April 25, 1950 N. KULBERSH 2,505,190

EXIT LOCK

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Fig. 1.

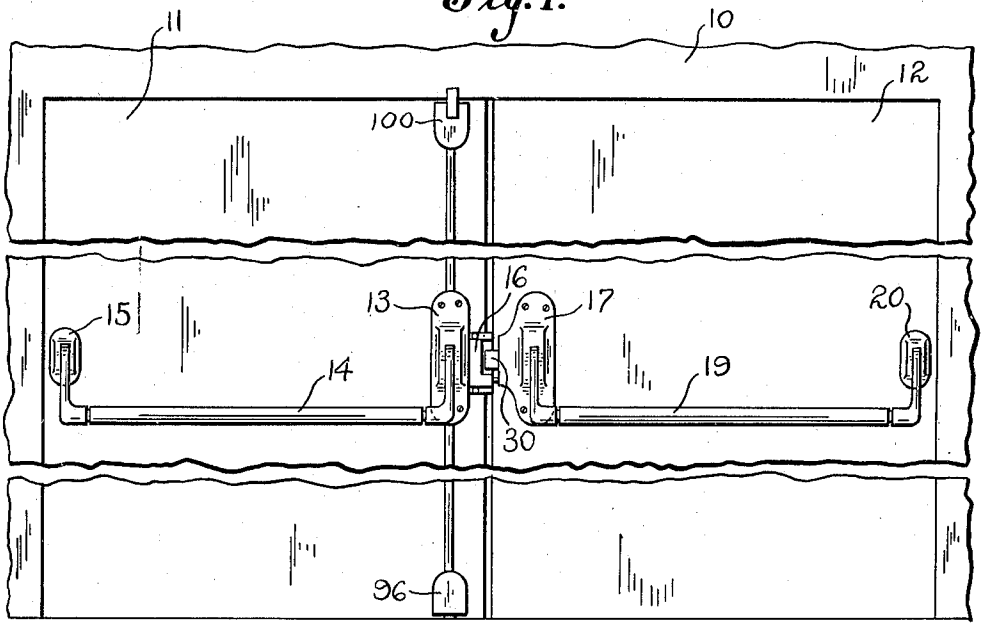


Fig. 2.

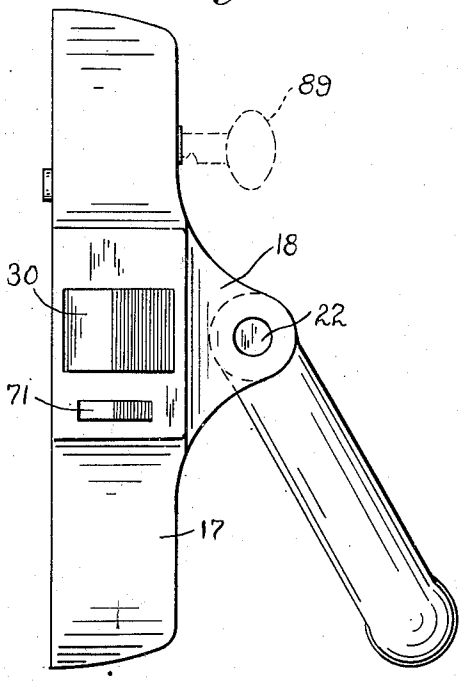
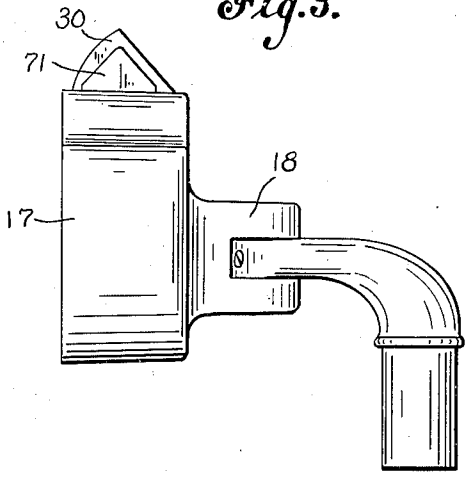


Fig. 3.



Inventor

Nathan Kulbersh

By Rockwell & Barnhouse

Attorneys

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Fig.4.

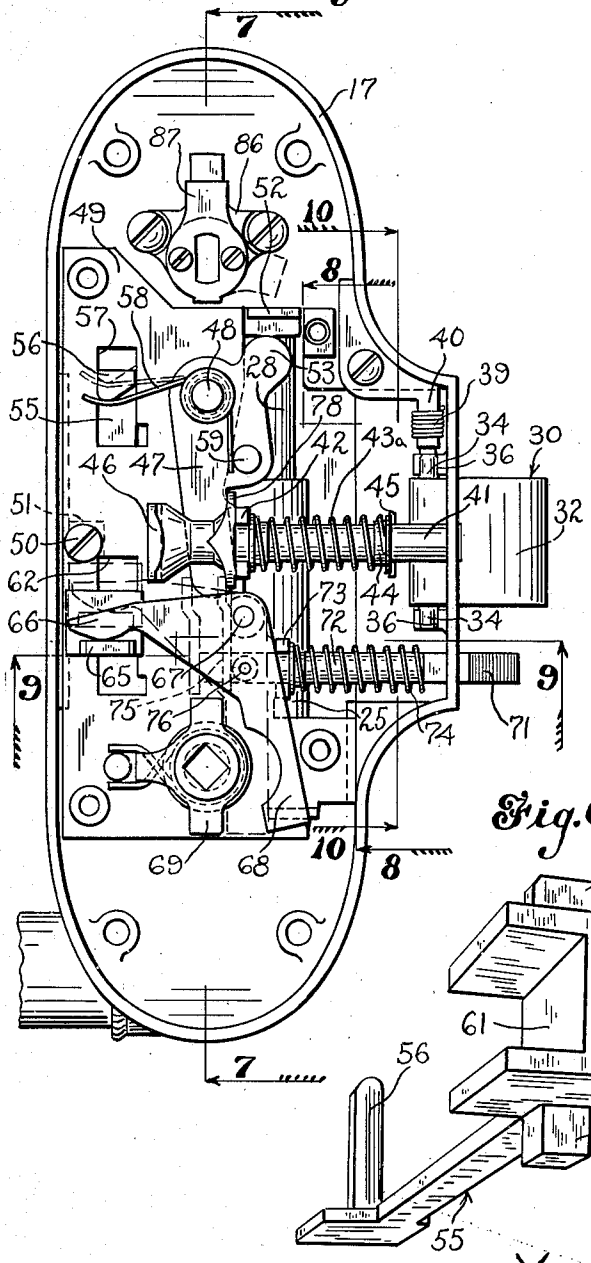


Fig.5.

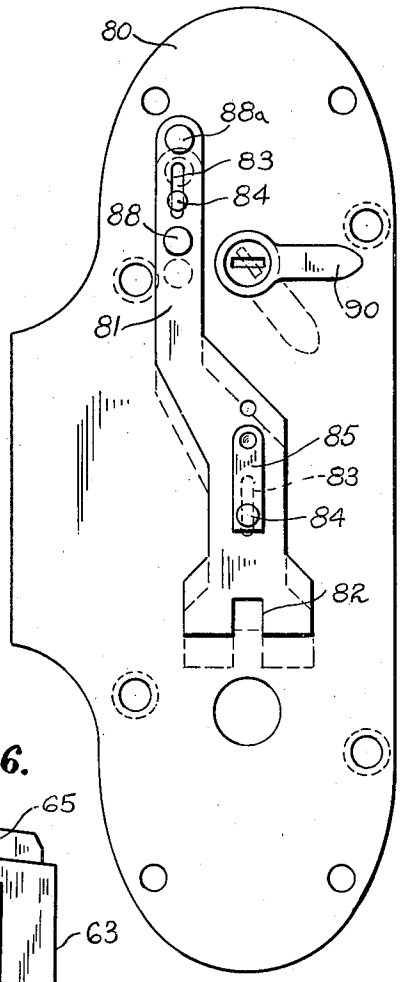


Fig.6.

Inventor

Nathan Kulbersh

By Rockwell & Barthelow

Attorneys

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Fig. 7.

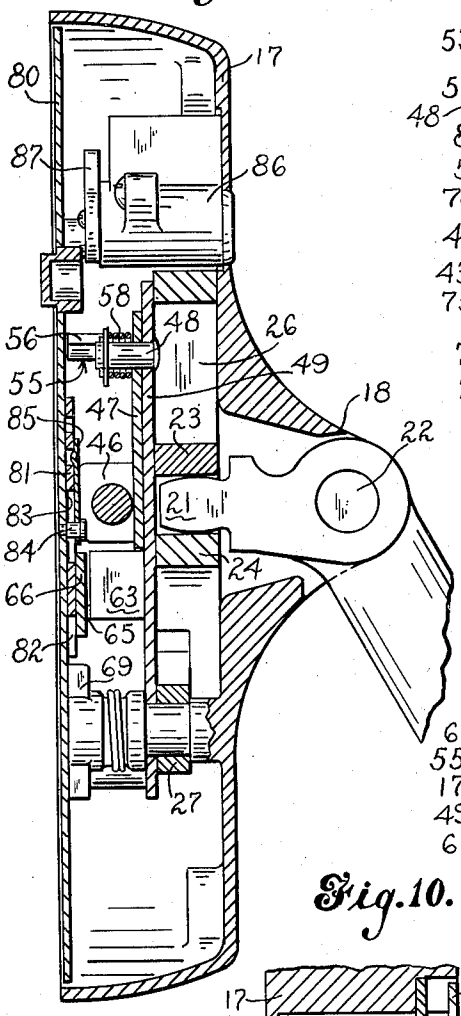


Fig. 8.

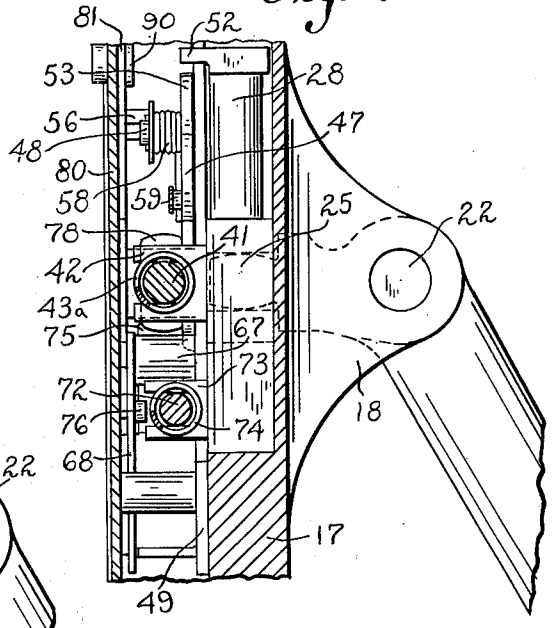


Fig. 9.

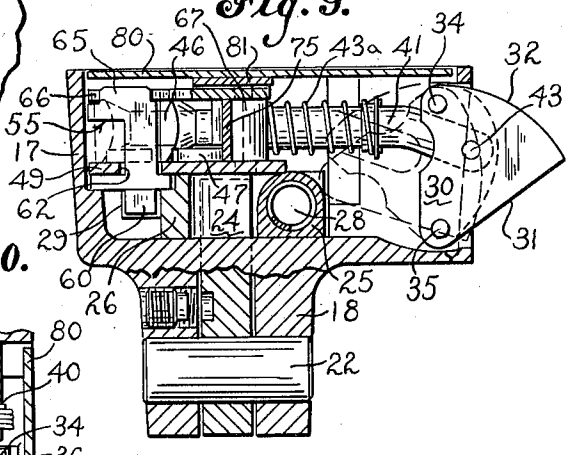
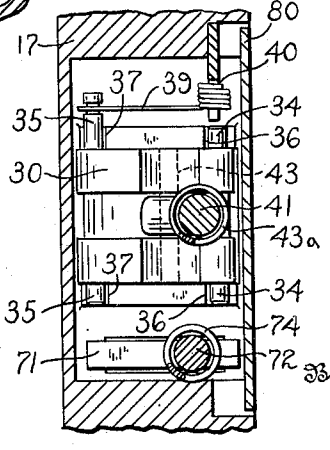


Fig. 10.



Inventor

Nathan Kulbersh

By Rockwell & Bartholow

Attorneys

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Fig. 11.

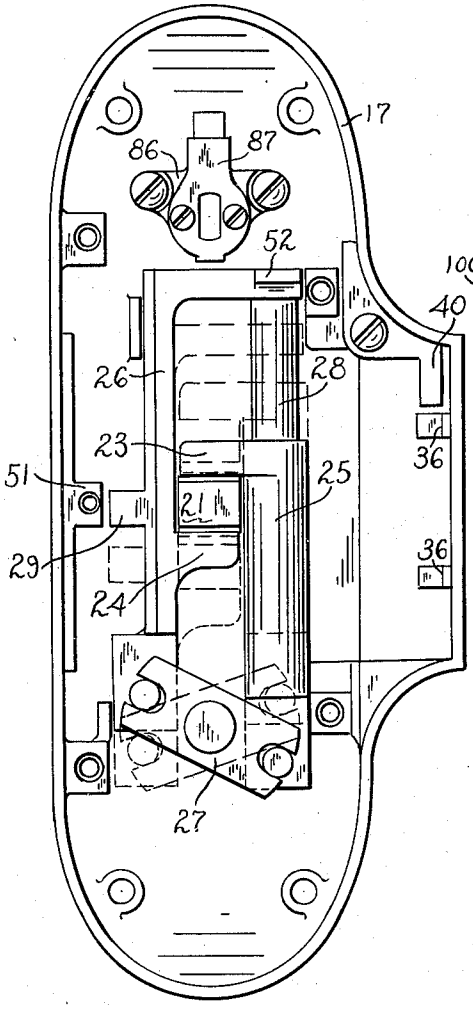


Fig. 12.

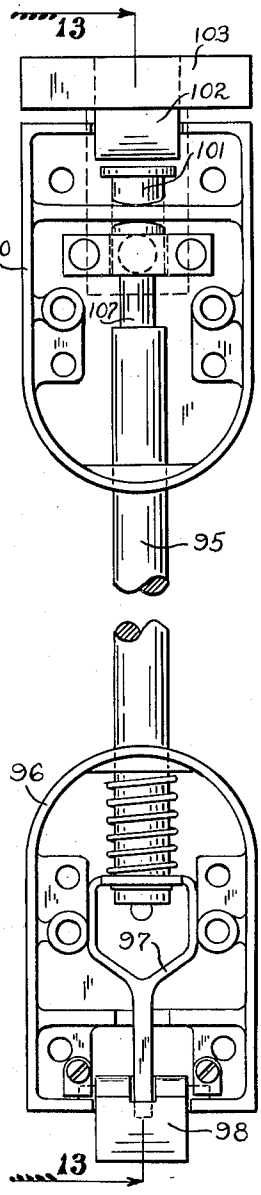
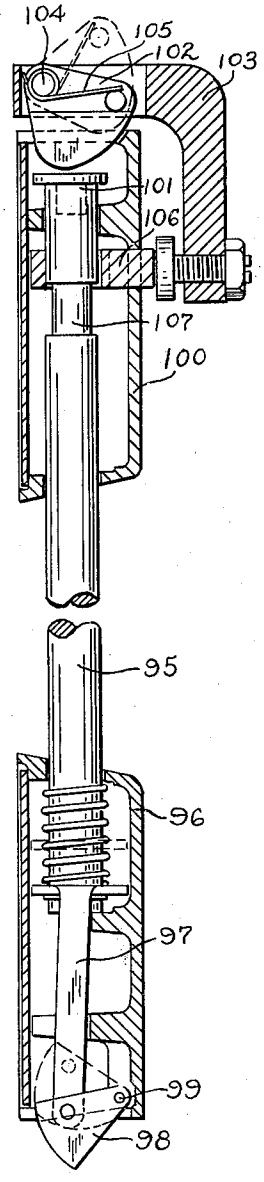


Fig. 13.



Inventor

Nathan Kulbersh

By Rockwell & Bartholow

Attorneys

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UNITED STATES PATENT OFFICE

2,505,190

EXIT LOCK

Nathan Kulbersh, West Haven, Conn., assignor to Sargent & Company, New Haven, Conn., a corporation of Connecticut

Application March 6, 1948, Serial No. 13,409

3 Claims. (Cl. 292—92)

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This invention relates to exit locks, and more particularly to a lock adapted to be applied to the door of a public building and designed for use in connection with a so-called panic bar which is pivotally connected to the lock case and lies across the inner face of the door in such a manner that operation of the panic bar in either direction will release the bolt and permit the door to open. Such locks are particularly adapted for use in an emergency, or in case of a panic, and should be so constructed that, when people within the building crowd against the door, the latch will be automatically released and not be prevented from moving to a door-releasing position by pressure upon the door.

In many instances, such locks are applied to double doors, one of the doors having a vertical rod or bolt which is designed to engage the lintel at the top of the door and the sill at the floor, and this door, which is normally closed, is usually provided with a strike to cooperate with a bolt in the lock case applied to the companion door. As shown herein, both doors are provided with operating members of the so-called panic-bar, so that persons crowding against the same will automatically release either or both doors, and the construction of the lock mechanism is such that movement of the panic bar in either direction will release the door.

It has sometimes occurred that, when such doors are provided with a sliding bolt, the pressure upon the door by people crowding against it, will cause the sliding latch to bind frictionally and prevent it from being retracted, so that the door will not be opened and, as a consequence, the occupants of a building will be prevented from leaving. I contemplate by the present invention constructing the lock mechanism so that there will be no danger of the bolt binding, but, on the contrary, pressure against the door will serve to automatically release it and not cause it to bind in closed position. To this end, the door bolt, which in this instance is beveled in a manner similar to latch bolts, is pivoted at each side, so that it may swing in either direction with respect to a vertical axis. In other words, when the door is closed, the bolt is retracted by being swung in one direction about the pivot at one of its rear edges by contact with the strike plate, and, when actuated or released by the panic bar, it may be swung in the other direction to open the door or when the door is moved in an opening direction. Thus, the bolt is not required to slide along the edge of the strike, and, therefore,

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can never be frictionally bound against the strike and prevented from being retracted.

One object of the present invention is to provide a new and improved emergency exit lock, wherein the bolt will always function easily and without binding regardless of conditions which might be imposed upon it.

Another object of the invention is to provide an emergency exit lock having a door bolt pivoted about both rear edges, so that it may swing in either direction.

A still further object of the invention is to provide a lock of the character described above which may be readily and positively controlled, and which may be employed in connection with a guard bolt, so that the door may not be opened from the outside by an unauthorized person.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is an elevational view of a pair of companion doors provided with an emergency exit lock embodying my invention;

Fig. 2 is a side elevational view of the lock applied to the right-hand door shown in Fig. 1;

Fig. 3 is a bottom plan view thereof;

Fig. 4 is a rear elevational view of the lock mechanism shown in Figs. 2 and 3, the rear cover of the case being removed to show the interior mechanism;

Fig. 5 is a view of the rear cover of the case;

Fig. 6 is a perspective view of the dogging slide;

Fig. 7 is a sectional view on line 7—7 of Fig. 4;

Fig. 8 is a sectional view on line 8—8 of Fig. 4;

Fig. 9 is a sectional view on line 9—9 of Fig. 4;

Fig. 10 is a sectional view on line 10—10 of Fig. 4;

Fig. 11 is a view similar to Fig. 4, but with many of the parts removed to show the mechanism at the front of the case;

Fig. 12 is a view of the latch structure at the upper and lower edges of the left-hand door shown in Fig. 1; and

Fig. 13 is a sectional view on line 13—13 of Fig. 12.

To illustrate a preferred embodiment of my invention, I have shown in Fig. 1 of the drawings a door frame at 10 having left- and right-hand doors 11 and 12 hinged thereto at their outer edges, these doors being arranged to swing outwardly as is usual with doors of public buildings.

At the inner side of the left-hand door 11 is arranged a lock case 13 to which is pivoted one end of a U-shaped panic bar 14, the other end

being pivoted to a bracket 15 secured to the door. The case 13 is provided with a strike plate 16 designed to cooperate with the bolt of a lock mechanism applied to the door 12, as will now be described.

To the inner side of the door 12 is secured the lock case 17, this case being provided with spaced ears or lugs 18 to which is pivoted one end of a panic bar 19, the other end being pivoted to the bracket 20 secured to the face of the door. As shown more especially in Figs. 7 and 11, the end of the panic bar which is secured to the case 17 is provided with a finger or lug 21 upon the side of its pivot 22 opposite the bar 19, which lug extends into the lock case so as to lie between projections 23 and 24 on the elements 25 and 26 of a walking beam structure slidably mounted in the lock case. The members 25 and 26 are connected by the pivoted link 27 in the usual manner, so that, when one of these members moves downwardly, the other will move upwardly. In order that these two members of the walking beam structure may be properly guided in their movements, the member 25 is hollow to provide a cylinder, and the member 26 is provided with a piston-like part 28 slidably received in the hollow member 25. It will be apparent that, with this construction, when the panic bar 19 is swung toward the door or in a clockwise direction, as viewed in Fig. 7, the finger 21 will contact the part 23 and move the member 25 upwardly, which, through the link 27, will effect downward movement of the part 26. Also, if the panic bar is raised or moved outwardly from the face of the door, the finger 21 will move downwardly, as shown in Figs. 7 and 11, and, by contacting the part 24, will move the member 26 downwardly. This latter member, therefore, moves downwardly regardless of the direction in which the panic bar is swung about its pivot 22, and it is provided with a lug 29 which serves to actuate the bolt-controlling slide, as will be hereinafter explained, this lug, of course, moving downwardly whenever the panic bar is actuated.

As shown more especially in Figs. 2, 3, 4 and 9, a bolt 30 is mounted in the case 17. The inner edge of this bolt is beveled as at 31, while the outer edge may be of rounded or arcuate shape, as shown at 32, and it will be seen that, when either the edge 31 or the edge 32 of the bolt engage the strike plate 16, it will tend to swing the bolt about a point adjacent the edge thereof.

As shown in Figs. 9 and 10, the bolt 30 is provided with upper and lower pivot pins 34 at its outer edge and upper and lower pivot pins 35 at its inner edge. These pivot pins are mounted in cradles 36 and 37, which cradles are open rearwardly to permit the bolt to pivot about either edge, and the pivot pins at the opposite edge move rearwardly into the case, as shown in the dotted-line positions of Fig. 9. That is, when the door is closed, for example, and the beveled surface 31 engages the strike plate 16, the bolt will pivot about the pins 35, and the pivots 34 will move rearwardly into the case. When opening pressure is applied to the door and the surface 32 of the bolt 30 pressed against the strike plate 16, the bolt will pivot about the pins 34, and the pins 35 will move rearwardly into the case. As shown in Fig. 10, the upper pin 35 is elongated, and one end of a spring 39 acts against this pin to hold it in the cradle 37, the other end of the spring being engaged with the lock case, as shown at 40.

A bolt stem 41 is slidably mounted in the case, the rear end of which is slidably mounted in the guide 42 secured to the case 13, and the forward end of the bolt stem is pivoted to the bolt 30 at the point 43 substantially midway between the pivot pins 34 and 35. This stem is urged in an outward direction, and, therefore, the bolt 30 is urged to the protracted position shown in full lines in Fig. 9 by a spring 43a which acts at its rear end against the guide 42 and at its forward end against a washer 44 held in place upon the stem 41 by a pin 45.

The rear end of the bolt stem 41 is provided with a crosshead 46, which is engaged by the lower end of a lever 47 pivoted at 48 to a plate 49 secured within the casing at the rear of the walking beam structure shown in Fig. 11, this plate being secured by the screw 50 to a lug 51 provided on the case. The other end of the lever 47 is adapted to be engaged and actuated by the part 52 of the walking beam element 26. It will be seen that the part 52 is normally spaced above the upper end 53 of the lever 47 so as to provide a certain amount of lost motion between these parts for a purpose which will hereinafter be explained, and it will also be obvious that, when the walking beam structure is actuated by the panic bar 19, the part 52 will be moved downwardly to engage the upper end 53 of the lever 47 and thus retract the latch bolt stem 41, which will in turn retract the latch bolt or cause it to swing inwardly about the pivot pins 35, these pins being yieldingly held in their forward position at this time by the spring 39.

It will be apparent that, in order to hold the door positively closed, it will be necessary to block movement of the bolt 30 as otherwise this bolt would be cammed by pressure against the strike to a retracted position in which it is moved pivotally about the pins 34. This is effected by means of a dogging slide 55, shown in Fig. 6, this slide being mounted forwardly of the plate 49 so as to be on the same side of the plate as the walking beam structure. At the upper end of the slide is an arm 56 which projects through an opening 57 in the plate 49, and a spring 58 engages this arm and tends to urge the slide upwardly, this spring being coiled about the pivot pin 48 of the member 47 and having its other end bearing against a stop post 59 on the lever 47.

At its lower end, the slide is provided with a lug 60 adapted to be engaged by the lug 29 (Fig. 11) on the walking beam member 26, so that, when the latter is moved downwardly, the slide 55 will also be moved downwardly against the tension of the spring 58. The slide 55 is also provided at its lower end with a part 61 which extends through a slot 62 in the plate 49, and the forward face 63 of this portion of the slide is adapted, when the slide is in its upper position, to stand behind the crosshead 46 of the bolt stem 41 and prevent the rearward or inward movement of the stem and thereby dog the bolt in protracted position. That is, the bolt cannot move about either of its pivots or slide rearwardly into the casing so long as the stem 41 is dogged against movement.

Means are provided for controlling the position of the slide 55 by means of the usual guard bolt adapted to be engaged by a solid portion of the door strike and hold the guard bolt retracted. For this purpose, the slide 55 is provided with a further projecting lug 65 (Figs. 4 and 6), which is engaged by one end 66 of a dogging lever pivoted in the case at 67. The other end 68 of this lever projects downwardly, and is adapted to be

operated by the arms of a rollback 69, which rollback is in turn adapted to be actuated by an outside knob (not shown).

The guard bolt 71 has a level upon each side, and is slidably mounted in the case. The stem 72 of this bolt extends rearwardly through the guide 73 secured to the case 13, and the bolt is normally held in protracted position by the spring 74. At the rear end of the stem 73 is a crosshead 75 which extends behind, and is engaged by, a post 76 on the front face of the dogging lever 68 (the rear face, as shown in Fig. 4). The crosshead 75 also extends upwardly, and, as shown in Fig. 4, lies rearwardly of an abutment 78 on the bolt stem 41, so that, whenever the latter moves rearwardly due to the retraction of the bolt 30, the guard bolt will also be retracted.

When the door is open, the parts are in the position shown in Fig. 4 of the drawings with both guard bolt 71 and latch bolt 30 standing in protracted positions. At this time, the dogging lever is held in position shown in Fig. 4 by engagement of the crosshead 75 with the post 76. As the spring 74 is stronger than the spring 58, the end 66 of the dogging lever holds the dogging slide 55 in its lower position in which the face 63 of this slide stands below the crosshead 46 on the bolt stem 41, and, therefore, the latter stem is free to move inwardly.

When the door is closed, both guard bolt and latch bolt are retracted by engagement with the door strike, and, when the door reaches its final closed position, the latch bolt 30 springs outwardly into the bolt opening in the strike but the guard bolt is held in retracted position, thus permitting the spring 58 to move the dogging slide 55 upwardly to the dotted-line position shown in Fig. 4 in which the part 63 of the dogging slide stands behind the crosshead 46 and dogs the bolt 30 against retraction.

With the door in closed position, it may be opened in one of several ways. First, it may be opened by means of the panic bar 19 which operates the walking beam structure previously described so as to move the part 26 of this structure downwardly, and thus move the slide 55 downwardly against the tension of the spring 58. This releases the bolt stem for retracting movement, and the door may be opened by pressure thereon as contact of the edge 32 of the latch bolt 30 with the strike will cause the bolt to pivot around the pins 34 and thus be retracted. However, outward pressure upon the door is not necessary as continued movement of the panic bar to continue downward movement of the walking beam structure will cause the lug 52 (Fig. 4) to engage the end 53 of the lever 47 and positively retract the bolt 30 by moving the stem 41 rearwardly.

It will be noted that there is lost motion between the parts 52 and 53 so as to permit the dogging slide 55 to be moved downwardly prior to the engagement of the end 53 of the retracting lever 47 by the lug 52. In this manner, the crosshead 46 is freed from engagement by the dogging slide before a retracting movement is imparted to the bolt stem 41.

The door may also be opened from the outside by means of the rollback 69, which, when rotated, will move the dogging lever to the position shown in Fig. 4. This causes the end 66 of this lever to engage the lug 65 and move the slide downwardly against the tension of the spring 58 and, thereafter, a pull upon the outside knob will cause the bolt to pivot about the outer pins 34 and release the door.

I have also provided means for dogging the outside knob against operation when it is desired to prevent entrance to the door. As shown in Fig. 5, the case 17 is provided with a rear plate 80 upon which is movably mounted a slide 81 having a notch 82 in its lower end adapted to embrace the upper arm of the rollback 69 when the slide is moved to its dotted-line position shown in Fig. 5. The slide may be mounted on the plate 80 by means of slots 83 provided in the slide and pins 84 secured to the plate, and may be releasably held in either upper or lower position by a friction spring 85.

As shown in Fig. 4, a key-operated hub 86 is rotatably mounted in the case, this hub being provided with a cam 87 adapted to stand between the posts 88 and 88a on the slide 81, so that the latter may be moved from the full-line position shown in Fig. 5 to the dotted-line position shown in this figure, and vice versa. The hub 86 is adapted to be operated by a key 89 (Fig. 2) at the inside of the door. Thus, by operation of this key, the rollback 69 operated by an outside knob may be dogged and the door prevented from being opened from the outside without the use of a key.

If the outside knob is dogged in this way, it is desirable to provide some means for permitting entrance to the door from the outside by means of a key. This is readily done by means of a key-operated rollback arm 90 rotatably mounted on the plate 80, as shown in Fig. 5. This arm is in a position to engage the arm 56 (Figs. 4 and 6) so as to move the dogging slide 55 downwardly against the action of the spring 58. Therefore, anyone at the outside of the door, if he is provided with the proper key, can rotate the arm 90, thus moving the dogging slide 55 downwardly clear of engagement with the crosshead 46, thus freeing the bolt stem 41 for retraction, and, thereafter, a pull upon the knob will cause the bolt to be cammed into the case and the door may be opened.

In Figs. 12 and 13 of the drawings, I have shown the bolt structure provided upon the door 11. A rod 95 is slidably mounted in the case 13, and is operated by the panic bar lever 14 in the usual manner. At the lower end, this rod extends into a case 96 and carries a yoke 97, the lower end of which is pivoted to a bolt 98, this bolt being in turn pivoted in the case at 99 and adapted to engage a plate in the door sill to hold the door in closed position.

At its upper end, the rod 95 extends into a case 100, and the upper end 101 of this rod is adapted, when the rod is moved upwardly, to engage and move to retracted position a bolt 102 pivoted to the door lintel 103 at the point 104. This bolt is normally urged toward the full-line position shown in Fig. 13 by the spring 105.

The parts are shown in full lines in the drawings in the positions occupied when the door is closed. It will be noted that the bolt 98 is in protracted position and the bolt 102 is in its lower position in which it projects through an opening in the case 100, so as to be engaged by this case and hold the door in closed position. When, however, the rod 95 is moved upwardly by the panic bar lever 14, the bolt 98 will be withdrawn into the case 96, as shown in dotted lines in Fig. 13, and the upper end 101 will engage the bolt 102 and move it upwardly out of the case 100, so that the lower end of the bolt will be flush with the door lintel and will permit the door to open.

A stop member 106 is mounted in the case 100,

and is adapted to engage the reduced portion 107 of the rod 95 to hold the latter in its upper position when the door is open, so that the bolt 98 will be held in retracted position at this time.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A door lock having a case, a latch bolt mounted therein, means connecting said bolt to the case for pivotal movement about two opposite edges thereof, a dogging slide mounted for sliding movement in the case to dog said bolt against movement about either of its pivots, a spring urging said slide to dogging position, a guard bolt projecting through the face of the case, said guard bolt being operatively connected to the slide to move it to non-dogging position, latch-bolt operating means to first move said dogging slide to non-dogging position and thereafter retract the latch bolt, a bar pivoted to the door, and means connecting said bar to said latch-bolt operating means to actuate the latter upon movement of the bar in either direction about its pivot.

2. A door lock having a case, a latch bolt mounted therein, means connecting said bolt to the case for pivotal movement about two opposite edges thereof, a dogging slide mounted for sliding movement in the case to dog said bolt against movement about either of its pivots, a spring urging said slide to dogging position, a guard bolt projecting through the face of the case, said guard bolt being operatively connected to the slide to move it to non-dogging position, latch-bolt operating means to first move said dogging slide to non-dogging position and thereafter retract the latch bolt, a bar pivoted to the door, and means connecting said bar to said latch-bolt operating means including a walking beam structure actuated by the bar.

3. A door lock having a case, a latch bolt mounted therein, means connecting said bolt to the case for pivotal movement about two opposite edges thereof, a dogging slide mounted for sliding movement in the case to dog said bolt against movement about either of its pivots, a spring urging said slide to dogging position, a guard bolt projecting through the face of the case, said guard bolt being operatively connected to the slide to move it to non-dogging position, latch-bolt operating means to first move said dogging slide to non-dogging position and thereafter retract the latch bolt, a bar pivoted to the door, means connecting said bar to said latch-bolt operating means including a walking beam structure actuated by the bar, and said walking beam structure engaging said slide and said latch-bolt operating means.

NATHAN KULBERSH.

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