Sept. 18, 1923. 1,468,053

F. B. TOWNSEND

SWINGING AND SLIDING DOOR

Filed Sept. 21, 1922 4 Sheets-Sheet 1

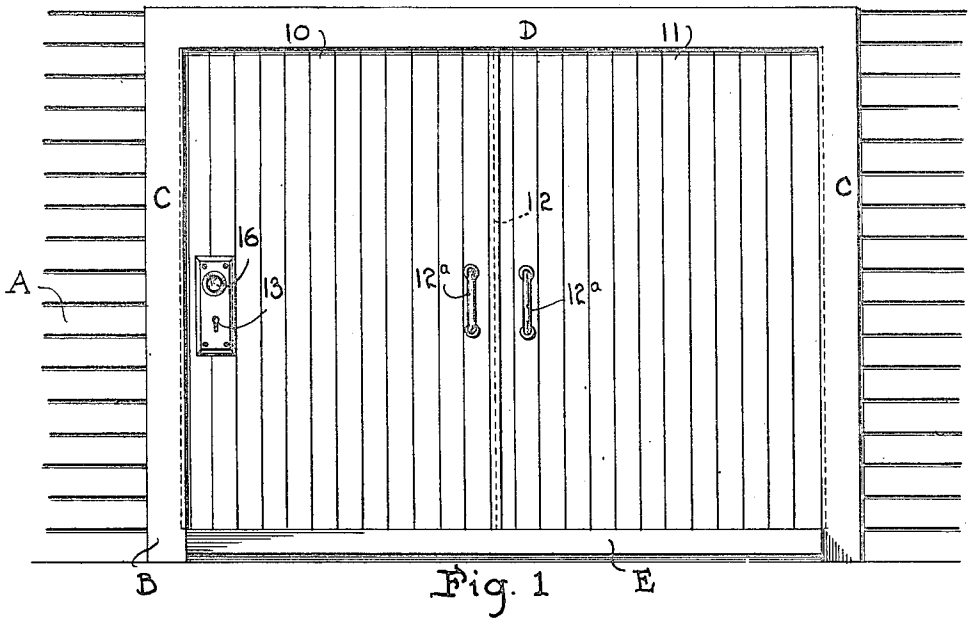


Fig. 1

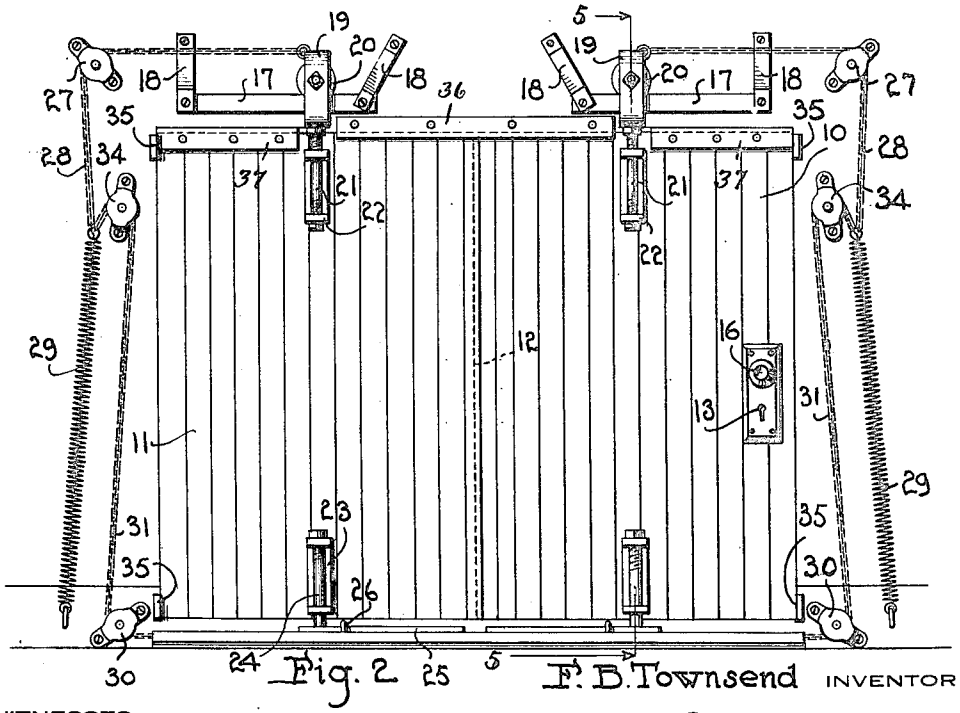


Fig. 2

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WITNESSES

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Sept. 18, 1923. 1,468,053

F. B. TOWNSEND

SWINGING AND SLIDING DOOR

Filed Sept. 21, 1922 4 Sheets-Sheet 2

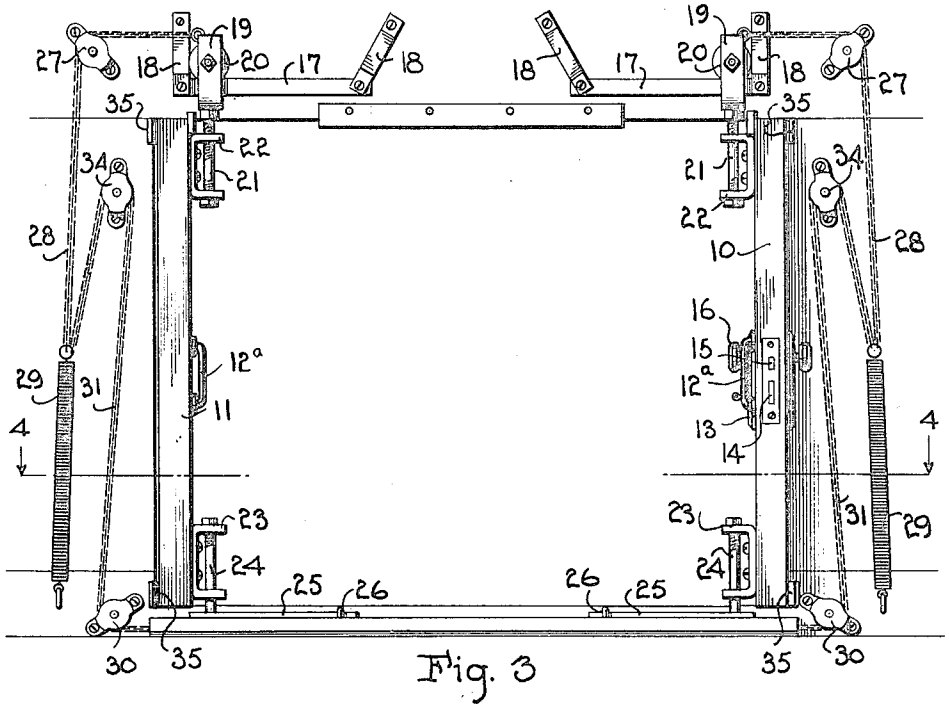


Fig. 3

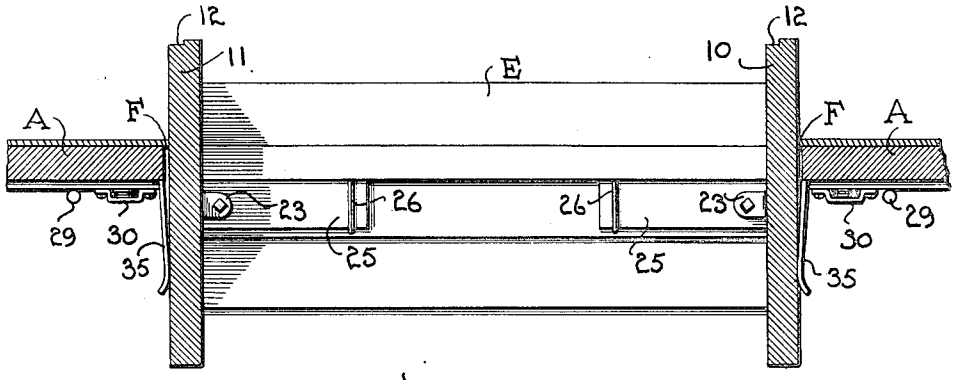


Fig. 4

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SWINGING AND SLIDING DOOR

Filed Sept. 21, 1922 4 Sheets-Sheet 3

Fig. 5

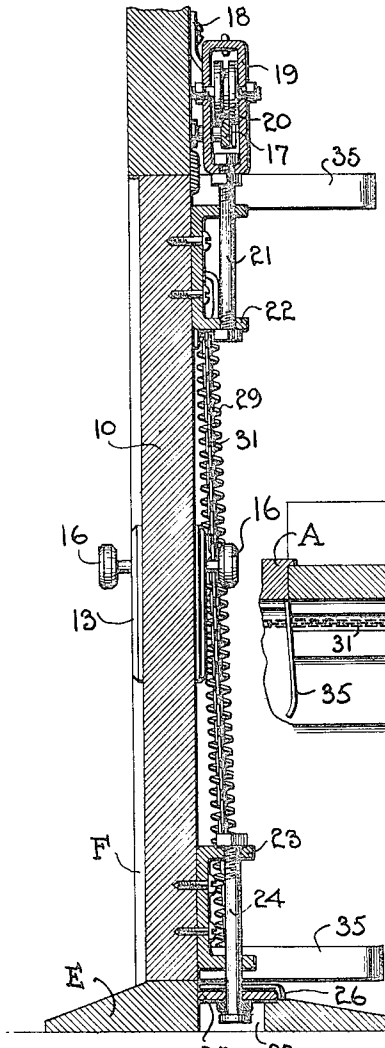


Fig. 6

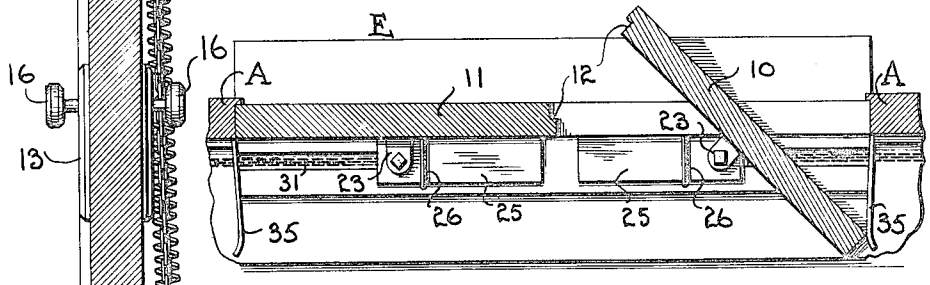
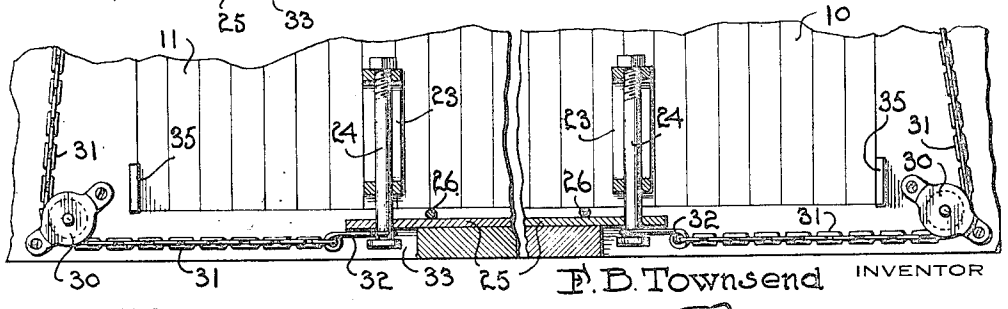


Fig. 7



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Sept. 18, 1923. 1,468,053

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SWINGING AND SLIDING DOOR

Filed Sept. 21, 1922 4 Sheets-Sheet 4

Fig. 8.

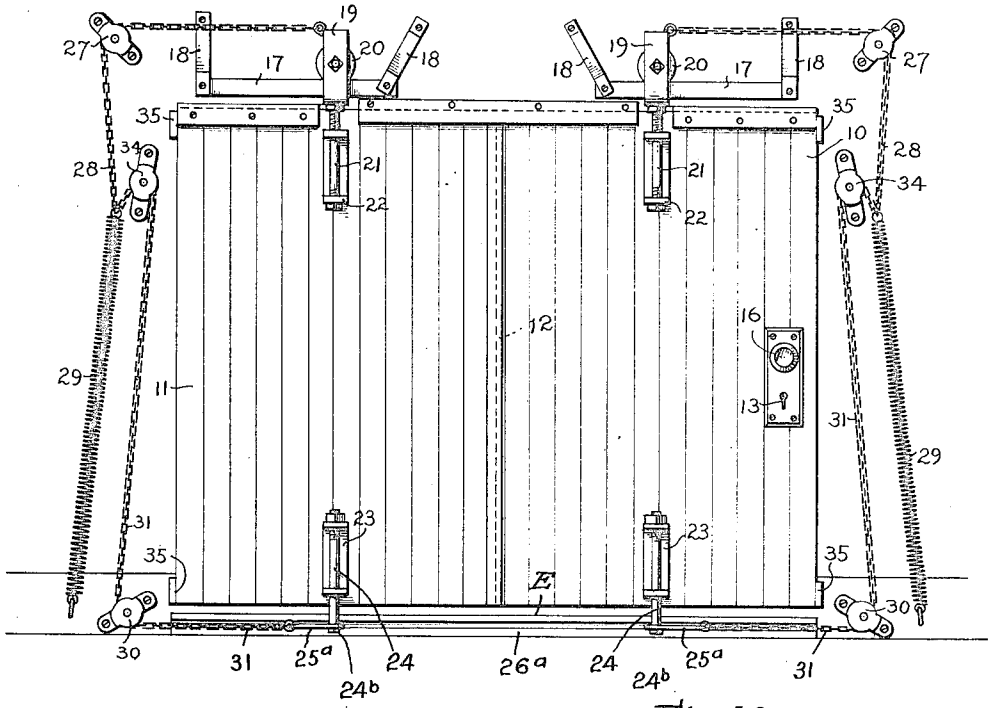


Fig. 9.

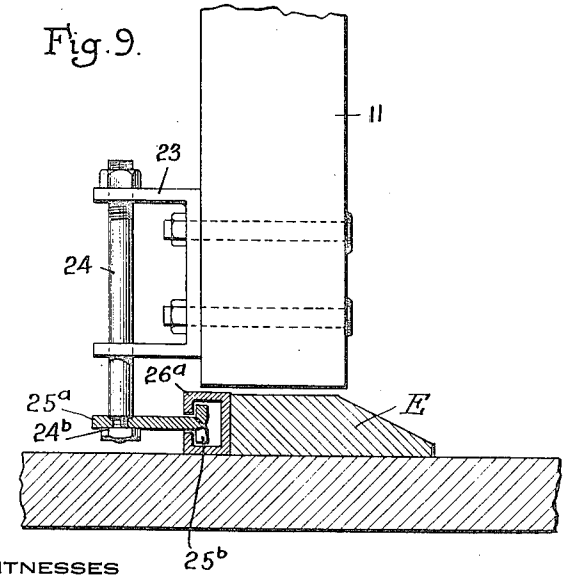
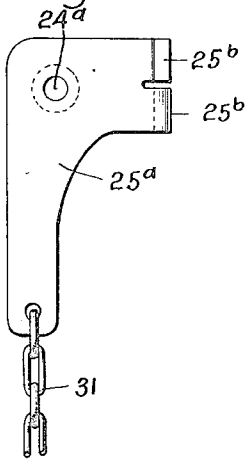


Fig. 10.



WITNESSES

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Patented Sept. 18, 1923. 1,468,053

UNITED STATES PATENT OFFICE.

FRANK BOGART TOWNSEND, OF PENN YAN, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN E. McMATH, OF PENN YAN, NEW YORK.

SWINGING AND SLIDING DOOR.

Application filed September 21, 1922. Serial No. 589,620.

To all whom it may concern:

Be it known that I, FRANK B. TOWNSEND, a citizen of the United States, residing at Penn Yan, in the county of Yates and State of New York, have invented new and useful Improvements in Swinging and Sliding Doors, of which the following is a specification.

This invention relates to doors for garages, warehouses and the like, and has for its object the provision of novel combined swinging and sliding doors so constructed that when the opening or closing movement is partly completed, the doors will be positively moved into the fully open or closed position, the doors when open lying at right angles against the jambs, and when closed abutting the jambs and each other.

An important object is the provision of a door mounting of this character in which the doors are suspended from their centers so that sagging will be impossible even after long continued use.

A further object is the provision of a door construction in which the doors may be held closed by a single bolt or lock, and in which little effort is required to effect closing or opening, the mounting being such that the doors will withstand high winds.

An additional object is the provision of a door construction which will be comparatively simple and inexpensive to manufacture and install, highly efficient in use, durable in service, and a general improvement in the art.

To the attainment of the foregoing objects and advantages the invention consists in the details of construction and arrangement to be hereinafter described and claimed and illustrated in the drawings, though it should be understood that the present form is merely an exemplification of a preferred embodiment, and that various changes and modifications may be resorted to as may be found advantageous in increasing the adaptability and utility of the device, provided such variations constitute no departure from the salient features of the invention or the scope of the appended claims.

In the drawings wherein similar reference characters designate corresponding parts in the several views.

Figure 1 is an elevation of the doors in closed position looking at the outside thereof;

Figure 2 is a similar view looking at the inside;

Figure 3 is an inside elevation showing the doors open;

Figure 4 is a cross section on the line 4—4 of Figure 3;

Figure 5 is a vertical cross section on the line 5—5 of Figure 2;

Figure 6 is a horizontal section showing one door in the act of being opened;

Figure 7 is a detail vertical section taken in a plane slightly to the rear of the doors and illustrating certain details;

Figure 8 is a front view similar to Fig. 2, but disclosing a modification of the lower slidable connection between each door and the sill;

Figure 9 is a cross section, on an enlarged scale, showing the said lower connection;

Figure 10 is a detail view of one of the elements of said lower connection.

Referring more particularly to the drawings, the letter A designates the side of a building such as a garage or the like, having a door opening within which is mounted a door frame B, including uprights C, connected by a lintel D, and a sill E. The under edge of the lintel is flush, while the confronting edges of the uprights are rabbeted or otherwise formed to provide abutments F.

The doors are designated by the numerals 10 and 11, and these doors are of such width that when brought into edge to edge relation, they will abut each other and also against the upright sides of the door frame, as shown, the abutments F serving in a measure to exclude water and wind. The abutting edges of the doors are likewise rabbeted, as shown at 12, to effect interfitting relation when closed (Fig. 6). Both doors are provided at their adjacent edges with handles 12^a and the door 10 carries a suitable locking device 13, having a bolt 14 engaging within a suitable keeper in the adjacent jamb or upright. The lock mechanism is not shown in detail, as it is not important though its position is indicated in Figure 1. This locking mechanism is preferably provided with a latch bolt 15 operated by knobs 16. The construction of these elements is old and well known.

The mounting for the doors consists of a pair of spaced tracks 17, carried by brackets 18 suitably mounted on the inside of the building above the door frame. Supported

upon these brackets are hangers each consisting of a frame 19, having a grooved wheel 20 journaled therein and rolling upon the track. Depending from the frames 19, are rods 21 which are revolubly mounted within U-shaped brackets 22 secured upon the inner faces of the doors. The lower ends of the doors are equipped with similar brackets 23, through which are journaled rods 24, which pass through bearing plates, 25, slidable through guides 26 mounted on the sill. By this construction it will be seen that each door is pivotally supported at its longitudinal axis so that it may swing during opening and closing movement.

Secured against the inside of the building above the upper corners of the door frame are guide sheaves 27, through which are trained chains or other flexible members 28, which are connected with the adjacent hanger frames 19, and which are also connected with springs 29, as shown, or with weights which may be substituted for the springs. Weights are not illustrated as they are the mechanical equivalents of the springs. Secured against the inside of the building near the lower corners of the frame, are other guide sheaves 30, through which are trained chains or other flexible members 31, which are connected with the lower ends of the rods 24, below the guide plates 25, by means of suitable links 32, it being noted that the sill is grooved, as at 33, for the accommodation of the chains (Fig. 7). After passing through the sheaves 30, the chains 31 are trained through other sheaves 34 which are located below the sheaves 27, and these chains are then connected with the springs 29.

Secured at the confronting edges of the door frame and extending into the building are resilient strips 35, which not only act as buffers for the doors when they move to open position, but which also act as fulcrums against which the doors engage and slide during the closing movement thereof.

Assuming that the doors are closed, as shown in Figures 1 and 2, in order to effect opening thereof, the lock must be operated with whatever key is provided to unlock the doors, and the knob 16 is turned to release the latch, after which, still holding the outside knob 16 in his left hand, the operator grasps the handle 12 of the door 10 and pushes the left hand edge of the door to the inside of the building. After the door has been thus partly opened, the spring 29 associated therewith pulling upon the carriage at the top of the door and the guide plate 25 at the bottom thereof, will complete the movement, so that the door will be drawn forcibly against the edge of the left hand upright of the frame, coming in contact with the strip 35. The opening movement is illustrated in Figure 6.

To open the other door, 11, the operator grasps the handle 12 thereon, and pulls the free edge of the door outwardly and toward the adjacent side of the frame, whereupon the door swings upon the rods 21 and 24, while at the same time the action of the spring associated with the door pulling upon the carriage and guide plate at the top and bottom of the door, respectively, will pull the door against the frame. The fully open position of both doors is shown in Figures 3 and 4, and it will be observed that they lie closely against the frame, and that they will not be shaken or swung even by a high wind. As the doors open, it is of course obvious that the hangers slide toward the outer ends of the tracks 17, and that the guide plates 25 slide within their confining brackets 26, so that there will be smoothness and evenness of movement.

To effect closing, the reverse operation is followed, the door 11 being closed first and the door 10 last. When either door is swung from the open to the closed position, it will first bear against the free ends of the resilient strips 35, which act as a fulcrum and against which the door bears throughout its closing movement. While the doors are being closed, the springs 29 oppose their movement, as the wheeled carriages 18 and guide plates 25 slide toward the center of the door frame and place the springs under tension. However, when the closing movement has been completed, the springs operate to force the outer edges of the doors against the jambs, so that a tight fit will be insured and rattling in a wind storm prevented. It might be mentioned, in passing, that the inside of the lintel carries a depending strip 36, against which the upper edges of both doors abut when in closed position, and the upper edges of the doors themselves carry similar abutment strips 37 which engage the rear side of the lintel.

Figs. 8, 9 and 10, I have disclosed a modified form of the invention, consisting of a different connecting means between the rods or bolts 24 and the sill of the door frame. I have applied to the parts the same numerals as employed in the description of the first form of the invention where the parts are the same, and the description already given will apply to the modified construction with this exception. In Figs. 8, 9 and 10, the rods 24 are provided with a reduced and threaded terminal passed through an opening 24^a of an angular plate 25^a, a nut 24^b being applied to the lower end of the rod or bolt 24 for holding the plate 25^a thereto. One end of the plate is connected with the lower end of the chain 31, while at the other end the plate is bent in reverse directions 25^b, extending up and down so as to form lugs to fit within and be guided in its movement by the guide 26^a, which is

mounted at one side of the sill E. These figures represent the preferred form of construction for the lower guiding connection between the door and the sill.

From the foregoing description and a study of the drawings, it will be apparent that I have thus provided a simply constructed and easily installed swinging and sliding door structure, in which the arrangement is such that the opening movement is assisted by springs or weights, the spring or weight means furthermore operating to hold the doors firmly against their jambs when in closed position. Owing to the fact that the doors are pivotally mounted at their longitudinal centers, they cannot sag even after long-continued use and in this way durability is insured. As the doors are suspended by wheeled carriages traveling upon tracks, and as their lower ends are guided by the slidably mounted guide plates, it is apparent that the movement of the doors from open to closed position, or vice versa, will be smooth and easy, binding being prevented by the peculiar cooperation of the parts. A noticeable feature of advantage is that rain and wind will be excluded, as the edges of the doors have interfitting engagement, and as the jambs or sides of the frame are rabbeted to receive the outer edges, together with the fact that the abutment strips are provided at the lintel and upper edges of the doors. Owing to the simplicity of the construction, it is evident that there is nothing to get out of order so that the mechanism should have a long life and satisfactorily perform all its functions.

While I have shown my invention applied to a double door, the invention may be carried out in a single door.

What is claimed is:—

1. Means for mounting a pair of doors within a door frame, consisting of tracks mounted above the frame, hangers movable along said tracks and pivotally suspending the doors at a point between their vertical side edges, means slidable along the bottom of the door frame and pivotally connected with the doors in line with the first-named pivotal connections, and means for constantly applying tension upon said hangers and slidable means for moving them toward the adjacent sides of the door frame.

2. Means for mounting a pair of doors within a door frame, consisting of tracks mounted above the frame, hangers movable along said tracks and pivotally suspending the doors at a point between their vertical edges, guide means slidable along the bottom of the door frame and pivotally connected with the doors in line with the first-named pivotal connections, and means constantly applying tension upon said hangers and guide means for moving them toward the adjacent sides of the door frame, said tension applying means comprising suitably arranged guide sheaves, flexible members connected with the hangers, other flexible members connected with the guides and connected with the first-named flexible members, all of said flexible members being suitably trained about the guide sheaves, and tension means connected with the associated flexible members.

3. Means for mounting a pair of doors within a door frame, consisting of tracks mounted above the frame, hangers movable along said tracks and pivotally suspending the doors at a point between their vertical edges, means slidable along the bottom of the door frame and pivotally connected with the doors in line with the first-named pivotal connections, means constantly applying tension upon said hangers and slidable means for moving them toward the adjacent sides of the door frame, and a pair of resilient strips at each side of the door frame extending horizontally substantially in line with the confronting faces of the door frame sides to act as buffers when the doors are moved to open position, or to act as fulcrums against which the doors slidingly engage during movement thereof to closed position.

4. Means for mounting a door within a door frame, consisting of a track above the frame, a wheeled hanger movable along the track and having means for pivotally suspending the door at substantially its longitudinal center, means slidable along the bottom of the frame and pivotally connected with the door in line with the first-named pivotal connection, and means constantly applying tension upon said hanger and slidable means directly in their line of movement for moving them toward one side of the door frame.

5. Means for mounting a pair of doors within a door frame, consisting of tracks mounted above the frame, wheeled hangers movable along said tracks and carrying depending rods, brackets at upper portions of the doors in which said rods are revolubly engaged, guides at the bottom of the frame, plates slidable within said guides and carrying upstanding rods in line with said first named rods, other brackets at the lower ends of the doors through which said last named rods are revolubly engaged, and means connected with said hangers and said plates for urging them toward the adjacent sides of the frame.

6. In combination with a pair of doors mounted within a door frame, tracks mounted above the frame, hangers slidable along said tracks, stationary guides on the bottom of the frame, plates slidable within said guides, brackets secured near the upper and lower ends of the doors at substantially the longitudinal centers thereof and pivotally connected with the hangers and plates re-

spectively, and tension means constantly urging said hangers and said plates toward the adjacent sides of the frame, said tension means exerting a force on said hangers and plates directly in the line of their movement in opening the doors.

7. In combination with a pair of doors mounted within a door frame, tracks mounted above the frame, hangers slidable along said tracks, stationary guides on the bottom of the frame, plates slidable within said guides, brackets secured near the upper and lower ends of the doors and pivotally connected with the hangers and plates respectively, tension means constantly urging said hangers and said plates toward the adjacent sides of the frame, and a pair of horizontally disposed buffer members at each side of the frame extending at right angles to the door opening and engaged by the doors when in open position to serve as fulcrums during closing movement thereof.

8. Means for mounting a pair of doors within a door frame, consisting of tracks mounted above the frame, hangers movable along said tracks and pivotally suspending the doors at a point between their vertical side edges, means slidable along the bottom of the door frame and pivotally connected with the doors in line with the first-named pivotal connections, means for constantly applying tension upon said hangers and slidable means for moving them toward the adjacent sides of the door frame, and fulcrum members carried by the frame extending horizontally at right angles to the door opening and engaged by the doors during closing movement thereof.

9. In combination with a door, a track at the top above the door, a wheeled hanger on said track, a pivotal means for connecting the door to said hanger, so as to permit the door to swing on a vertical axis, a slidable means at the bottom at one side of the door when in its closed position, a pivotal means between the door and the slidable means in line with the first-named pivotal means, a flexible element connecting the hanger with the slidable means, pulleys for guiding the movement of the end portions of the flexible element in the line of movement of the hanger and slidable means when opening the door, and a tension means connected with an intermediate portion of said flexible element.

10. In combination with a door, a track mounted above the door, a wheeled hanger on said track, a pivotal means for connecting the door to said hanger, a guide at the bottom of the door, a plate movable in the guide, a pivotal means connecting the plate to the bottom of the door, the two pivotal means being in vertical alinement, a flexible element connecting the hanger with the plate at the bottom of the door, and a tension means connected with an intermediate portion of said flexible element.

11. A device for mounting a pair of doors within a door frame, comprising tracks adapted to be mounted above the frame, hangers movable along the tracks, means for pivotally suspending the doors from said hangers at a point between the vertical side edges of the doors, means slidable along the bottom of the door frame and pivotally connected with the doors in alinement with the first-named pivotal connections, and automatic means for directly applying a force to said hangers and slidable means respectively in the direction in which they are movable to open the doors.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

FRANK BOGART TOWNSEND.