

Nov. 2, 1965

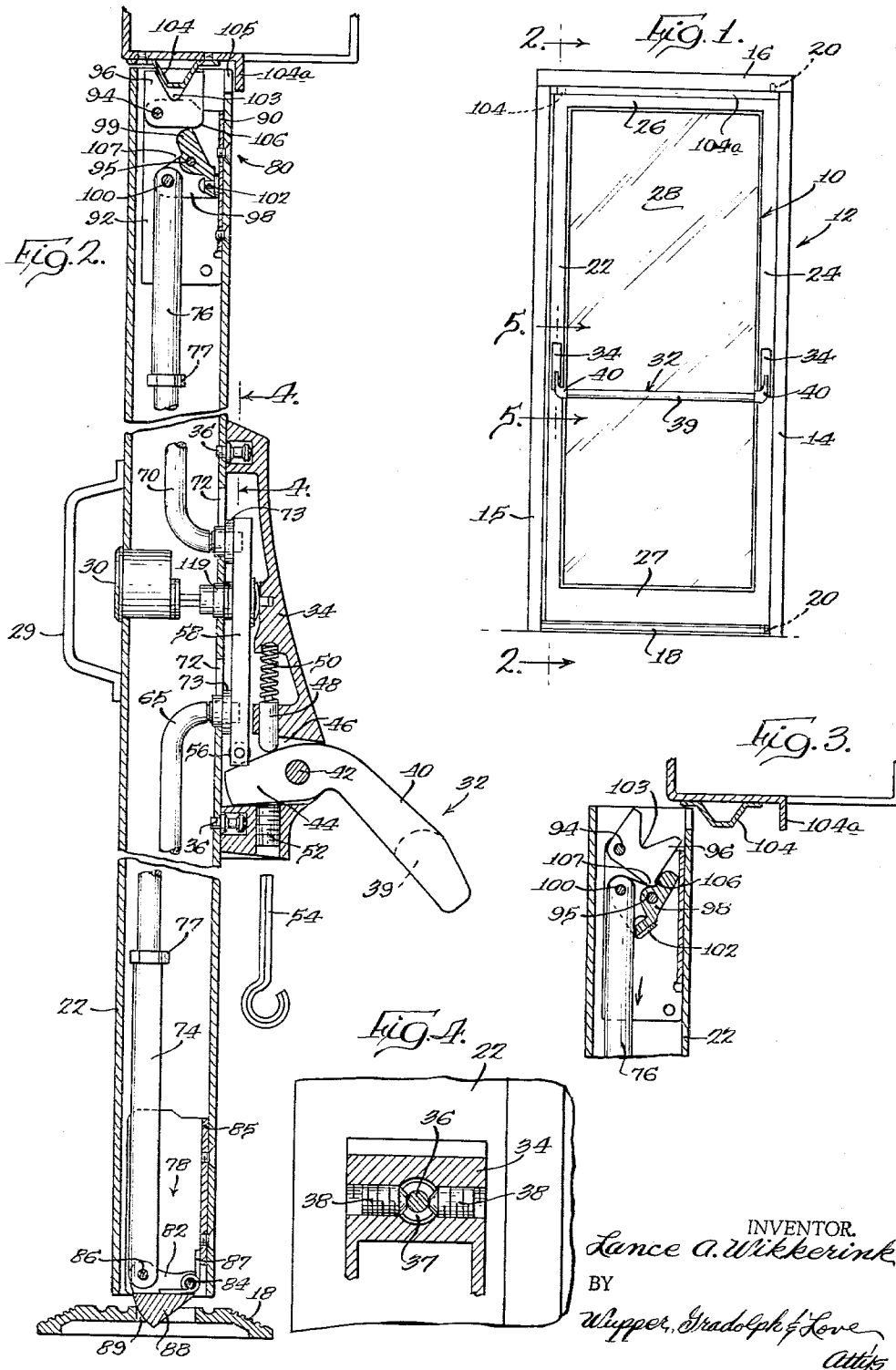
L. A. WIKKERINK

3,214,947

PANIC EXIT LOCK

Filed May 6, 1963

3 Sheets-Sheet 1



INVENTOR.
Lance A. Wikkerink
BY
Whipper, Grudolph & Love
Attys

Nov. 2, 1965

L. A. WIKKERINK

3,214,947

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Fig. 5.

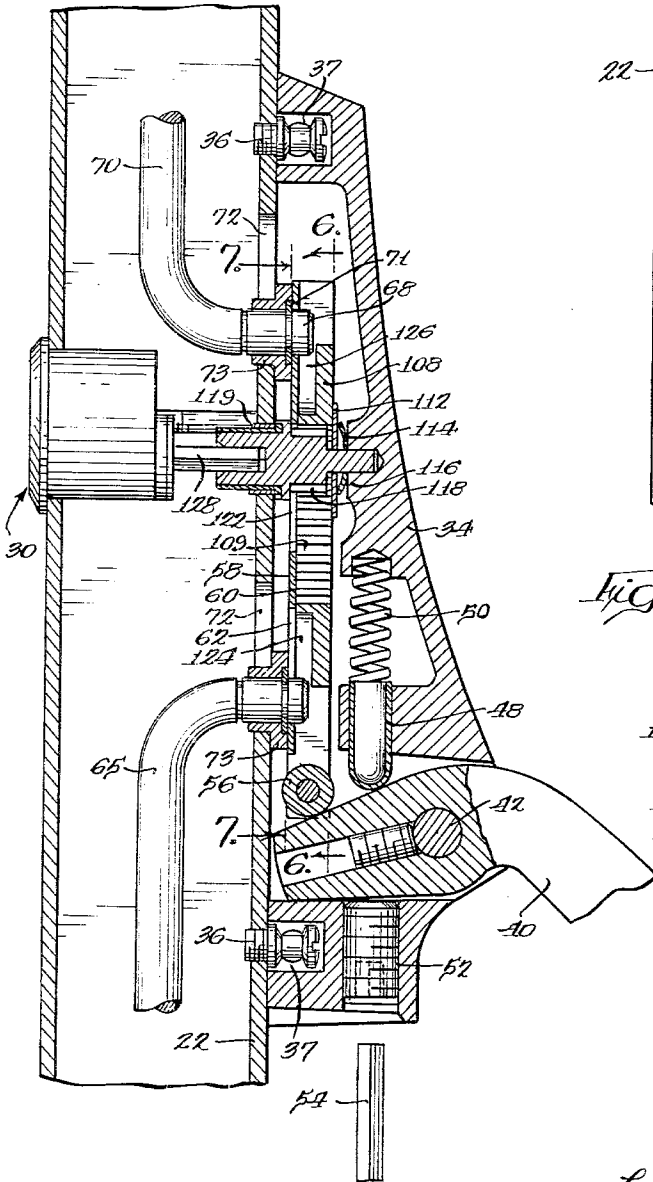


Fig. 6.

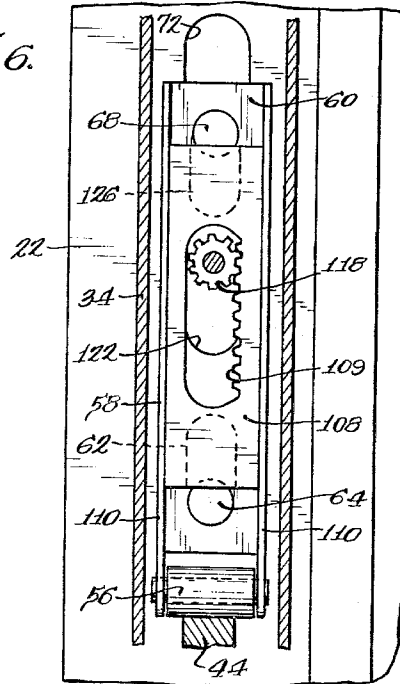
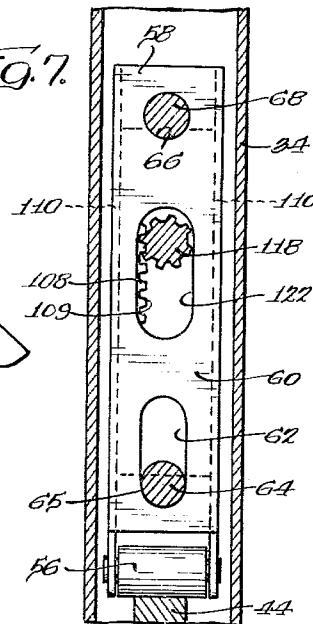


Fig. 7.



INVENTOR.
Lance A. Wikkerink

BY

Wagner, Bradolph & Lore
Attys

Nov. 2, 1965

L. A. WIKKERINK

3,214,947

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Fig. 8.

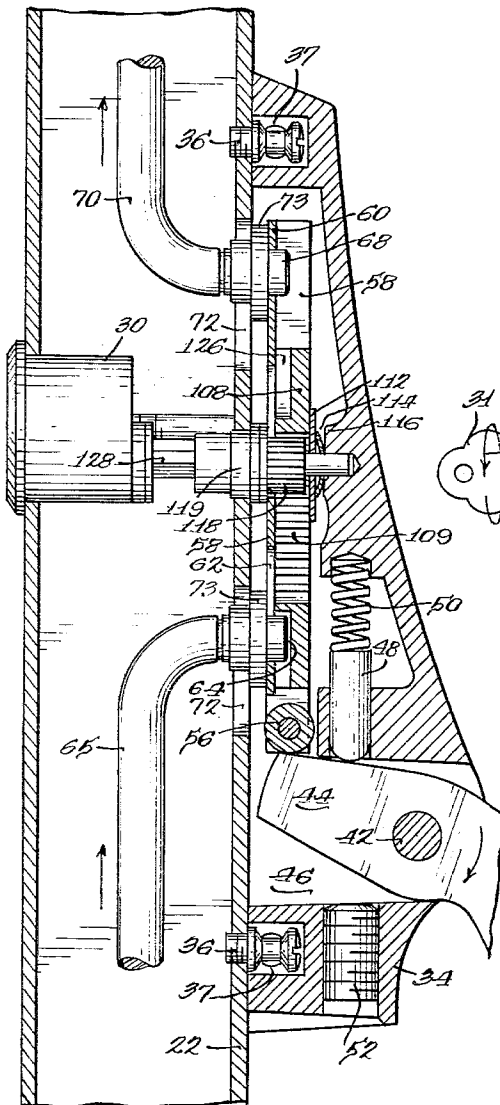
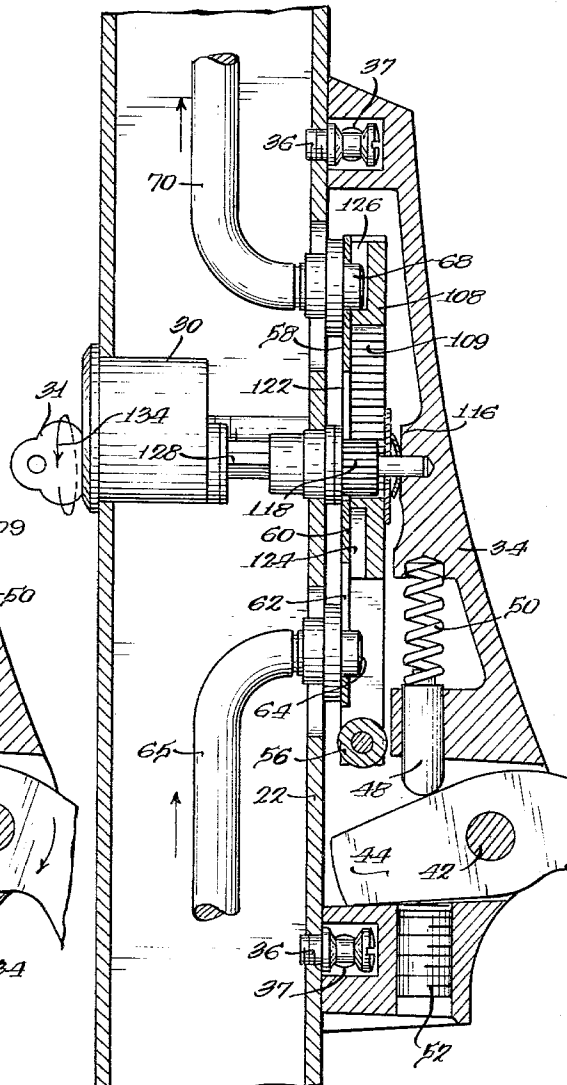


Fig. 9.



INVENTOR.
Lance a. Wikkerink
BY
Wupper, Bradolph & Love
Attys

1

3,214,947

PANIC EXIT LOCK

Lance A. Wikkerink, Milwaukee, Wis., assignor to Republic Industries, Inc., Chicago, Ill., a corporation of Illinois

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8 Claims. (Cl. 70—92)

This invention relates in general to panic exit doors and more particularly to an improved panic exit door mechanism which provides several optional desirable modes of operation, some of which have not previously been available.

Panic exit doors present a number of problems since during certain hours of the day the door should be freely movable between the closed and open positions, while during other hours the door should be locked to prevent entrance, but easily opened from the inside to permit exit. To permit easy exit through the locked door, a panic exit bar is utilized on the inside of the door for unbolting the door in response to the application of pressure to the bar.

Usually the panic exit bar is held depressed during the daylight hours to retract the bolts and the door is freely movable to permit passage with the least interference. The arrangement for depressing or releasing the panic bar generally comprises an Allen head stop screw which is adjusted in one or the other direction to position the panic bar accordingly. The screw usually is located in the under side of the canopy or housing which supports the panic bar, and, as a rule, a special Allen wrench is used to make the rather cumbersome adjustment.

To avoid this adjustment problem, the present invention utilizes a very simple mechanism for alternatively retracting the bolts in one position or placing the bolts under control of the panic bar when in another position, the mechanism being actuated by simple operation of a key in a conventional lock which is provided for the panic door. This avoids the need for adjustment of the stop screw, and thus, when the door is opened in the morning, for example, the key is inserted and turned. This retracts the bolts and disengages the panic bar from the bolt operating mechanism and leaves the door free to swing without latching action. Likewise a simple revolution of the key in the lock in the reverse direction permits the door to latch and places the bolts under control of the panic bar. In either the locked or unlocked condition the key can be removed.

It is therefore a primary object of the present invention to provide an improved panic lock mechanism having the above set forth desirable features as well as other advantages to appear presently.

It is another object of the present invention to provide an improved panic exit door in which the panic bar is engaged with or disengaged from the bolt operating mechanism by a simple operation of the door key which is removable in either the locked or unlocked condition.

In addition, the present invention includes improvements by which the stress on the key during movement of the various parts by the key is maintained at a substantially constant small value over a range of almost a full turn of the key, instead of the key being subjected to a high torque during a short range of movement.

It is therefore another object of the present invention to provide an improved arrangement for directly key operating the latch elements of a panic exit door without subjecting the key to high stresses.

It is also another object of the present invention to provide an improved latch arrangement for a panic exit door such that the bolts are always held retracted when the door is open, but are adapted to snap into latching position when the door is closed providing the key has been operated to the locked position.

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Yet another object is to provide a novel latch having the above advantages, but which is easily adapted to be unlocked by adjustment of its stop screw in the conventional manner if desired.

The above and other objects of the present invention will become apparent on examination of the following specification and claims together with the drawings, wherein

FIG. 1 is a general plan view of the door and frame from the inside;

FIG. 2 is a vertical view taken through the line 2—2 in FIG. 1;

FIG. 3 is an enlarged vertical sectional view of the upper portion of the door with the door partly open;

FIG. 4 is a cross sectional view taken along the line 4—4 of FIG. 2;

FIG. 5 is a large scale cross sectional view taken along the line 5—5 of FIG. 1 showing the central portion of the mechanism with the door closed and locked;

FIG. 6 is a cross sectional view taken along the line 6—6 of FIG. 5;

FIG. 7 is a cross sectional view taken along the line 7—7 of FIG. 5;

FIG. 8 is a view similar to FIG. 5, but illustrates the positions of the elements when the bolts have been retracted by actuation of the panic bar; and

FIG. 9 is a view similar to FIG. 8, but illustrating the mechanism as it appears when the bolts have been retracted by key actuation.

In FIG. 1 a panic exit door is indicated by the reference character 10. It is mounted in a door frame 12. The door frame comprises a pair of spaced apart upright members 14 and 15 having a head 16 and a threshold strip 18. The door 10 is hinged so as to pivot about upper and lower pins 20, one of which forms a portion of a conventional door checking mechanism (not shown) which closes the door under control whenever it is opened and released.

The door comprises a framework having left and right hollow vertical stiles 22 and 24 united by a pair of horizontal rails 26 and 27 for enclosing a glass panel 28. A conventional handle 29 (FIG. 2) may be provided on the outside of the door, and a cylinder lock assembly 30 is mounted in the door and is adapted to receive a key 31 from the outside of the door, as seen in FIG. 9. The metal door 10 and frame 12 may be considered to be essentially conventional.

A panic bar 32 is supported between a pair of housings 34 mounted on the stiles 22 and 24 approximately midway between the upper and lower rails 26 and 27. The housings 34 are supported on the stiles 22 and 24 by means of a pair of spaced apart studs 36, as seen in FIG. 2, having peripheral recesses 37 therein adapted to be engaged by set screws 38 as seen in FIG. 4, for example. The panic bar 32 is generally U-shaped having a horizontal cross bar 39 and a pair of vertical lever arms 40 which are pivotally suspended from pins 42 carried by the housings 34 as best seen in FIG. 2.

The arm 40 at the free edge of the door 10 terminates in a lever 44 located in a recess 46 formed in its housing 34. A vertically aligned spring guide and sleeve assembly 48 under pressure of a spring 50 serves to bias the lever 44 and the panic exit bar 32 into counterclockwise rotation about pins 42 so that the bar 39 is normally held away from the door. An adjusting screw 52 threaded into the under side of the housing by means of an Allen wrench, diagrammatically illustrated at 54, bears against the lower face of the lever 44 and serves to position the panic bar. In prior arrangements it is necessary to adjust the screw 52 to different positions for placing the panic bar 32 in a bolt operating position or for retracting the bolts. In the present arrangement, the screw 52 may

be used for the same purpose, but ordinarily it is not necessary to change the adjustment.

The nose portion of the lever 44 is adapted to engage a roller 56 carried adjacent the lower edge of a U-shaped slide or traveler 58. The central leg 60 of the slide has a vertical slot 62 therein adjacent its lower end in which the upper end 64 of an L-shaped depending bolt operating rod 65 is engaged. The slide element 58 also has an aperture 66 therein near its upper end which embraces the lower end 68 of an upstanding L-shaped bolt operating rod 70.

The bolt rods 65 and 70 extend through slots 72 in the stile 22 into the hollow space within the stile, and each has a flanged bearing collar 73 thereon which serves to guide its rod in the stile, the collars being retained by split rings 71. The rods 65 and 70 have respective extensions 74 and 76 adjustably secured on the ends thereof by jamb nuts 77. The extensions 74 and 76 in turn connect the rods to a lower bolt assembly 78 and an upper bolt assembly 80 respectively.

The lower bolt operating assembly 78 comprises a bolt element 82 pivotally mounted by means of a pin 84 on a U-shaped latch housing 85. The housing 85 in turn is secured adjacent the lower end of the stile 22. The bolt element 82 is also pivotally connected to rod extension 74 by a pin 86. A spring 87 carried on pin 84 biases the bolt 82 for counterclockwise rotation about pin 84 so that the rod 65 and its extension 74 are normally biased downward. In this position, the lower portion 88 on the bolt element extends below the bottom door edge and engages a recess 89 in the threshold, as shown in FIG. 2, to hold the door locked.

The upper bolt assembly comprises a U-shaped latch housing 90 mounted in the hollow framework of door 10 adjacent the top of the stile 22. The housing 90 carries pins 94 and 95 which pivotally support a top latch element 96 and a latch release element 98. The release element 98 is pivotally connected to the upper end of rod extension 76 by means of a pin 100, and it has a resilient bumper 102 extending therefrom. The release element 98 has an arm 99, the end of which serves to hold the latch element 96 in a substantially horizontal position when the connector 76 and the rod 70 are moved downwardly to pivot the arm 99 in a counterclockwise direction about pin 95 and bring the bumper 102 against the inside surface of the housing 90.

The latch element 96 has a V-shaped groove 103 in its upper surface. The groove 103 engages a strike 104 having a similar V shape and depending from the upper jamb for maintaining the door locked. The upper horizontal rail 26 of the door is cut away at 105 to enable the door 10 to move past strike 104, while a depending flange 104a on the jamb acts as a stop.

When the connector 76 is raised to pivot the release element 98 clockwise about pin 95, the latch element 96 falls out of engagement with strike 104 to permit the door 10 to be opened. When the latch 96 falls, the lower corner 106 of the latch nests in a notch 107 in the back surface of the release element 98 and prevents the release element from returning to the latching position as seen in FIG. 3.

A vertically disposed retractor or rack 108 is carried between the legs of the U-shaped slide 58. One side edge of the rack is against the central inside face of the web of the slide with the smooth back of the rack against one of the slide side rails 110, so that the teeth 109 at the front of the rack face toward the slide center line. A plate 112 and a spring washer 114 secured between the rack 108 and a boss 116 on the housing 34 serves to maintain the rack 108 and slide 58 in position.

The rack 108 in turn is adapted to be reciprocated by a pinion 118 which is journaled in the boss 116 and in a bearing 119 in the stile 22. A slot 122 is provided in the back wall 60 of slide 58 to accommodate the hub of the pinion while permitting limited vertical movement

of the slide. The rack 108 is provided with grooves or notches 124 and 126 at its lower and upper ends respectively so that it can move vertically to a limited extent relative to the ends 64 and 68 of the rods 65 and 70.

A rectangular drive shaft 128 connects the pinion 118 with the cylinder lock assembly 30 so that the key 31 can rotate the shaft 128 and pinion 118 to run the rack 108 upwardly or downwardly.

When the door is locked, as is indicated in FIGS. 2 and 5, the panic bar 32 projects outwardly with its cam 44 in the lower position just out of contact with the roller 56. The slide 60 and rack 108 are in their lowermost positions, the slide being held down mostly by the weight of the rods 65 and 70.

If the door 10 is to be unbolted through operation of the panic bar 32, pressure is applied to the cross bar 39 for rotating the lever 40 clockwise about pin 42 against the pressure of spring 50. The cam nose 44 acts against the roller 56 to raise the slide 58. Under these conditions, the pinion 118 does not rotate and the rack 108 remains in the position shown in FIG. 5. The slide 58 on moving upwardly raises the rod end 68 and rod segments 70-76, which pivots the locking element 98 clockwise about pin 95 to remove the latch support 99 from beneath latch element 96. Latch element 96 therefore falls around pivot pin 94 as soon as the door is opened slightly, and releases the strike 104 so that the upper bolt assembly 80 is unlocked. When this happens, the corner 106 of latch element 96 falls behind the back edge 107 of the release element 98 to hold the latch element 96 in the unlatched position.

As the slide 58 moves upwardly, the lower end of slot 62 engages rod end 64 and raises the rod segments 65-74. This pivots latch element 82 clockwise about pin 84 against the tension of spring 87 to lift element 82 from the threshold recess 89. The door 10 may then be swung open. The relative positions of the elements under these conditions are shown in FIGS. 8 and 3.

When the door has swung outwardly and the bar 32 has been released, the pressure of spring 50 returns the bar to normal; however, the slide 58 remains in its raised position due to the latching effect of the elements 96 and 98. The door, after release, is returned to its closed position under the influence of a suitable door check mechanism so that the strike 104 engages latch 96 to pivot corner 106 counterclockwise out of engagement with notch 107. This enables rod segments 76 and 70 to fall and to carry along slide 58. As the slide 58 moves downwardly, this permits rod segments 65 and 74 to move in the same direction. This pivots latch 82 into engagement with recess 89, and the door is thus returned to locked condition.

To unlock the door 10 from the outside, a key 31 is inserted in lock assembly 30 and rotated in the direction indicated by the arrow 134 in FIG. 9 one full turn, and then removed if desired. This rotates the shaft 128 and pinion 118, and raises the rack 108. When the lower end of rack upper groove 126 engages rod end 68, the rod 70 is raised and this raises the slide 58 which is fixed thereto. The moving slide 58 in turn raises the rod end 64 and rod segments 65 and 74. The rod segments 76 and 74 therefore operate to retract bolts 82 and latch 96 in the manner previously explained.

The door may now be opened, leaving the rack 108 and slide 58 in the upper position shown in FIG. 9. The door then remains unbolted so that it may be freely moved between its open and closed positions. Each time the door is closed, the latch element 96 engages the strike 104 and the latch swings upwardly, but since it is not supported in this position, its movement does not influence door operation. The release element 98, however, remains in retracted position, since the rack 108 holds the slide 58 and rod end 68 from moving downwardly. The panic bar 32 is, under these conditions, disengaged from the slide as shown in FIG. 9 and its movement

rendered immaterial in so far as operation of the latch mechanism is concerned.

It should be noted that the rack is moved the same distance for each increment of key movement, and that the key rotates through a full turn between locked and unlocked positions. The torque requirements upon the key are therefore very low as compared with other systems, particularly systems which lock or unlock with a half turn of a key, and systems in which bolt movement is greater during certain increments of the key movement. Furthermore, the key can be removed in either the locked or unlocked positions.

To lock the door, the key 31 is used to rotate shaft 128 in a direction opposite to that indicated by arrow 134 in FIG. 9. This rotates the pinion 118 and moves the rack 108 downward from the position shown in FIG. 9 to the position shown in FIG. 8. Thereafter, when the door is closed, the mechanism assumes the position shown in FIG. 1; that is, when the latch 96 moves into engagement with the strike 104, the connector 76, rod 70, and slide 58 can move downward, since they are no longer held by the rack 108. As the slide drops, rod segments 65-74 become unsupported and move downward under the influence of gravity and the pressure of spring 87 to seat the bottom latch element 88 in recess 89. The door is now locked and the slide 58 is in position to be operated by the panic bar 32.

It will be noted from the above that temporary unlocking of the door is greatly facilitated. Thus the key may be operated to unlock the door and the door opened to permit entrance. The key may then be operated in the reverse direction and removed while the door is held open. Thereafter, if the door is allowed to close, it will automatically relock.

When a multiple door system is used, it may be desirable to have only one door equipped fully as described above to gain entrance. The other doors can be dogged open from the inside by using the Allen type key 54 (FIG. 2) to tighten the dogging screw 52 which operates against the underside of lever 44. Doors to be so operated need not have the lock 30, shaft 128, pinion 118, or rack 108, and these elements may be simply omitted without otherwise changing the mechanism.

It will be noted that the lower end of the slide has a slot 62 for forming the attachment to the end 64 of the lower control rod 65. This arrangement provides a lost motion connection so that if there is a stone, or dirt or the like, in the threshold strip recess 89, the door will still lock at the top if, of course, the key has been turned to locked position. Thus, when the door is closed—even though the lower latch element 88 cannot fall into the recess 89, thereby holding the rod 65 in its upper position—there is still sufficient lost motion to permit the mechanism at the top of the door and the slide to operate in the usual manner.

It will be appreciated that the invention has been described in connection with a specific embodiment and that variations in the structure may be made without departing from the spirit and scope of the invention, and that the scope of the invention is to be measured by the scope of the following claims.

Having described my invention, what I desire to secure by Letters Patent of the United States is:

1. A lock mechanism for use on a panic door adapted to be mounted in a door frame comprising a panic bar, means pivotally attaching said panic bar to said door and biasing a portion of said bar outwardly away from said door, latches mounted on the door and normally conditioned when the door is closed for locking said door to said door frame and adapted in an alternative condition to free said door when control elements connected thereto are moved in one direction, a slide adapted to be operated in a certain direction by said panic bar when said portion is depressed and connected to move said control elements in said one direction away from said normal condition to free

said door when said slide is moved in said certain direction, an element movable with said slide, a movable rack carried adjacent said slide, a pinion meshed with said rack, cylinder lock means having a certain angular position at which a key is insertable and removable, means connecting said cylinder lock means to said pinion for rotating said pinion to move said rack back and forth in an endwise direction depending upon the direction of rotation of said cylinder lock, means on said rack for engaging the element movable with said slide and operating said slide in said certain direction to free said door in response to rotation of said cylinder lock in one direction to said certain angular position, and rotation of said cylinder lock in the opposite direction back to the same said certain angular position moving said rack in the opposite direction to free said slide.

2. A lock mechanism for use on a panic door adapted to be mounted in a door frame comprising a panic bar, means pivotally attaching said panic bar to said door and biasing a portion of said bar outwardly away from said door, latches mounted on the door and normally conditioned when the door is closed for locking said door to said door frame and adapted in an alternative condition to free said door when control elements connected thereto are moved in one direction, a slide adapted to be operated in a certain direction by said panic bar when said portion is depressed and connected for moving said control elements in said one direction away from said normal condition to free said door when said slide is moved in said certain direction, an element movable with said slide, a movable member carried adjacent said slide, a rotatable element connected for moving said member, cylinder lock means having a certain angular position at which a key is insertable and removable, means connecting said cylinder lock means to said rotatable element for rotating said rotatable element to move said member in either direction depending upon the direction of rotation of said cylinder lock, means on said member for engaging the element movable with said slide and operating said slide in said certain direction to free said door in response to rotation of said cylinder lock in one direction to said certain angular position, and rotation of said cylinder lock in the opposite direction back to the same said certain angular position moving said member in the opposite direction to free said slide.

3. A lock mechanism for use on a panic door adapted to be mounted in a door frame comprising a panic bar, means pivotally attaching said panic bar to said door and biasing a portion of said bar outwardly away from said door, top and bottom latches mounted on the door and normally conditioned when the door is closed for locking said door to said door frame and adapted in an alternative condition to free said door when control elements connected thereto are moved in one direction, a slide adapted to be operated in a certain direction by said panic bar when said portion is depressed and connected for moving said control elements in said one direction away from said normal condition to free said door when said slide is moved in said certain direction, an element movable with said slide, a movable rack carried adjacent said slide, a pinion meshed with said rack, cylinder lock means having a certain angular position at which a key is insertable and removable, means connecting said cylinder lock means to said pinion for rotating said pinion to move said rack back and forth in an endwise direction depending upon the direction of rotation of said cylinder lock, means on said rack for engaging the element movable with said slide and operating said slide in said certain direction to free said door in response to rotation of said cylinder lock in one direction to said certain angular position, and rotation of said cylinder lock in the opposite direction back to the same said certain angular position moving said rack in the opposite direction to free said slide, the connection between said slide and said

lower latch including lost motion means to permit said lower latch to remain retracted if blocked against extending when said slide is freed.

4. A lock mechanism for use on a panic door adapted to be mounted in a door frame comprising a panic bar, means pivotally attaching said panic bar to said door and biasing a portion of said bar outwardly away from said door, top and bottom latches mounted on the door and normally conditioned when the door is closed for locking said door to said door frame and adapted in an alternative condition to free said door when control elements connected thereto are moved in one direction, a slide adapted to be operated in a certain direction by said panic bar when said portion is depressed and connected for moving said control elements in said one direction away from said normal condition to free said door when said slide is moved in said certain direction, an element movable with said slide, a movable member carried adjacent said slide, a rotatable element connected for moving said member, cylinder lock means having a certain angular position at which a key is insertable and removable, means connecting said cylinder lock means to said rotatable element for rotating said rotatable element to move said member in either direction depending upon the direction of rotation of said cylinder lock, means on said member for engaging the element movable with said slide and operating said slide in said certain direction to free said door in response to rotation of said cylinder lock in one direction to said certain angular position, and rotation of said cylinder lock in the opposite direction back to the same said certain angular position moving said member in the opposite direction to free said slide, the con-

nection between said slide and said lower latch including lost motion means to permit said lower latch to remain retracted if blocked against extending when said slide is freed.

5. The combination called for in claim 1, including means for holding said latches in the said alternative door-free condition when the door is open regardless of the position of said rack.

6. The combination called for in claim 2 including means for holding said latches in the alternative door-free condition when the door is open regardless of the position of said member.

7. The combination called for in claim 3 including means for holding said latches in the said alternative door-free condition when the door is open regardless of the position of said rack.

8. The combination called for in claim 4 including means for holding said latches in the said alternative door-free condition when the door is open regardless of the position of said member.

References Cited by the Examiner

UNITED STATES PATENTS

1,518,187	12/24	Dyer	70—92
2,805,091	9/57	Clifton	292—21
2,824,440	2/58	Jewett et al.	70—92
2,932,536	4/60	Pyknen	70—92
2,959,440	11/60	Hay	292—92
3,083,560	4/63	Scott	70—92

ALBERT H. KAMPE, *Primary Examiner.*