April 2, 1963 R. G. SCOTT 3,083,560

LOCKING MECHANISM AND PANIC ACTUATING DEVICE

Filed July 22, 1960 2 Sheets-Sheet 1

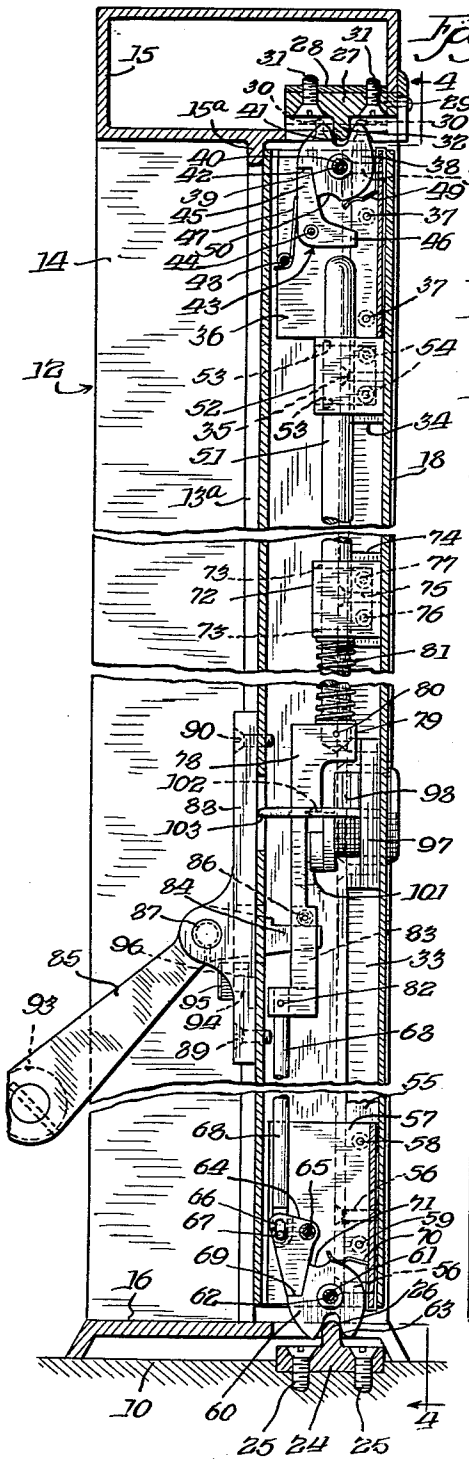

Fig. 2.

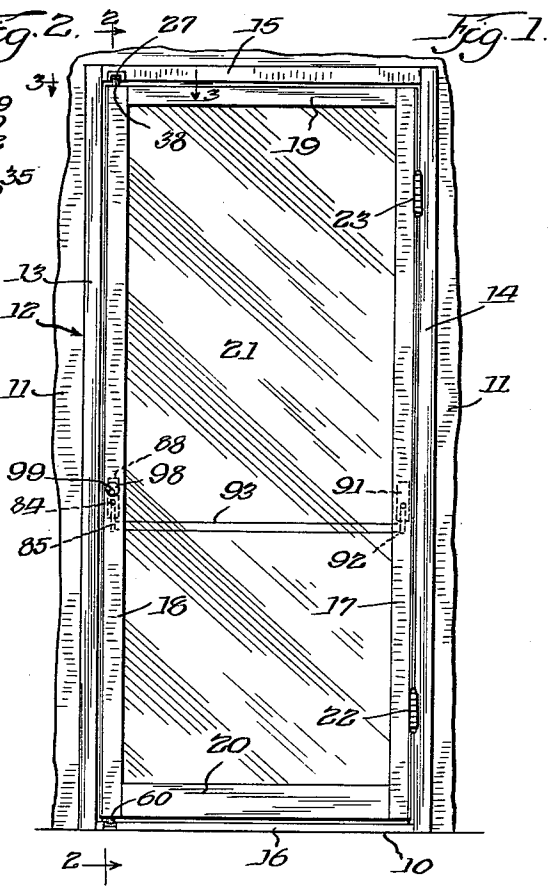

Fig. 1.

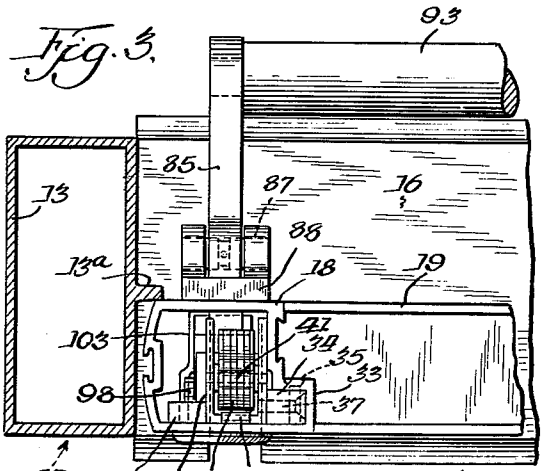

Fig. 3.

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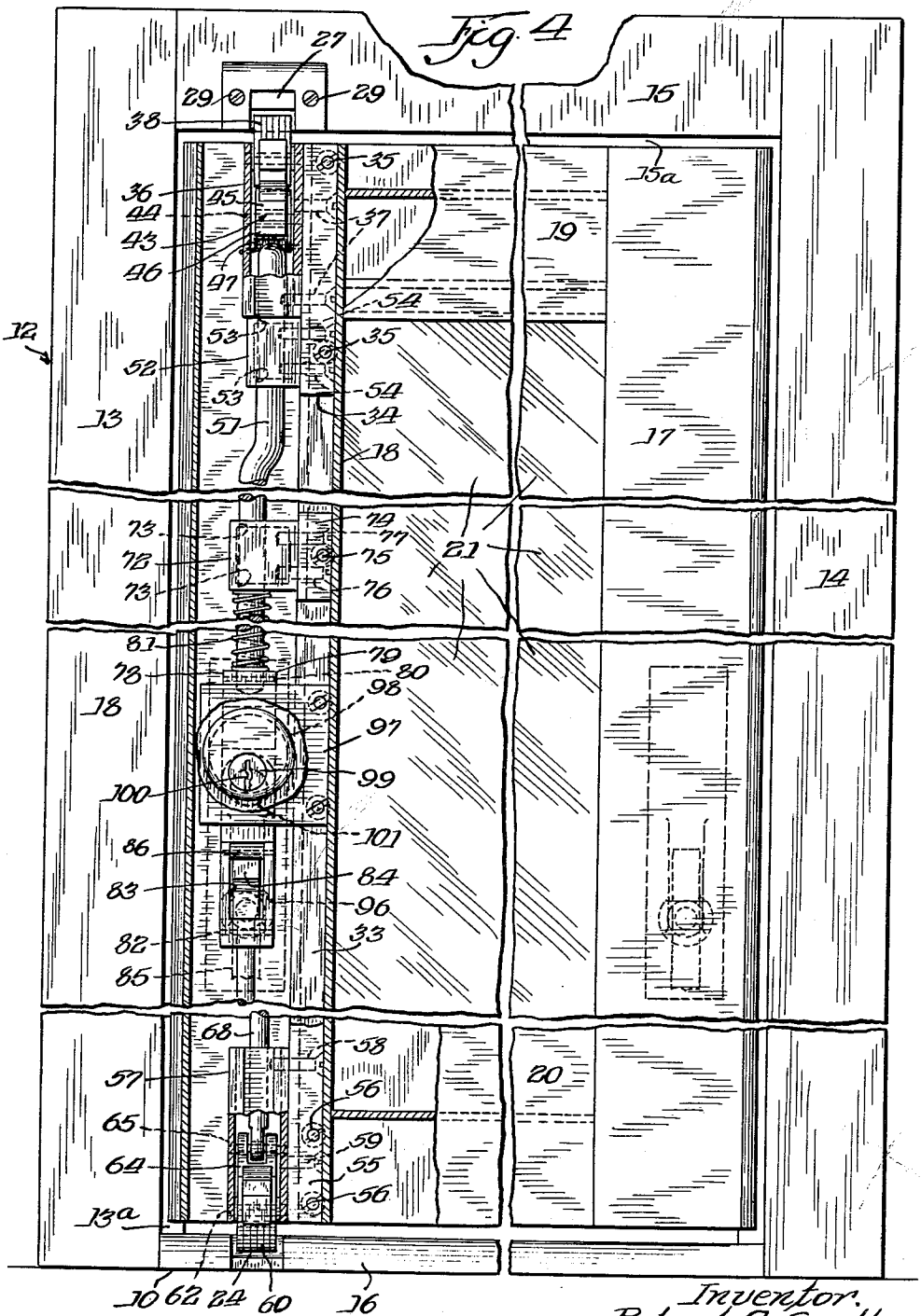
Fig. 4



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United States Patent Office

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LOCKING MECHANISM AND PANIC ACTUATING DEVICE

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My invention relates to a locking mechanism and panic actuating device for a door not ordinarily used for entry into or exit from a building, but which is usually an auxiliary type of door for use in school rooms, halls, theaters and other public buildings, to permit rapid and easy exit from the building in case of fire, or some other happening in the building, which necessitates the rapid clearing out of the occupants without panic and through a plurality of exits without the necessity for crowding around the usual doorways of the building.

Another object of my invention is the provision of a panic type operating mechanism which is simple in performance and easy to operate and which is so constructed that it is practically impossible to fail to operate and release a door so that it can be easily opened and permit passage of people therethrough.

Another and a further object of my invention is the provision of a door opening mechanism which is so mounted in the door that it can be easily actuated by pressure exerted upon a bar which passes across the inner face of the door so that the door is unlatched and in position to yield to opening pressure placed on the bar or on the inner face of the door as these panic doors are all adapted to open outward because if they open inward with a mass of people crowding against them on this inner side it would be impossible for the doors to be opened.

Another and further object of my invention is the provision of a panic door locking mechanism which can be easily actuated from the inside of the door, but which can also be opened from the outside preferably by means of a key inserted into the usual lock and tumbler device, and if desired, can be easily converted into a tumbler actuated device from both sides if such operation should become desirable or necessary.

Another and further object of my invention is the provision of a panic actuating device for the locking mechanism of the door in which the door is locked to the door frame at its top and bottom rather than by means of a bolt centrally located so that pressure upon the bar both unlocks the door and causes the door to open without any further effort being necessary, such as turning the knob or the like, which action could be easily overlooked in a panic situation.

Another and further object of my invention is the provision of rotating latch members for a door which are engaged in both locked and unlocked positions by the movement of the door into and away from closed position, which are positive in operation, are easily locked and unlocked, and are certain in operation when the door needs to be opened quickly.

These and other objects of my invention will be more fully understood by reference to the accompanying drawings and in which—

FIGURE 1 is an elevational view of the door and door frame taken from the outside embodying my invention;

FIGURE 2 is a vertical sectional view through the locking stile of a door showing the locking mechanism and operating parts therefor on lines 2—2 of FIGURE 1;

FIGURE 3 is a plan section taken on lines 3—3 of FIGURE 2; and

FIGURE 4 is a view partially in section and partially in elevation of the outer side of the door showing the locking mechanism in position within the locking stile of the door.

Referring now specifically to the drawings, and in which like reference characters refer to like parts throughout, a floor 10 is shown and a wall 11 as a part of a building in which the door frame 12 is built which comprises a side frame member 13, a second side frame member 14 spaced from the member 13, a header 15 connecting the two side frames 13 and 14 at the top, and a threshold 16 resting upon the floor and spanning the space between the side frames 13 and 14 at the bottom of the door opening. A rib 13^a on the side frame 13 and a rib 15^a on the header 15 form stops for the door and limit its travel into the door frame.

The door comprises a hinge stile 17 at one side of the door, a lock stile 18 at the opposite side, a top rail 19, a bottom rail 20 and a panel 21 mounted in the door and secured at its side edges to the hinge stile 17 and lock stile 18 and at its top and bottom to the top rail 19 and bottom rail 20 to form a complete closure for the door which may be of glass, wood panel, or any other material desired. Hinges 22 and 23 are secured to the hinge stile 17 and to the side frame member 14 by means of which the door is mounted to swing outward from the door opening formed by the frame 12 in the wall 11. A floor striking member 24 is secured to the floor 10 by means of screws 25, 25 and has a striking rib 26 thereon at its upper side which extends into a cut-out portion of the threshold 16, with the rib extending approximately to the level of the threshold 16 which forms a striking and locking member for the door at the lower side thereof as will be more fully described hereinafter.

A top striking member 27 is provided which is secured in the hollow header 15 of the door frame by means of a striking cage 28 which is secured to the header 15 by means of screws 30, 30 with the striking member 27 being secured to the cage 28 by means of screws 31, 31 which top striking member 27 has a downwardly extending striking rib 32 thereon which is engaged by a latch hereinafter described to hold the door at its upper end in closed position.

The lock stile 18 is hollow and substantially rectangular in cross sectional shape except that at its side adjacent the door panel 21 it has a rectangular extension 33 thereon and which extends throughout the length of the lock stile 18, and within which a rectangular shaped top block 34 is fitted. The block 34 is secured in position by means of screws 35, 35 which pass through the wall of the lock stile 18 and which lock stile 18 has a top latch cage 36 mounted therein which is secured to the block 34 by means of screws 37, 37. The top latch cage 36 is a channel section in form and has a rotating top latch 38 mounted therein for rotary movement upon a pin 39 secured in the walls of the latch cage 36, which latch 38 is somewhat elliptical in shape as shown, is composed of a plurality of metal plates which are placed in side to side relation with each other to provide a latch of adequate thickness and are held together by a hollow rivet 40 which forms a bearing for the pin 39 as the latch 38 rotates. The latch 38 has a recess 41 at the apex of its long diameter at one side thereof, which recess is outwardly flared at each of its sides and when in locked position engages the striking and locking rib 32 on the member 27. The top latch 38 has a cut-out portion at one of its sides with a shoulder 42 formed thereon, which shoulder 42 is engaged by a detent, designated as a whole as 43, which is pivotally mounted upon a pin 44 in the latch cage 36 and has leg portions 45 and 46 thereon, which leg portion 45, in the closed position of the door, lies against the edge of the cut-out portion of the latch 38 with the end of the leg 45 engaging the shoulder 42 on the latch 38, with a spring 47 mounted upon a pin 48 in the top latch cage 36 which normally holds the detent 43 in engaged position with the latch 38. A latch

spring 49 is provided which is fitted over the end of the upper latch cage 36 and has a curved inner end which is fitted into a curved recess 50 in the periphery of the latch 38 which normally holds the latch 38 against rotation in its unlocked position but in position to properly engage the rib 32 as the door is closed.

A thrust rod 51 is provided which is mounted in a guide block 52 having openings 53, 53 therein through which the thrust rod 51 passes with the said guide block 52 being secured to the top block 34 by means of screws 54, 54 which rod 51 extends downward within the lock stile 18 where it is connected to other parts of the mechanism hereinafter described.

A bottom block 55 is mounted in the lower end of the lock stile 18 within the area defined by the extension 33 of the walls of the lock stile and is secured in position by means of screws 56, 56 with a lower lock cage 57 being provided which is channel shaped in cross section and quite similar to the upper lock cage 36 in construction and is secured in position by screws 58 and 59 which pass through the bottom block 55 and into one of the side walls of the lower lock cage 57. A lower rotating latch 60 composed of a plurality of elliptical shaped plates placed in side to side relation with each other and held in unit position by a rivet 61 passing therethrough which in turn is mounted upon a pin 62 mounted in the lower lock cage 57, with the latch 60 having a door stop rib receiving recess 63 at the apex of its long diameter in one side thereof which is normally adapted to engage over the rib 26 on the floor striker 24. A lower detent 64 is pivotally mounted on a pin 65 secured in the lower lock cage 57 and has an elongated opening 66 within which a pin 67 is mounted which extends through the end of the pull rod 68, with the detent 64 engaging a shoulder 69 formed as a cut-out on one side of the lower latch 60 which engagement prevents the rotation of the latch 60 in a clockwise direction when the door is in closed position. A spring 70 is fitted at one of its ends over the lower end of the lock cage 57 and is turned upward and inward to a curved end portion which is adapted to fit into a curved recess 71 in the outer periphery of the latch 60 which normally holds the latch 60 against rotation when the door is in open position.

A guide 72 for the rod 51 is provided which is quite similar in construction to the guide 52 and has bores 73, 73 therethrough through which the rod 51 extends which guide 52 is secured to a block 74 mounted in the lock stile 18 by a screw 75, with the guide 72 being secured to the middle block 74 by means of screws 76 and 77.

The thrust rod 51 is secured to a throw bar 78 at its lower end with the throw bar having an extension 79 thereon within which the lower end of the rod 51 is fitted and secured to the throw bar by a pin 80. A compression spring 81 is mounted upon the rod 51 in an abutting engagement with the fixed guide 72 at its upper end, and against the upper end of the throw bar 78 which spring exerts its force in an expansive position and tends to drive the throw bar 78 downward and keeps the thrust rod 51 out of engagement with the leg 46 on the detent 43. The spring 81 also counterbalances the weight of the latch operating mechanism hereinafter described and also keeps the rod 68 pushed downward so that the detent 64 is held in position to retain the door in locked position during the normal operation of the device. The throw bar 78 is secured to the upper end of the rod 68 by a pin 82 and has a slot 83 within which the inner end 84 of an operating lever 85 extends, with the end 84 of the lever 85 being fitted under a roller pin 86 in the slotted end of the throw bar. The operating lever 85 extends inward and downward on the inside of the door and is pivotally mounted upon a roller pin 87 mounted in a bracket 88 secured to the inner face of the lock stile 18 by means of screws 89 and 90. A bracket 91 is secured to the hinge stile 17 and has a lever 92 pivotally mounted therein with a thrust bar 93 mounted at each of its ends in the levers 85 and 92 respectively so that a push on the thrust bar 93 depresses the lever 85 raising the end portion 84 and lifts the throw bar 78. This movement pushes the rod 51 upward which brings the upper end of the push rod 51 into engagement with the leg 46 on the detent 43 pushes the leg 45 out of engagement with the shoulder 42 on the upper latch member 38 thereby permitting the latch member 48 to rotate in a counterclockwise direction and release itself from the upper locking rib 32 as the door is opened. The pull rod 68 is moved upward at the same time thereby rotating the detent 64 out of engagement with the shoulder 69 on the lower latch member 60 permitting the latch 60 to rotate in a clockwise direction so the door is completely released and is responsive to pressure against the thrust bar 93 and can be very easily opened.

A pin having a knurled button 95 on the outer end thereof and an eccentric head 96 on the inner end thereof is provided, which if desired can be turned into position so that the eccentric head pushes the inner end 84 of the lever 85 into its uppermost position, or can be turned into such position by pressure on the thrust bar 93, and holds the top and bottom detents out of engagement with the rotating latches 38 and 60 so that the door can be freely opened and closed without locking should it be desired to be left in this position.

A locking cylinder holder block 97 is secured to the outer face of the locking stile 18 and has a locking cylinder 98 mounted therein within which a tumbler cylinder 99 is positioned with a key opening 100 therein with a roller 101 mounted on the inner end of the cylinder which is eccentric to the cylinder 99 and which when rotated 180° engages upon the shoulder 102 formed upon the throw bar 78 so that through the action of a key the door can be opened from the outside if desired or if necessary for any particular purpose. A U-shaped lock spring 103 is inserted through the inner wall of the lock stile 18 which passes on each side of the throw bar 78 and is fitted into grooves in the sides of the locking cylinder 98 and into the holder block 97 to hold the locking cylinder in place in the door stile 18 and against rotation.

In operation the device is quite simple in that, as shown in FIGURE 2, when the door is in closed position the upper latch 38 and the lower latch 60 are in such position that they engage over the locking ribs 26 and 32 respectively, with the latch 38 being held in engagement with the rib by the leg portion 45 of the detent 43 engaging with the shoulder 42 on the upper latch member 38 and held in such position by the spring 47. The lower latch member 60 engages the rib 26 and is held in this position by the lower detent 64, which is in engagement with the shoulder 69 formed on the latch member 60, so that this member is held in position by pressure of the compression spring 81 which forces the throw bar 78 downward, which in turn forces the rod 66 downward to hold the detent 64 against rotation and in engagement with the shoulder 69 on the lower latch member 60. When it is desired to open the door from the inside, pressure against the thrust bar 93 moves the operating levers 85 and 92 downward with the inner end 84 of the operating lever 85 engaging the roller pin 86 which lifts the throw bar 78 upward exerting a pull on the detent 64 which rotates the detent 64 in a clockwise direction freeing its end from the shoulder 69, while the throw bar 78 exerting an upward pressure on the rod 51 brings it into engagement with the leg 46 on the detent 43 causing the detent 43 to rotate in a counterclockwise direction upon the pin 34 and moving the leg portion 45 outward against the pressure of the spring 47 and taking the detent 43 out of engagement with the shoulder 42 which permits the latch member 38 to rotate in a counter-clockwise direction as continued pressure on the thrust bar 93 forces the door to open position. As

the latch member 38 turns in a counter-clockwise direction the latch is freed of the rib 32 and turned sufficiently for the curved end of the spring 49 to engage in the recess 50 thereby holding the latch member 38 against further rotation and permitting its curved surface adjacent the shoulder 42 to engage against the inner face of the leg portion 45 of the detent 43. As the door is pushed outward the bottom latch 60 rotates in a clockwise direction because the latch 60 is free of the detent 64 and the curved end of the spring 70 engages in the curved recess 71 on the latch 60 which holds the latch against further rotation and places the latch 60 in position for engagement with the rib 26 in the closing operation of the door. In this condition the door can be swung outward to wide open position so that rapid passage of individuals through the door can be permitted without in any way being interfered with by the door.

As soon as pressure is released on the thrust bar 93, the spring 81 pushes the throw bar 78 downward only slightly and the pin 67 is pushed downward slightly in the elongated opening 66 with the detent 64 remaining against the curved surface of the latch 60 where it remains until it is closed. As the door reaches its closed position, the upper latch member 38 engages against the rib 32 which turns the latch member 38 in a clockwise direction, with the lower latch member 60 engaging against the rib 26 which turns the latch member 60 in a counter-clockwise direction until both locking members 38 and 60 engage upon the ribs 26 and 32 respectively, in which position the spring 47 forces the leg portion 45 of the detent 43 in position under the shoulder 42 and the detent 64 is forced downward by the spring 81 and weight of the throw bar 78 so that the detent 64 is forced into engagement with the shoulder 69 on the lower locking member 60 and the door is again locked in position.

After the door has been opened and it may be desired to hold the detents 43 and 64 out of engagement with the locking members 38 and 60, the knurled member 95 is turned in such manner that the eccentric 96 is rotated under the end 84 of the lever 85 so that the locking detents 43 and 64 are prevented from engagement with the locking members 38 and 60. In this position the door can be opened and closed with the latches 38 and 60 functioning in such manner that they are in latched position when the door is closed but not locked so that a door can either be pushed open or pulled open from its outside if desired without unlocking the door it will be understood when the door is opened the upper latch 38 rotates in a counter-clockwise direction, while the lower latch 60 turns in a clockwise direction, thus rotating to an outside position the sides of these latch members on their shortest diameters which places the outer edge of the latch only slightly below and above the ends of the locking stile so that the door can be made close fitting and will not drag on the floor at the bottom nor engage the header at the top. When it is desired to restore the locking mechanism the eccentric 96 is turned to out of engaged position with the lever 84 and it functions as hereinabove described.

When it is desired to open the door from the outside, a key is fitted into the locking tumbler and rotated and as the member 101 acts upon the shoulder 102 on the throw bar 78, the throw bar 78 is lifted and performs in exactly the same manner as if it were lifted by the lever 84, and which forces the detents 43 and 64 out of engagement with the locking members 38 and 60 in which condition the door can be pulled open from the outer side if entry is desired from the outside of a building.

While I have described more or less precisely the details of construction, I do not wish to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts and the substitution of equivalents as circumstances may suggest or render expedient without departing from the spirit or scope of the invention.

What is claimed is:

1. In combination with a door having a hollow locking stile on one of its sides and a hinge stile on the other side, latch cases mounted in the upper and lower ends of the locking stile, rotating latches in the said latch cases, each of said latches having a locking rib receiving recess in one side thereof and having a shoulder formed thereon and also having spring receiving recesses in the outer edges thereof, combined locking and striking ribs mounted on the door frame for engagement with the said latches, pivotally mounted upper and lower detents movable for engagement with the shoulders on said latches, springs carried by the latch cases in engagement with the latches and fitting into the spring receiving recesses whereby the said latches are held against rotation when in unlatched position, a throw bar, a push rod connected to the throw bar at its upper end for engagement with the upper detent, a second rod connected to the said throw bar and to the lower detent, a guide for the said push rod, a compression spring on the said push rod in engagement with the said guide and the throw bar, a pivotally mounted lever on the said door, one end of which engages the throw bar and a thrust bar mounted on the other end of the said lever.

2. In combination with a door having a hollow locking stile on one of its sides and a hinge stile on the other side, latch cases mounted in the upper and lower ends of the locking stile, rotating latches in the said latch cases, each of said latches having a locking rib receiving recess in one side thereof and having a shoulder formed thereon and also having spring receiving recesses in the outer edges thereof, combined locking and striking ribs mounted on the door frame for engagement with the said latches, pivotally mounted upper and lower detents movable for engagement with the shoulders on said latches, springs carried by the latch cases in engagement with the latches and fitting into the spring receiving recesses whereby the said latches are held against rotation when in unlatched position, a throw bar, a push rod conected to the throw bar at its upper end for engagement with the upper detent, a second rod connected to the said throw bar and to the lower detent, a guide for the said push rod, a compression spring on the said push rod in engagement with the said guide and the throw bar, a pivotally mounted lever on the said door, one end of which engages the throw bar and a thrust bar mounted on the other end of the said lever, and means whereby the detents are held in out of engaged position with the rotation latches.

3. In combination with a door having a hollow locking stile on one of its sides and a hinge stile on the other side, latch cases mounted in the upper and lower ends of the locking stile, rotating latches in the said latch cases, each of said latches having a locking rib receiving recess in one side thereof and having a shoulder formed thereon and also having spring receiving recesses in the outer edges thereof, combined locking and striking ribs mounted on the door frame for engagement with the said latches, pivotally mounted upper and lower detents movable for engagement with the shoulders on said latches, springs carried by the latch cases in engagement with the latches and fitting into the spring receiving recesses whereby the said latches are held against rotation when in unlatched position, a throw bar, a push rod connected to the throw bar at its upper end for engagement with the upper detent, a second rod connected to the said throw bar and to the lower detent, a guide for the said push rod, a compression spring on the said push rod in engagement with the said guide and the throw bar, a pivotally mounted lever on the said door, one end of which engages the throw bar and a thrust bar mounted on the other end of the said lever, a rotatably mounted pin in the said door, a button on one end thereof and an eccentric member on the inner end of the button adapted to engage the pivotally mounted lever for holding the detents in out of engaged position with the said latches.

4. In combination with a door having a hollow locking stile on one of its sides and a hinge stile on the other side, latch cases mounted in the upper and lower ends of the locking stile, rotating latches in the said latch cases, each of said latches having a locking rib receiving recess in one side thereof and having a detent engaging shoulder formed thereon and also having a spring receiving recess in the outer edge thereof, pivotally mounted upper and lower detents movable for engagement with the shoulders on said latches, springs carried by the latch cases in engagement with the latches and fitting into the spring receiving recesses whereby the said latches are held against rotation when in unlatched position, a throw bar, a push rod connected to the throw bar at its upper end for engagement with the upper detent, a push and pull rod connected to the said throw bar and to the lower detent, a guide for the said push rod, a compression spring on the said push rod in engagement with the said guide and the throw bar, a pivotally mounted lever on the said door, one end of which engages the throw bar, and a thrust bar mounted on the other end of the said lever, a locking cylinder on the opposite side of the door from the thrust bar, and an eccentric member in the locking cylinder adapted to engage the throw bar whereby the latches may be released.

5. In combination with a door having a hollow locking stile on one of its sides and a hinge stile on the other side, latch cases mounted in the upper and lower ends of the locking stile, rotating latches in the said latch cases, each of said latches having a locking rib receiving recess in one side thereof and having a shoulder formed thereon and also having a spring receiving recess in the outer edge thereof, pivotally mounted upper and lower

detents movable for engagement with the shoulders on said latches, springs carried by the latch cases in engagement with the latches and fitting into the spring receiving recesses whereby the said latches are held against rotation when in unlatched position, a throw bar, a push rod connected to the throw bar at its upper end for engagement with the upper detent, a push and pull rod connected to the said throw bar and to the lower detent, a guide for the said push rod, a compression spring on the said push rod in engagement with said guide and the throw bar, a pivotally mounted lever on the said door, one end of which engages the throw bar and a thrust bar mounted on the other end of the said lever, a locking cylinder on the side of the door opposite the thrust bar, a key actuated tumbler in the locking cylinder and an eccentric member on said tumbler for engagement with the throw bar whereby the latches may be unlocked.

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