March 31, 1953 J. B. LONG ET AL 2,632,925

SLIDING DOOR

Filed Aug. 10, 1948

Fig. 1.

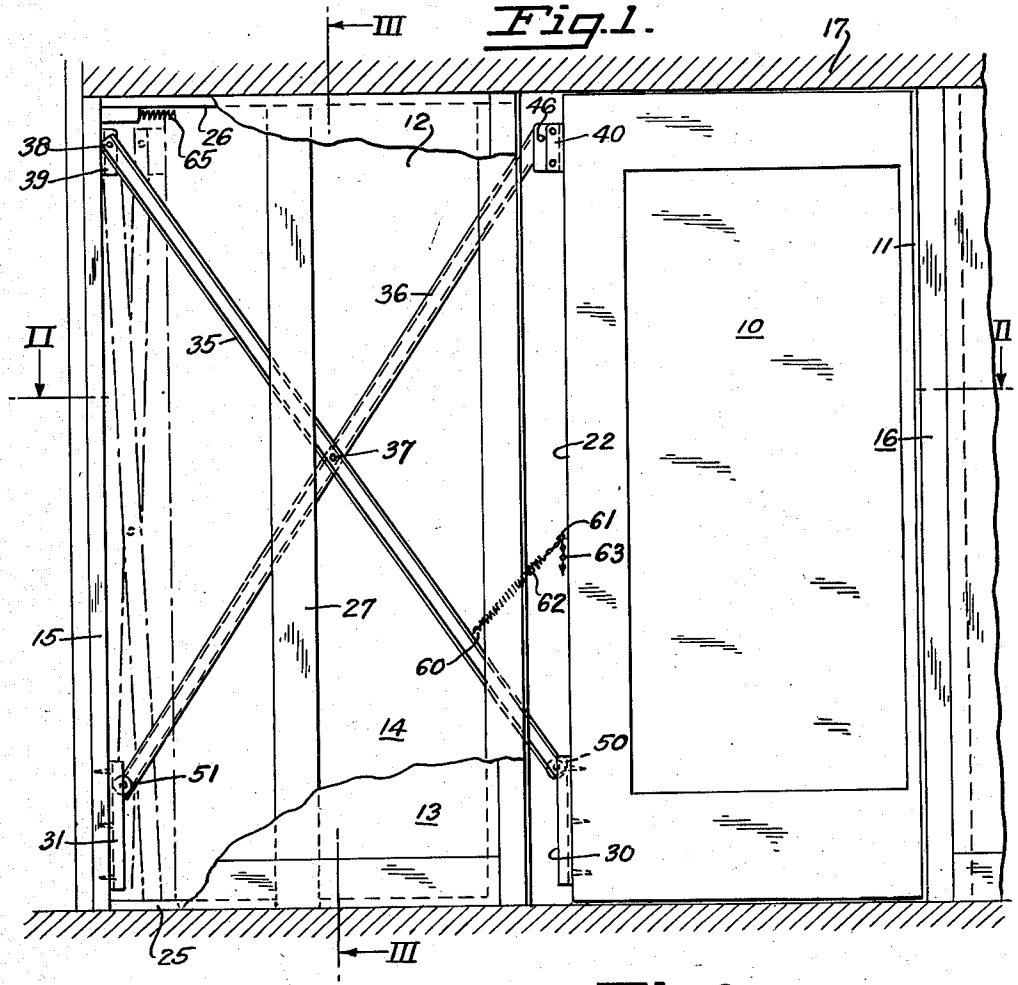


Fig. 2.

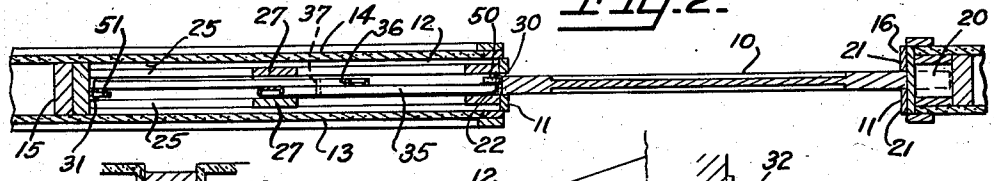


Fig. 3.

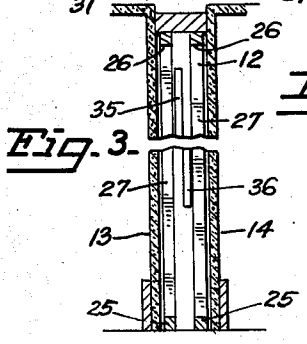


Fig. 5.

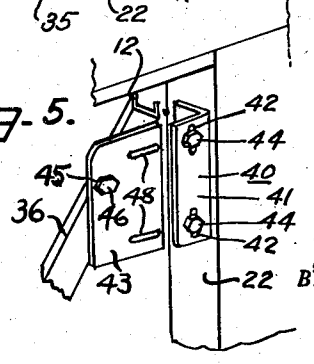
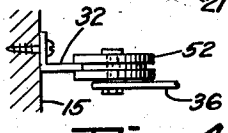


Fig. 4.



INVENTORS
JOHN B. LONG
FRANK D. DOWNIE
BY
A. Duncan Owen
ATTORNEY

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SLIDING DOOR

John B. Long and Frank D. Downie,
Alameda, Calif.

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4 Claims. (Cl. 20—19)

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This invention relates to improvements in sliding doors.

The apparent advantages of sliding doors are often outweighed by the expense of installation, difficulty of adjustment or repair after installation, and by other disadvantages. For example, doors which slide on a horizontal trackway above or below the door cannot be moved except by substantial force, unless the suspension arrangement includes expensive and delicately adjusted ball bearing arrangements or their equivalent.

To avoid these disadvantages, doors have been designed to hang on a cantilever at one side of the door. However, these doors have heretofore failed to solve several problems. For one thing, the bars from which the door is hung tend to sag as the door moves out, and either the door scrapes when it is being opened and closed or else it hangs at an angle. Various complicated and expensive structures have been proposed to remedy this difficulty. One of these is shown in the patent to Coe, No. 1,410,167. The remedies heretofore applied have either proved too expensive to be practical or else have failed to solve the problem.

When cantilevered doors are installed and are adjusted by such expensive methods as those shown in the patents to Clarke, No. 375,260 and Balderson, No. 509,643, the wall is closed up around the cantilevers. Subsequent adjustment can be made only by ripping out the wall to get at the machinery, and if the door sags soon after installation, the cost of repair or replacement is almost prohibitive. If the roller jumps the track, as has happened with some doors, the same thing is true, and the door cannot be moved until the wall is torn out.

One object of the invention is to solve the above problems.

Another object of the invention is to provide a sliding door which does not require the use of overhead supports or any horizontal tracks.

Another object of the invention is to provide a sliding door of simple and inexpensive construction.

Another object of the invention is to provide a sliding door which is easy to install.

Another object of the invention is to provide a sliding door which can be adjusted or repaired after it has been installed and the wall completed around its pocket.

Another object of the invention is to provide a sliding door which can be moved by finger-tip action.

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Another object of the invention is to provide a sliding door which will remain stationary in any desired position, without rolling on across the doorway.

Another object of the invention is to provide a cantilevered sliding door which is inexpensive to produce and simple to install, and which will not sag as it moves across the opening.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment. In accordance with U. S. Revised Statutes 4888, this embodiment is described in detail, but it is not intended thereby to narrowly limit the claims.

In the drawings:

Fig. 1 is a view in elevation of a door embodying the principles of my invention, most of the wall around one side of the pocket being removed to show the cantilever with more clarity; the removable jamb is removed, and the door is shown in its adjusting position; the dotted lines at the left of the figure show the cantilever and the edge of the door in its fully retracted position;

Fig. 2 is a view in section along the line II—II of Fig. 1; the removable jamb is shown in place, and the door is shown in its closed or extended position;

Fig. 3 is a view in section along the line III—III of Fig. 1;

Fig. 4 is a view in plan of a different type of roller and track combination which may be used; and

Fig. 5 is a view in perspective of the adjustment mechanism at the top of the door, the parts being shown partly disassembled in order to show them more clearly.

The invention is an improved cantilevered door. Its cantilever or hanger comprises two crossed bars, the upper end of one bar being pivoted adjacent and supported by the door, while the upper end of the other bar is similarly pivoted and secured at a post in the rear of the pocket known as the cripple. At the lower ends of the bars are rollers which slide on vertical trackways secured to the door and the cripple.

Figs. 1 and 2 show a door 10 adapted to close an opening 11 or to retract into a pocket 12 between two walls 13 and 14, the walls being completed after the installation of the door. The door frame comprises a cripple 15 at the rear of the pocket 12, a jamb 16 across the opening 11 from the pocket 12, and a header 17 supported over the cripple 15 and jamb 16.

The jamb 16 should be particularly noticed.

It includes a channel 20 covered over in the finished doorway by the removable stop member 21 (see Fig. 2). When the door is being installed or adjusted, however, the element 21 is left off or removed so that part of the door 10 can be slid over into the channel 20 (Fig. 1 and Fig. 2, dotted lines). In this position the rear edge 22 of the door 10 is out of the pocket 12 and is accessible for adjustment or removal. When the stop 21 is in place again the door cannot be moved out far enough for the mechanism to show. This removable jamb thus makes possible adjustment of the door 10 after installation.

Preferably guides 25 are installed along the floor of the pocket 12, and similar guides 26 are provided beneath the header 17 in the pocket. The purpose of the guides 25 and 26 is to hold the door 10 to a straight path inside the pocket 12. Where there are vertical studs 27 in the pocket, the guides 25 and 26 are preferably located a short distance inside these studs and prevent the door from rubbing against the studs.

Runners or tracks are secured adjacent the lower ends of the cripple 15 and the rear edge 22 of the door 10. These runners or tracks may either comprise grooved channels 30 and 31, as shown in Figs. 2 and 3, or projecting ridges 32, as shown in Fig. 4.

The cantilever comprises two crossed arms 35 and 36 pivoted at their center point on a bolt or stud 37. The arm 35 runs from the upper end of the cripple 15 to the lower end of the door 10, and the arm 36 runs from the lower end of the cripple to the upper end of the door. At its upper end, the arm 35 is pivoted on a bolt 38, which is held by a bracket 39, fixed to the cripple 15 about 3 or 4 inches below the header 17.

A somewhat similar bracket 40 is preferably secured at a similar location near the top of the door 10 (see the enlarged view in Fig. 5). This bracket 40 differs from the bracket 39 in that its upstanding portion 41 is perforated by two vertical slots 42. A plate 43 has horizontal slots 48 corresponding in position approximately to the slots 42. The plate 43 is adjustably secured to the bracket 40 by bolts 44, the vertical and horizontal position of the plate depending on the position of the bolts 44 in the vertical slots 42 and in the horizontal slots 48 in the plate. The plate 43 is perforated at 45 to receive a stud or bolt 46 about which the upper end of the arm 36 rotates.

At the lower end of each of the arms 35 and 36 are rollers 50 and 51, which are adapted to roll along the tracks 30 and 31. The roller 50 and its track 30 should be proportioned so that the roller is confined horizontally for a distance somewhat greater than the maximum vertical clearance of the door, so that it cannot jump the track. Once the angle of swing about the pivot point 46 is determined, the depth of groove 30 is determined by the proportions of the door. For example, the track 30 should be twice as deep as the possible vertical swing about the pivot point 46, where the distance from the roller 50 to the pivot point 46 is twice as great as the distance from the pivot point 46 to the upper right hand corner of the door. Thus, if the track 30 is grooved (as in Figs. 2 and 3), the groove must be at least as deep as the maximum vertical clearance of the door. If the roller 52 is grooved as in Fig. 4, its groove should be correspondingly deep. The roller 51 and runner 31 may be the same as the roller 50 and runner 30, but the grooves could be shallower.

An important feature of this door is that the track 31 is offset outwardly (toward the door) with respect to the bolt 38. This is very important, for this simple factor enables the door to move in a substantially horizontal line. The amount of offset depends upon the weight of the door and upon the rigidity of the arms 35 and 36. For example, with steel arms and a standard size pine door, the offset need only be about $\frac{1}{32}$ of an inch. With a heavy hardwood door or over-size door, the offset should be about $\frac{5}{32}$ of an inch. The effect of this offset is to make the door run up hill as it closes, its uphill path being exactly balanced by the sag.

To provide exact balance, so that the door will remain stationary in any position to which it is moved, there may be a hook 60 on the arm 35, a hook 61 on the door edge 22, and a spring 62 between them. By having a chain 63 on one end of the spring 62, the tension of the spring 62 may be adjusted simply by inserting the proper link of the chain around the hook 61.

A door of this type can be moved with finger tip pressure. In order to prevent the rear edge of the door from banging against the cripple when the door is opened by too much force, a shock spring 65 may be placed adjacent the upper end of the cripple.

It will be evident from the above description that even after the door is in place it may be readjusted simply by removing the element 21 from the jamb and sliding the door 10 over into the channel 20. Then the bracket 40 will move out into the opening. The door 10 may be removed completely, or the pivot point of the arm 36 may be reset, or adjusted horizontally or vertically. Also, the tension of the spring 62 may be adjusted by moving a different link of the chain 63 around the hook 61.

We claim:

1. A bracket for pivotally supporting one end of a cantilever bar and for enabling the pivot point to be positioned with respect to a member to which said bracket is attached, including in combination, a plate having a pivot pin transfixing it and also having a plurality of parallel slots therethrough; an L-channel, one leg of which is adapted to be secured to said member, its other leg having a plurality of parallel slots corresponding in number to the slots on said plate, the slots on said channel running in a direction perpendicular to the slots in said plate; and a plurality of bolt members, each of which passes through a slot in said channel and a slot in said plate, whereby the location of said pivot pin with respect to the member to which said bracket is attached can be varied by varying the points of intersection of said slots.

2. A sliding door construction having provision for adjustment thereof after installation in a wall having a door receiving pocket and a door closable opening adjacent one edge of the pocket, comprising in combination a door adapted to close said opening and to slide back into said pocket for clearing the opening, a cantilever support including a pair of pivotally connected crossed arms having upper and lower ends, said upper ends of the arms being respectively pivotally connected to a fixed bracket at the rear of said pocket and an adjustable bracket at the rear edge of the door adjacent the upper end thereof, said lower ends of the arms being each provided with a roller engageable with a vertical track respectively secured to the rear of said pocket and the rear edge of said door adjacent the lower end thereof, an elongated coil

spring having one end thereof secured to the arm whose upper end is pivotally connected to said fixed bracket intermediate its roller provided end and the pivotal connection between the arms, a spring tension adjusting chain having one end thereof connected to the opposite end of said spring, anchoring means on the rear edge of said door intermediate said adjustable bracket and said second track for selectively receiving any link of the chain in the adjustment of the tension of the spring, and a normally closed recess in said wall at the edge of said opening opposite said pocket for receiving a front portion of the door and with the rear edge of the door together with said adjustable bracket, second named track and said spring tensioning chain exposed in said opening for ready repair or adjustment thereof.

3. The structure according to claim 2, wherein said rollers and said tracks respectively overlap horizontally to an extent greater than the vertical clearance of said door in said opening, so that movement of said door in said opening can not cause said rollers to become disengaged from said tracks, the path of the roller on said track at the rear of said pocket lying closer to the door than the pivot point on said fixed bracket, whereby the door will tend to run uphill at an angle sufficient to balance the amount of sag caused by its extended position.

4. A cantilevered door adapted to move in and out of a pocket and to move in a level path across an opening, including in combination: a door; a rail secured on a side edge of said door adjacent its lower end; a cripple at the rear of the door-receiving pocket; a rail secured adjacent the lower end of said cripple; a cantilever support comprising a pair of crossed bars pivoted at their intersection, one of said bars being pivoted at its upper end adjacent said cripple and supported

thereby; a bracket supported on said door for pivotally supporting the other one end of said cantilever bar and for enabling the pivot point to be positioned with respect to said door, said bracket including a plate having a pivot pin transfixing it and also having a plurality of parallel slots therethrough; an L-channel, one leg of which is adapted to be secured to said door, its other leg having a plurality of parallel slots corresponding in number to the slots on said plate, the slots on said channel running in a direction perpendicular to the slots in said plate; and a plurality of bolt members, each of which passes through a slot in said channel and a slot in said plate, whereby the location of said pivot pin with respect to said door can be varied by varying the points of intersection of said slots; and rollers on the lower ends of said bars adapted to roll up and down on said rails.

JOHN B. LONG.
FRANK D. DOWNIE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
375,260	Clarke	Dec. 20, 1887
511,208	Nilson	Dec. 19, 1893
606,659	Hartman	July 5, 1898
1,267,415	Huckestein	May 28, 1918
1,612,934	Miller	Jan. 4, 1927

FOREIGN PATENTS

Number	Country	Date
6,675	Great Britain	May 6, 1887

OTHER REFERENCES

"Building Reporter," Architect Forum, February 1949, p. 158.