3. An installation for a slidable door which comprises: a slidable door; a first fixed side element; a first set of rollers; a second set of roller; each roller in said first and second set of rollers having an axle which is supported on said first fixed side element; said first set of rollers engaging a horizontal top part of said slidable door and said second set of rollers engaging a horizontal top part of said slidable door and said second set of rollers engaging a horizontal bottom part of said slidable door and constituting the sole means for guiding and supporting the door; and at least one roller of said second set of rollers being a drive roller, the axle of said drive roller being coupled to a remotely controllable power operated means; the base plate being secured to said first fixed side element; a rotatable eccentric sleeve, a bearing between the eccentric sleeve and the base plate enabling the sleeve to rotate relative to the base plate; a drive shaft for the drive roller, a second bearing between the eccentric sleeve and the drive shaft enabling the drive shaft to rotate relative to the sleeve; and spring means connected to the eccentric sleeve to bias the drive shaft of the drive roller towards the horizontal bottom part of the slidable door.

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