Jan. 3, 1928. 1,654,892

E. P. MEYER ET AL

DOOR

Filed July 10, 1926 3 Sheets-Sheet 1

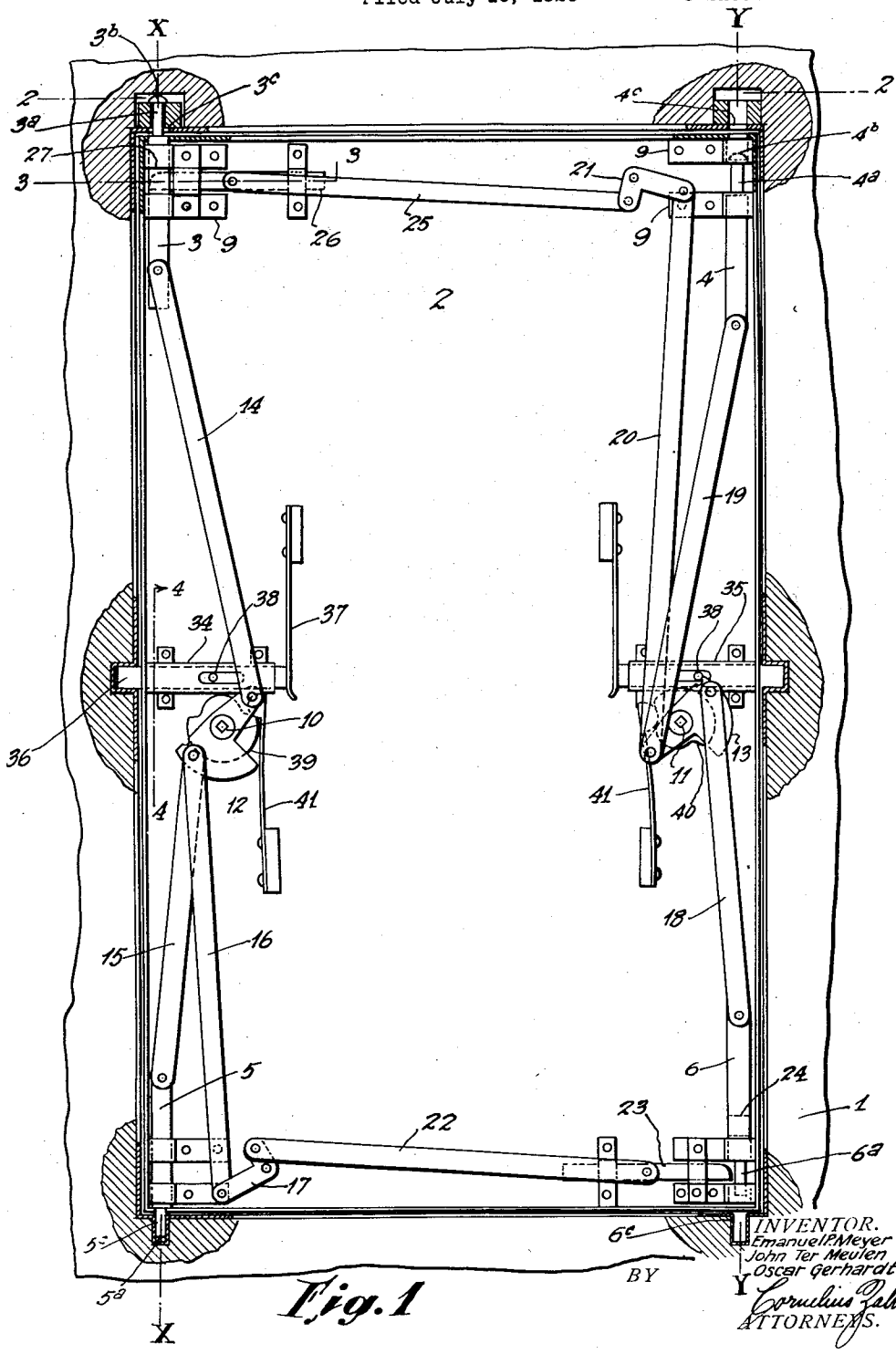


Fig. 1

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Filed July 10, 1926 3 Sheets-Sheet 2

Fig. 2

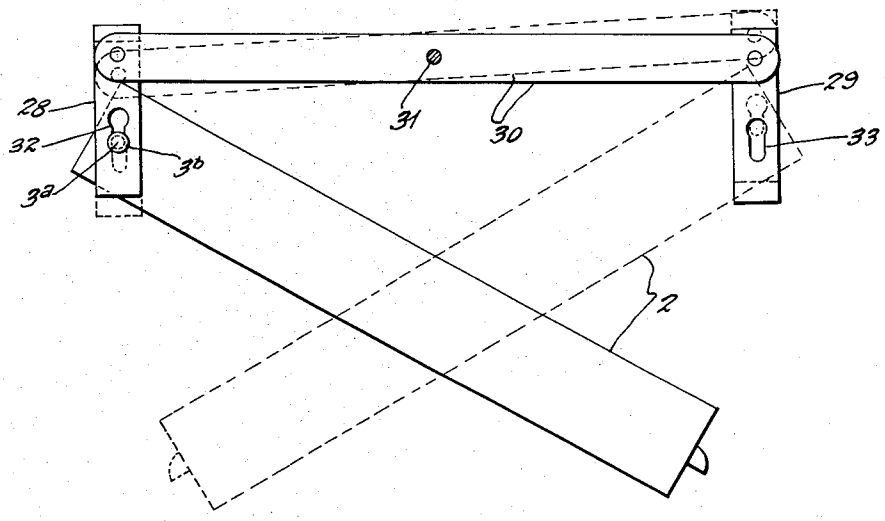


Fig. 3

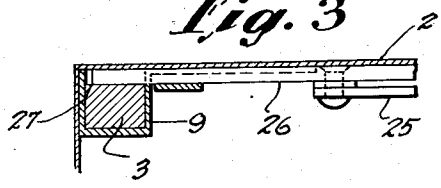
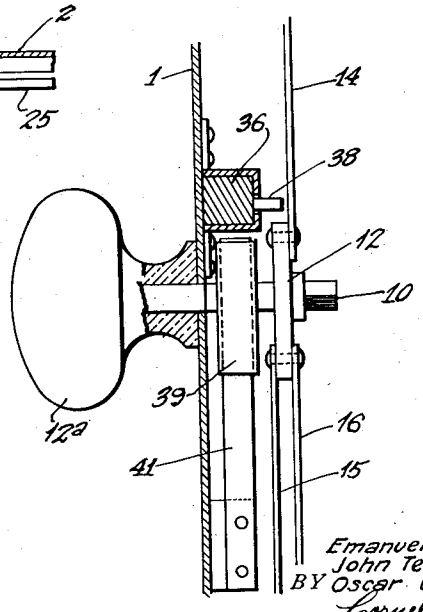


Fig. 4



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3 Sheets-Sheet 3

Fig. 6

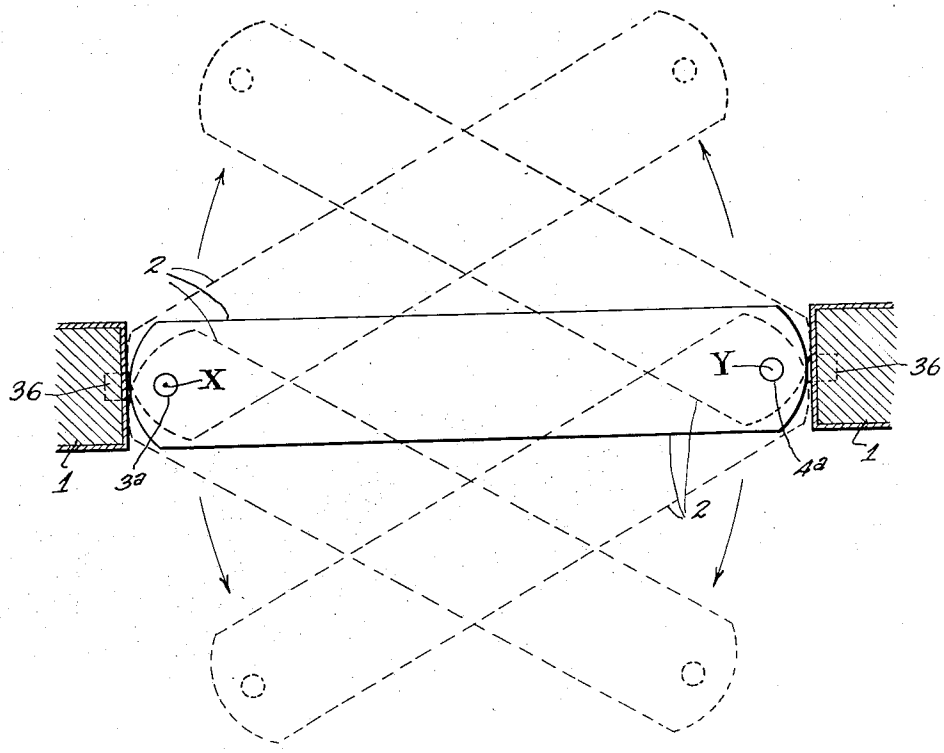
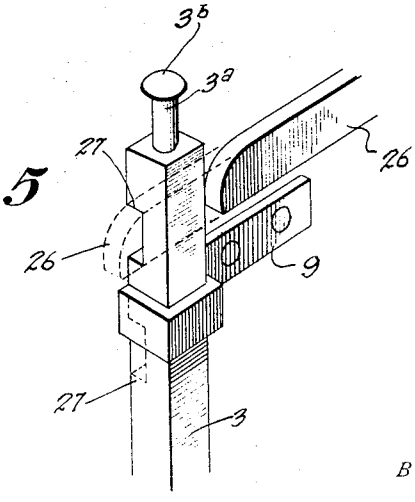


Fig. 5



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UNITED STATES PATENT OFFICE.

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DOOR.

Application filed July 10, 1926. Serial No. 121,641.

This invention is a door adapted for use in any environment in which doors are ordinarily employed. The particular shape or size of the door will of course depend upon the place where it is used, but it is to be understood that the door of the present invention is adapted for general application in the various arts. For example, it may be used to advantage as an automobile or car door, or as a garage door, or as a door in any building, factory or dwelling.

It is the usual practice in hanging conventional doors to hinge them along one of their vertical edges, so that they will swing in a predetermined direction. It frequently occurs, however, that the swinging of such door in the opposite direction, i. e., from its opposite lateral edge would be to pronounced advantage, but under present practice, there is no known way of hinging the door whereby it may swing from either lateral edge at the option of the operator.

It is the purpose of this invention to provide such a door. Moreover, doors are generally hung so that they will swing inwardly or outwardly or both inwardly and outwardly, but in every instance, the swinging of the door is from one lateral edge. The present invention provides a door which will swing either inwardly or outwardly or both inwardly and outwardly from a hinged connection at either lateral edge. This result is accomplished by the employment of the simple, novel and efficient means hereinafter more fully described.

In practically carrying out the invention, the door which in practice may be constructed of wood, metal or any other suitable material, is mounted within any suitable door frame and is provided adjacent each of its lateral edges with trunnions mounted to vertically reciprocate through the upper and lower edges of the door. The upper and lower trunnions adjacent the corresponding edges of the door are in vertical alinement and both the top and bottom of the door frame are provided with pocket or holes which, when the door is closed, are alined with the trunnions, so that the trunnions may be projected to extend into the holes to provide either bearings for the trunnions or to lock the door in closed position. When one lateral set of trunnions is projected and the other set retracted, it will be apparent that the door may be swung on the common axis of the two projected trunnions. If the door is subsequently closed and the two previously projected trunnions retracted, while the other two trunnions are projected, the door can thereupon be swung on the last two projected trunnions in a direction opposite to that in which the door was previously moved.

If the door frame is constructed to permit of movement in both an inward and outward direction, the door is capable of four distinct swinging movements, i. e., inward and outward swinging movements from one of its lateral edges, as well as inward and outward swinging movements from its other lateral edge. In some cases, however, these four movements are not necessary or desirable and in such instance, the door casing may be so constructed as to limit to either the two inward swinging movements or the two outward swinging movements as circumstances may require.

It is of course desirable that the trunnions on which the door is adapted for the movements described, be so interlocked or interconnected that the two trunnions at one edge of the door will be locked against retraction, while the trunnions at the other edge of the door are retracted. This is to preclude the simultaneous retraction of all the trunnions with the consequent danger of the door falling out of the doorway. Suitable means is provided for so interlocking the several trunnions.

The trunnions are operable by means of suitable door knobs projecting from one or both faces of the door and adjacent the opposite lateral edges thereof and latches are preferably associated with the knob spindles, so that when the door is closed, it will be automatically retained against inadvertent opening, without necessitating the projection of the locking trunnions. The arrangement, moreover, is preferably so constituted that one pair of trunnions may be moved into unlocked positions and the other pair into door hinging position without effecting operation of the latches, so that the appropriate latch may be operated from time to time without effecting any movement of the trunnions. A door thus functioning will to all intents and purposes operate as a conventional door, but with the inherent adaptability of pivotal movement on a different axis should this be desired.

The door is preferably made hollow to lighten the construction and all of the oper-

ating parts for the trunnions, except the knobs are preferably housed within the door in concealed positions. The interconnecting of the trunnions as described will positively preclude the simultaneous withdrawal of all of the trunnions while the door is closed and appropriate means either inherent in the building construction or associated with the door frame may be utilized to preclude the simultaneous withdrawal of all the trunnions, while the door is open as will be hereinafter more fully described.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is an elevation of a door embodying the present invention. In this view, one face plate of the door is removed to show the interior operating parts and a portion of the door casing and associated parts are illustrated in section in the interest of clearness.

Figure 2 is a plan view looking downwardly from the plane of the line 2—2 of Figure 1 with the door casing removed.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1.

Figure 5 is a detailed perspective view showing the manner in which the trunnions are locked against retraction by a sliding locking belt; and,

Figure 6 is a diagrammatic horizontal section through a door casing showing the various ways in which a door embodying the present invention may be operated.

Referring to the drawings, 1 indicates a door casing of a building, though, in practice, it may be the casing of an automobile body or of a car body or of any other enclosure with which the invention may be associated.

A door 2 is mounted within the door opening. In practice, this door may be of any suitable material and may be provided with one or more windows. For the purpose of illustration, the door is shown as constructed from sheet metal and hollow to permit of the housing of the operating parts therein. Adjacent each of the four corners of the door, plungers are mounted for vertical reciprocation. These plungers are designated 3, 4, 5 and 6 and they are secured to the door by suitable guides 9 for vertical sliding movement. Those portions of the plungers which are adapted to at all times be housed within the door are shown as square in cross section, while beyond the squared portion of the plungers, they are formed with cylindrical portions 3^a, 4^a, 5^a and 6^a, respectively. Each of the trunnions 3^a and 4^a carries an enlarged head at its outer end, these enlarged heads being designated 3^b and 4^b, respectively.

The door frame is provided with holes or pockets which are in alinement with the respective trunnions when the door is in closed position and these holes are designated 3^c, 4^c, 5^c and 6^c.

Positioned at a convenient height from the floor and adjacent the lateral edges of the door are spindles 10 and 11, which extend entirely through the door and are provided at their opposite ends with knobs 12^a, whereby the spindles may be annularly rotated; and fixed on each spindle interiorly of the door is a rocker, that associated with the spindle 10 being designated 12 and that associated with the spindle 11 being designated 13.

One arm of the rocker 12 is secured by a link 14 to the plunger 3 and with the other arm of said rocker is associated two links 15 and 16, the former of which is secured to the plunger 5, while the latter of which is secured to a bell crank 17 positioned in the lower portion of the door.

A similar arrangement is associated with the rocker 13, but reversed vertically. That is to say, the single link 18 is secured to the plunger 6, while the double links 19 and 20 are respectively secured to the plunger 4 and the bell crank 21 positioned in the upper portion of the door.

The lower bell crank 17 is connected by a link 22 to a slidable bolt 23 adapted to cooperate with a recess 24 formed in the plunger 6, while the upper bell crank 21 is secured by a link 25 to a sliding bolt 26 adapted to cooperate with the recess 27 in the plunger 3. The manner in which these locking bolts 23 and 26 cooperate with the plungers, as clearly shown in Figure 5, wherein it will be apparent that when the locking bolt 26 is in dotted line position, it will occupy the recess 27 and lock the plunger 3 against retraction, whereas, when the bolt is in the full line position shown, the plunger may be retracted in the manner hereinafter described.

If it be assumed that the door is closed and all plungers projected into their alined and corresponding holes of the door frame, movement of the door will obviously be impossible until either one or the other set of trunnions are retracted.

It will be noted from Figure 1 that the trunnions 3^a and 5^a are in alinement and have a common axis X—X. Similarly the trunnions 4^a and 6^a are in alinement and have a common axis Y—Y. It therefore follows that if the trunnions 4^a and 6^a are

retracted, the door may be swung upon the trunnions 3^a and 5^a on the axis X—X and if, instead, the trunnions 3^a and 5^a are retracted, the door may be swung on the trunnions 4^a and 6^a on the axis Y—Y.

The mechanical connections between the respective plungers and the door knobs 12^a permit of the manual operation of the trunnions at the option of a person wishing to open the door. For example, if the knob associated with the spindle 11 is turned anticlockwise in Figure 1, the plungers 4 and 6 will be retracted to withdraw the respective trunnions from the holes 4^c and 6^c in the door frame and this will permit the opening of the door on the trunnions 3^a and 5^a.

It will be further noted from Figure 1 that when the link 19 is drawn downwardly to retract the plunger 4^a, the link 20 will be simultaneously drawn downwardly for the purpose of sliding the locking bolt 26 into the recess 27 of the plunger 3 for the purpose of locking this plunger, so as to preclude its retraction. Inasmuch as the plunger 3 is connected with the plunger 5, through the links 14 and 15 and the rocker 12, it follows that the plunger 5 will also be locked against retraction. Accordingly, so long as the locking bolt 26 is in the position shown in Figure 1, the trunnions on which the door is held for pivotal movement cannot be retracted.

If instead of swinging the door on the axis X—X, it is preferred to swing it on the axis Y—Y, the trunnions 4^a and 6^a are left in projected positions and the other pair of trunnions are retracted by operating the knob associated with the spindle 10 in the same manner as described with reference to the spindle 11, except that the locking bolt 23 will enter the recess 24 of the plunger 6 and will lock this plunger together with the plunger 4 against retraction.

The door, constructed as thus far described, is adapted for swinging movement in four directions, as shown diagrammatically in Figure 6, wherein the axes X—X and Y—Y are designated by points at the centers of the trunnions 3^a and 4^a. In this figure, the full line position shows the door closed, while the four different dotted line positions show the four directions in which the door may be swung.

It is of course desirable in a door of the character described to provide some means to preclude the withdrawal of the pivotal trunnions, while the door is open. If the floor adjacent the door is substantially flush with the lower edge of the door, no separate means need be provided to this end since it is necessary to project the trunnions at the free edge of the door, in order to withdraw the locking bolt which locks the pivotal trunnions against retraction and if the floor is directly adjacent the lower edge of the door, those trunnions on which the door is not pivoted cannot be projected because of the close proximity of the floor. However, some doors are mounted above saddles, so as to be an appreciable distance above the adjacent floor and some means should be provided to lock the pivotal trunnions independently of the locking bolts 26 and 23. Any suitable means may be employed to accomplish this result and one form of means for this purpose is shown in Figures 1, 2 and 3 which discloses the adaptation of the present invention to a door swinging in two directions, as best illustrated in Figure 2.

In the illustrative means referred to, there is associated with each of the holes 3^c and 4^c a slide block which, together with the head 3^b of the trunnion operates to lock the pivotal trunnion against retraction when the door is open. Thus, the slide block 28 is associated with the hole 3^c and the slide block 29 is associated with the hole 4^c. These two slide blocks are mounted for reciprocation, as shown in Figure 2, and are connected by a rocker 30, pivoted at its center at 31 to the doorway.

The slide block 28 has a keyhole slot 32 and the slide block 29 has a keyhole slot 33. The parts are so associated that when the door is closed, one face of the door at its extreme upper edge will bear against the rocker 30 and move it into such position that the enlarged ends of both keyhole slots 32 and 33 will be in alinement with the holes 3^c and 4^c, respectively, so that either set of trunnions can be freely moved into and out of said holes. If, however, the door is open, the pivoted edge of the door will bear against the rocker 30 and oscillate it slightly to move the slide block 28, for example, into the full line position of Figure 2 in order to bring the narrow portion of the keyhole slot beneath the head 3^b of the cooperating trunnion. As long as the door is open, and pivoted on the trunnion 3^a, it will manifestly be impossible to withdraw the trunnion, even though the locking bolt 26 is withdrawn.

If, instead of swinging the door on the trunnion 3^a, it is swung on the trunnion 4^a, the rocker will be oscillated in the opposite direction and the slide block 29 will serve to lock the trunnion 4^a in the same manner as the lock 28 serves to lock the trunnion 3^a. It therefore follows that no matter which set of trunnions is used to perform the function of the pivot or hinge connection between the door and the door frame, there will be no possibility of releasing the door by an inadvertant operation of the wrong door knob.

It is generally desirable to associate with the door of this invention, a suitable latch

whereby it may be maintained against inadvertant opening even though one set of trunnions are retracted. One such latch is associated with each lateral edge of the door, said latches being designated 34 and 35, respectively. Both are of identical construction and each is provided with a latching element 36 normally impelled into projected position by a spring 37. The latching element carries a pin 38 which projects into the path of the associated rocker, for example, the rocker 13, so that by manipulating the knob of the spindle 11, the rocker may be caused to bear against the pin 38 and retract the latch element. This latch element may be operated to release or to lock the door without necessitating the projection or retraction of the trunnions 4^a and 6^a. The rocker 12 similarly cooperates with the corresponding pin 38 of the latch mechanism 34.

In order to remove from the springs 37, the load imposed by the trunnion operating mechanism during the projection of the latch element, cams 39 and 40 are preferably associated with the respective spindles 10 and 11, and springs 41 bear against these cams in such manner that when any particular knob is operated to unlatch the door, the corresponding spring 41 will return the rocker into disengaged relation from the pin 38 after the knob is released, so that the rockers 12 and 13 are held by this spring and cam arrangement out of the normal travel of the pins 38. This allows the latching elements to operate as spring latches without overcoming the inertia of other operating parts.

The door of the present invention is adapted to a wide variety of uses and in the arts generally. The present invention is not restricted to details, but is to be considered as fully commensurate with the appended claims.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

1. A door positioned within a suitable doorway and provided adjacent each of its lateral edges with a pair of substantially alined trunnions mounted for reciprocation into and out of holes provided in the top and bottom of the doorway, means for operating each set of trunnions individually to permit of the swinging of the door on either pair of trunnions, and means automatically operable by the door for locking the pivotal trunnions thereto against retraction while the door is open.

2. In an assembly of the character described, a door positioned within a suitable doorway and provided adjacent each of its lateral edges with substantially alined trunnions, those trunnions at the top of the door being mounted for reciprocation into and out of fixedly positioned holes formed in the top of the doorway and those trunnions at the bottom of the door being mounted for reciprocation into and out of fixedly positioned holes in the bottom of the doorway, a manually operable device positioned adjacent each lateral edge of the door and intermediate its upper and lower edges, mechanical connections between each manually operable device and the corresponding trunnions to permit of the operation of one pair of trunnions to the exclusion of the other pair and vice versa, said manually operable connections embodying a latching bolt automatically operable by the door adapted when one pair of trunnions is retracted to fasten the other pair against retraction.

In testimony whereof, we have signed our names to this specification this 25th day of June 1926.

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