

[54] **PANIC PROOF LOCK SET** 3,390,558 7/1968 Tornoe et al. 70/107
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[57] **ABSTRACT**

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A "panic proof" lock set including a spring latch and dead bolt wherein turning of the inside knob retracts the spring latch and the dead bolt simultaneously. A two lobed cam carried by the inside knob actuates a push rod which turns a crank coupled to the dead bolt operating mechanism such that the dead bolt is retracted. The outside hardware including a keyed lock and outside knob and rosette are held in place by screws extending from a retainer plate on the inside surface of the door. The retaining screws do not extend through the cavity under the inside escutcheon so as to allow maximum room for the mechanism which couples the interior knob to the dead bolt.

[52] **U.S. Cl.** 292/34; 70/107; 70/462; 292/35; 292/36

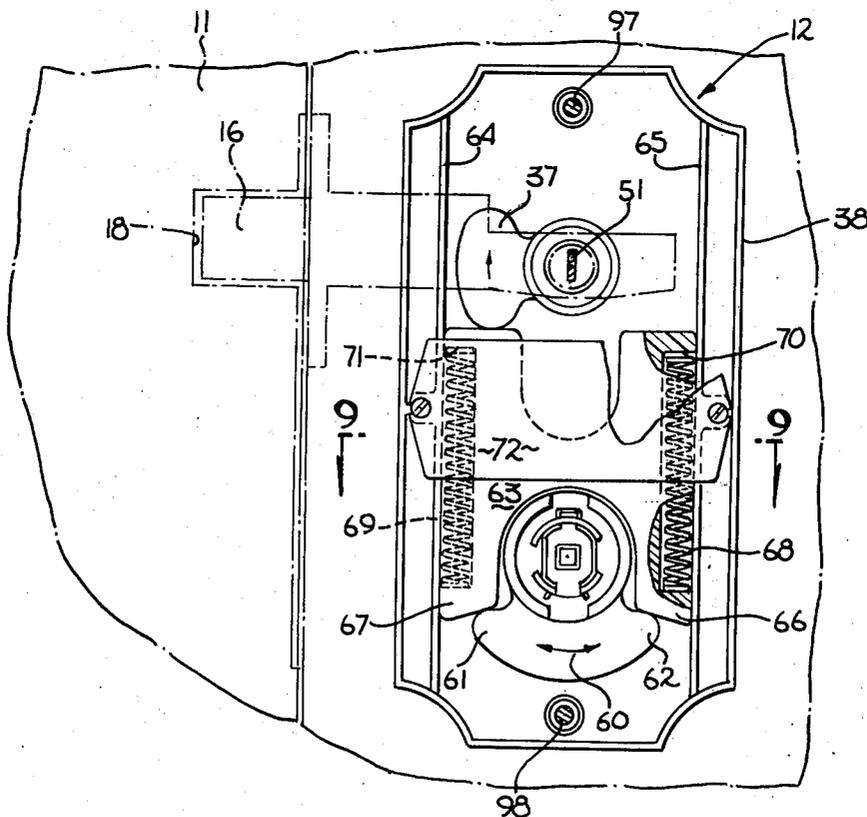
[51] **Int. Cl.²** **E05B 63/14**

[58] **Field of Search** 70/107, 462; 292/36, 47, 292/48, 139, 196, 244, 245, 138, 195, 184, 231, DIG. 25, 34, 35

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5 Claims, 14 Drawing Figures



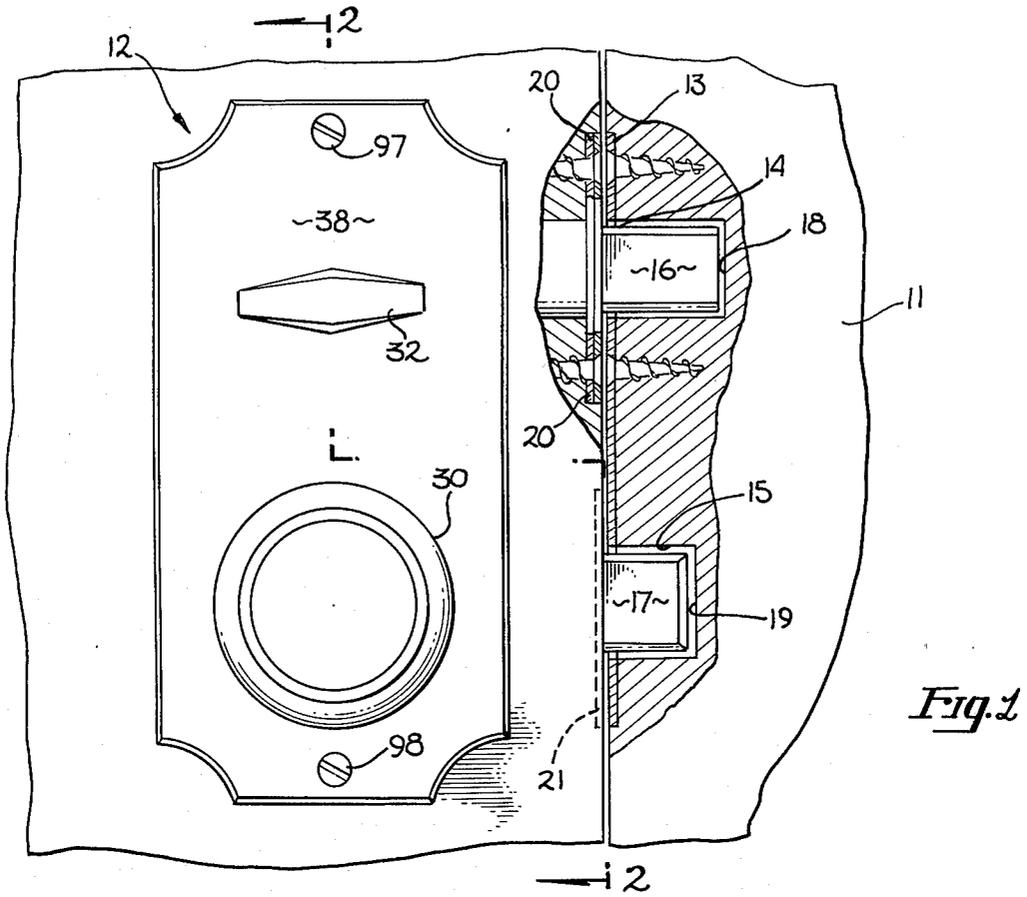


Fig. 1

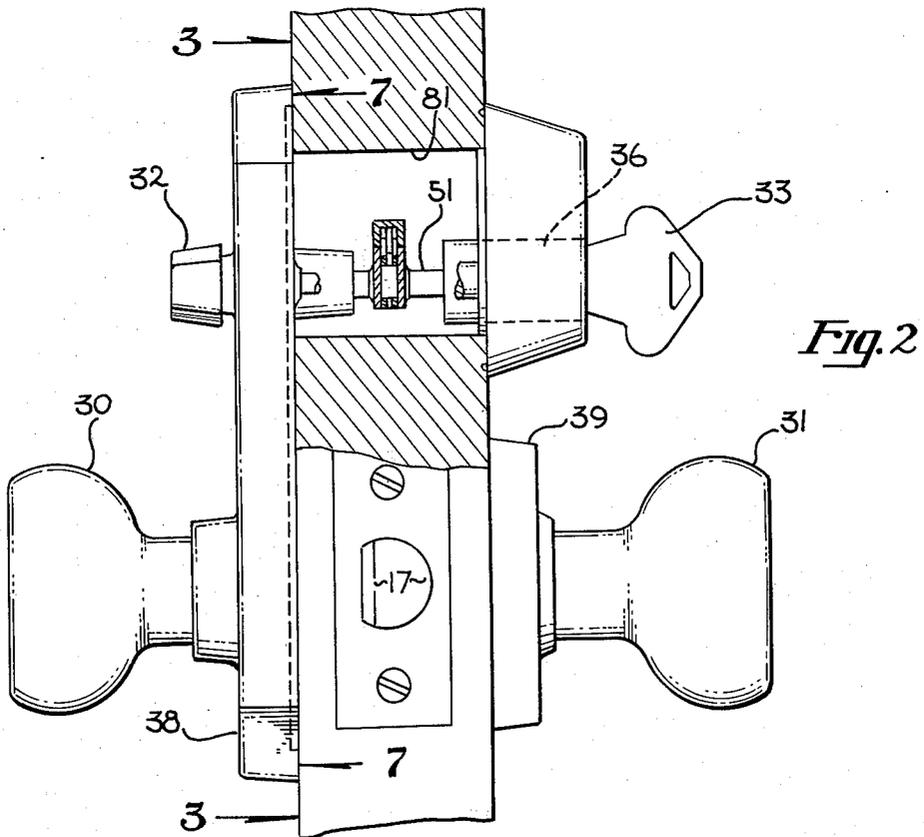


Fig. 2

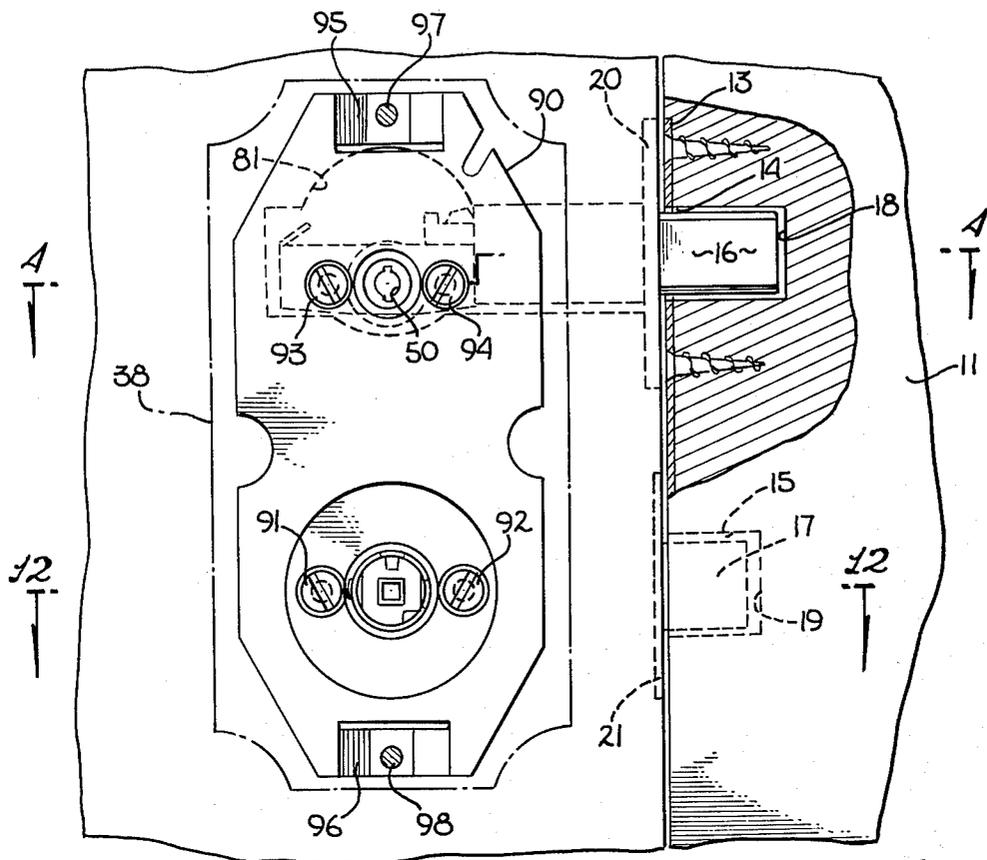


Fig. 3

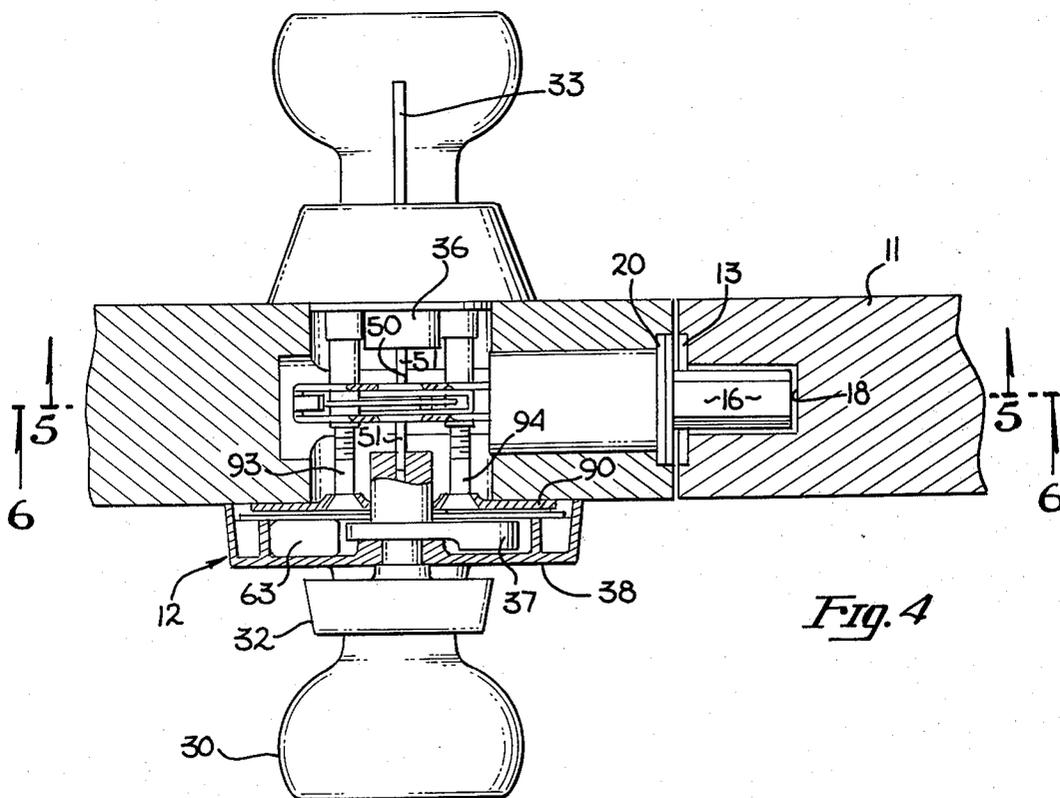


Fig. 4

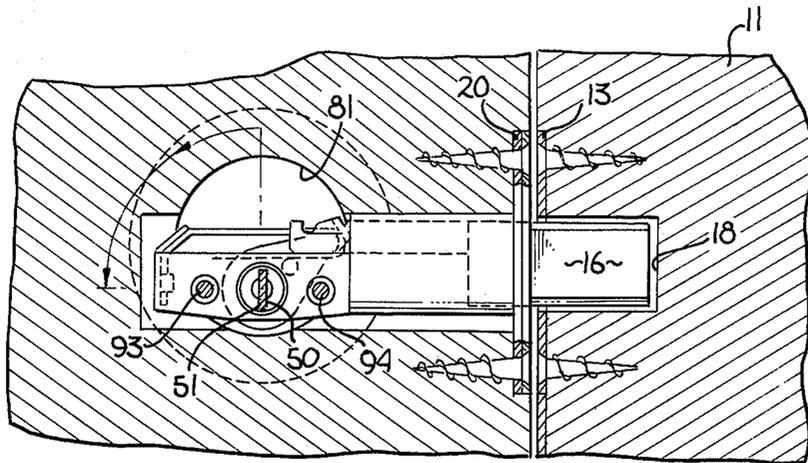


Fig. 5

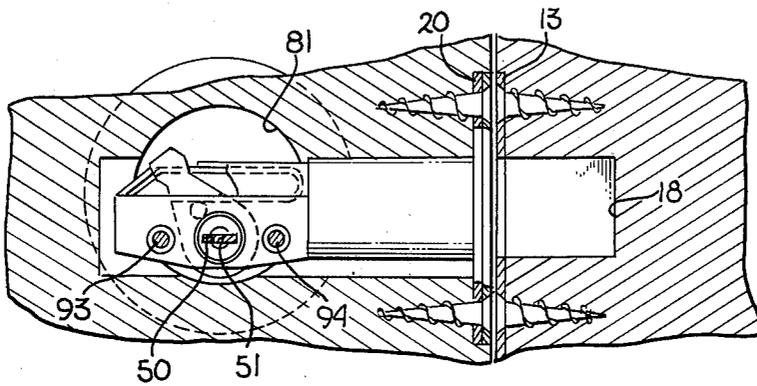


Fig. 6

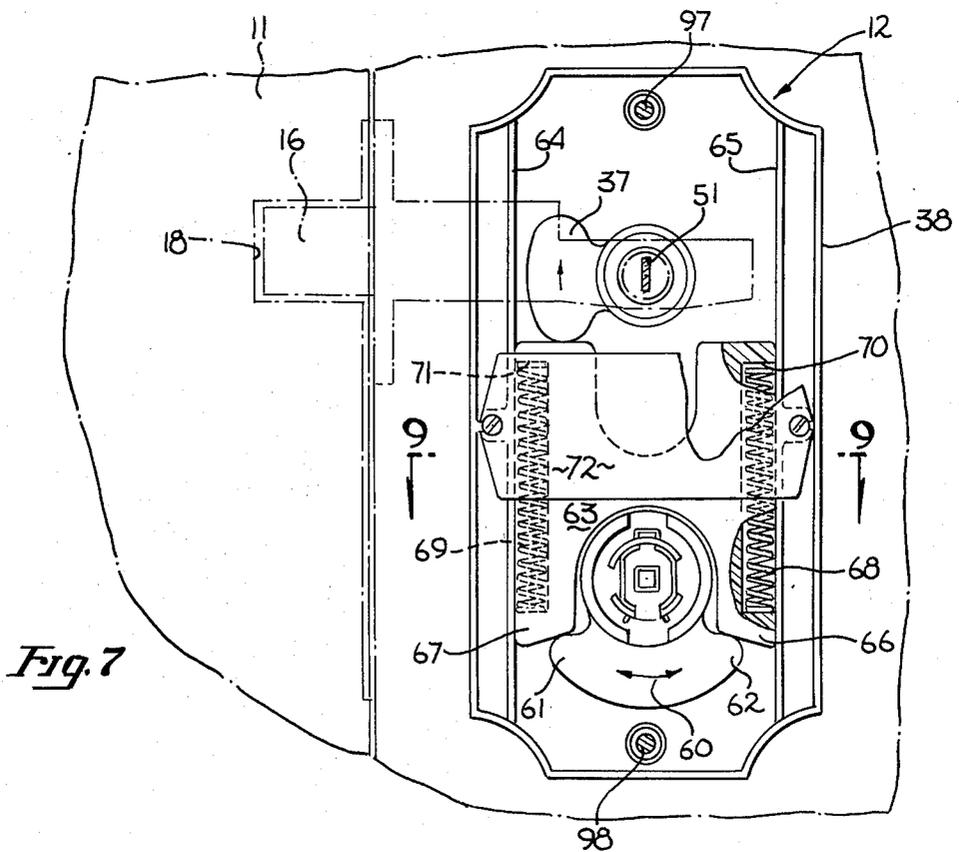
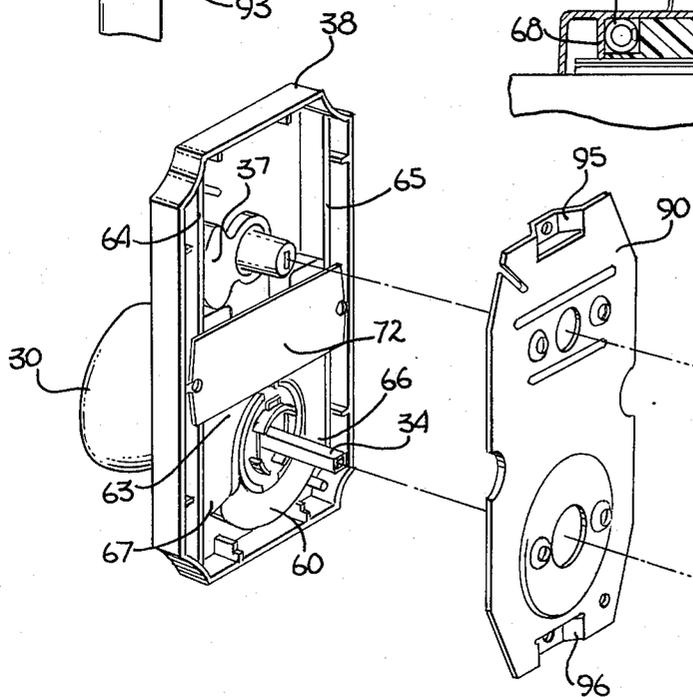
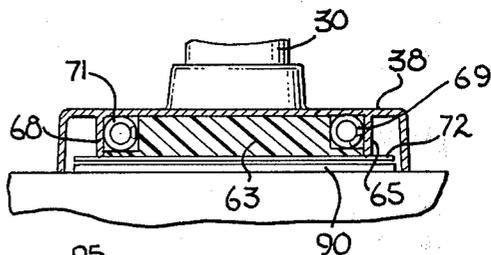
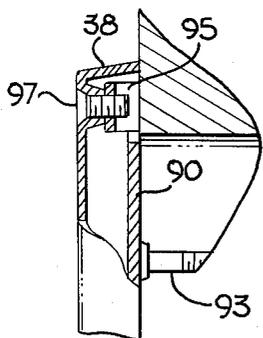
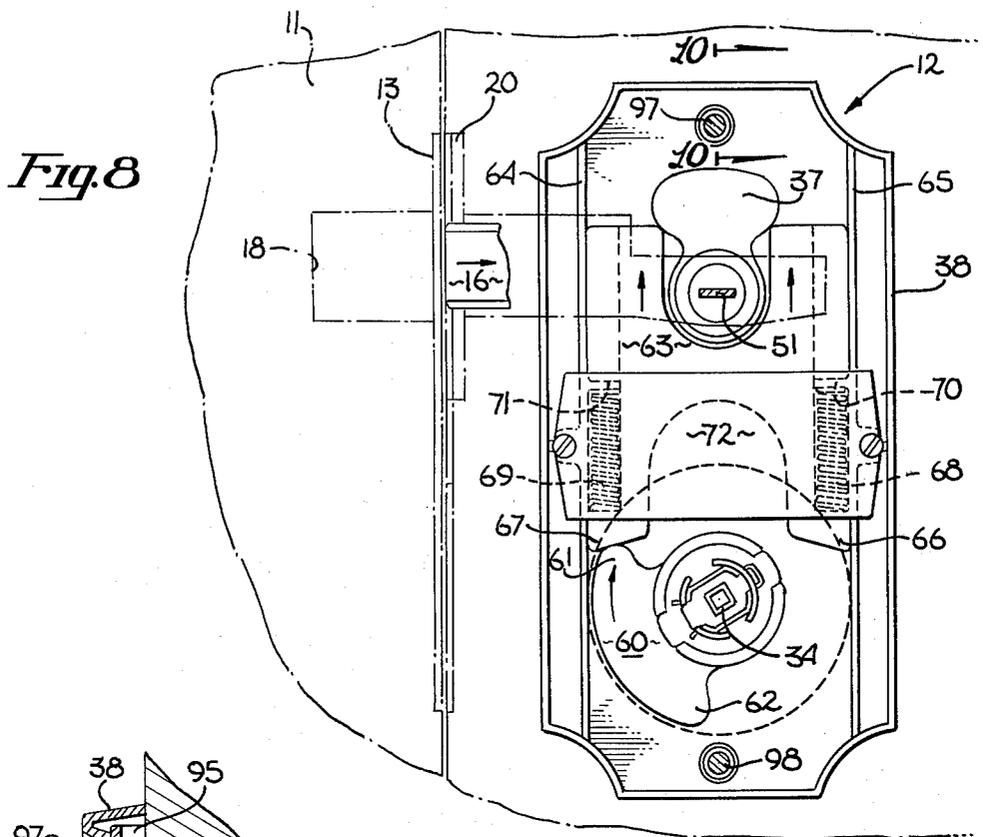


Fig. 7



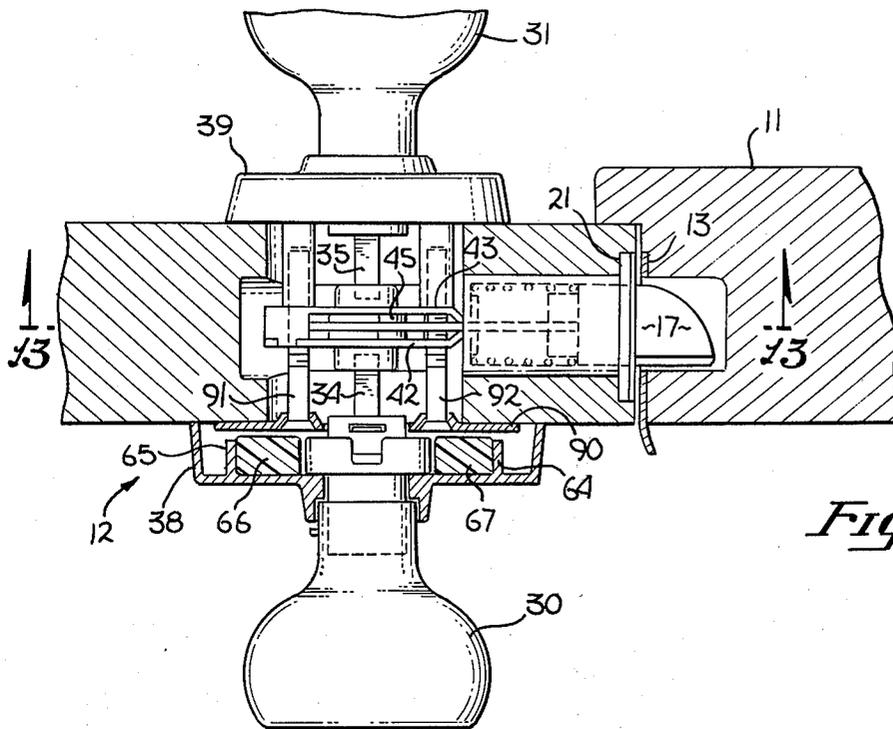


Fig. 12

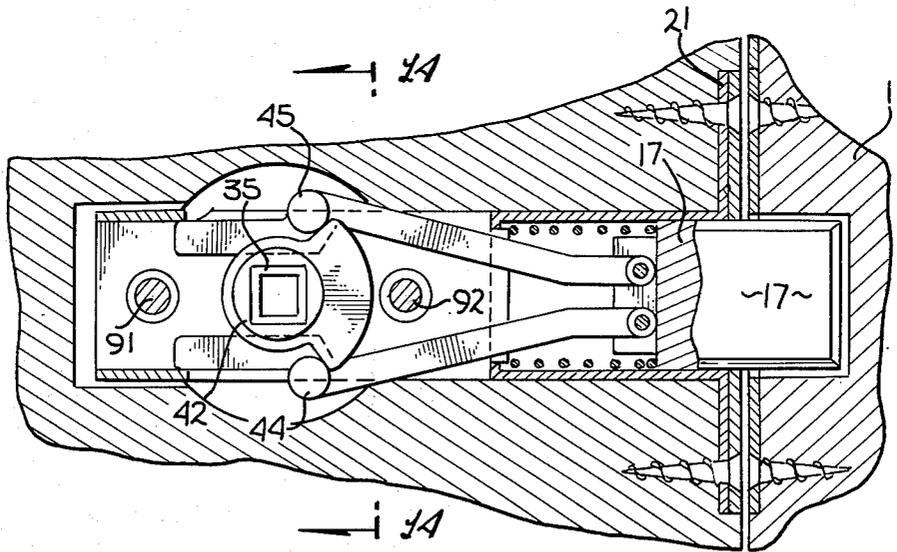


Fig. 13

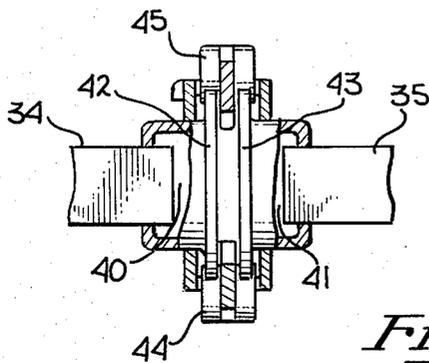


Fig. 14

PANIC PROOF LOCK SET

BACKGROUND OF THE INVENTION

1. Field of the Invention

The field of this invention is door locks, and particularly so-called "panic proof" door locks of the dead bolt type which can be unlocked and opened by turning only one knob.

2. Prior Art

A high security lock system for a building door normally involves both a spring latch, for convenience in opening and closing an unlocked door, and a dead bolt for securely locking the door. The dead bolt conventionally penetrates the jamb over an inch in order to protect against the possibility of the jamb or door being sprung enough to disengage the bolt from the jamb and may be extended and retracted with a key from the outside or a thumb turn from the inside. The spring latch is knob operated from either side.

There have been a disturbing number of instances in which a person on the inside of a building in a panic situation, such as a fire, has failed to open a door leading to safety simply because, in the emergency, he failed to appreciate that the dead bolt and spring latch must be both retracted in order to open the door. Recently, there has been a movement to protect against this problem by the use of the so-called "panic proof" lock. In such a lock, the spring latch and dead bolt are independent mechanisms, as always, but an additional mechanism is provided to couple the interior knob to the dead bolt so that when the interior knob is turned, not only is the spring latch retracted, but the dead bolt, if extended, is retracted also.

Prior art mechanisms for accomplishing the desired result are generally relatively complicated devices using levers and gears in combination. These devices are also unidirectional; that is, different parts are required for a lock for a left opening door and for a right opening door resulting in extra expense and inconvenience. The invented lock is extremely simple, which makes for lower cost, and the same lock can be installed in either left or right opening doors.

SUMMARY OF THE INVENTION

A dead bolt assembly with a rotary actuator which requires one-quarter turn to either extend or retract the bolt, is coupled to a crank which is arranged to be vertical when the bolt is retracted and horizontal toward the edge of the door when the bolt is extended. A generally "H" shaped push rod, constrained to move vertically, moves the crank to the vertical position when the push rod is moved to its upward limit. The push rod is spring loaded downward but is urged upward by a two lobed cam attached to the inside door knob. The door knobs also operate a conventional spring latch. Thus, if the dead bolt is in the locked position, the crank on the dead bolt assembly will be in the horizontal position and a turn of the inside knob will not only retract the spring latch, but will cause the push rod to rise moving the dead bolt crank to the vertical position, opening the door. The outside door knob operates the spring latch but does not turn the inside knob so that it is not effective to unlock the dead bolt.

In the typical installation, the dead bolt may be extended or retracted by a key on the outside of the door or a thumb turn on the inside of the door and it may also be retracted by turning the knob on the inside of

the door, thus providing a door lock with a dead bolt which may be unlocked and opened from the inside in one operation, merely by turning the inside knob.

The invented mechanism is completely symmetrical meaning that the dead bolt and latch can extend in either direction from the lock so as to allow installation on either left opening or right opening doors.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a broken section of a portion of a door in which an embodiment of the invented lock is installed. FIG. 2 is a sectional view of the invented lock at 2—2 of FIG. 1.

FIG. 3 is a sectional view of the invented lock taken at 3—3 of FIG. 2.

FIG. 4 is a sectional view of the invented lock taken at 4—4 of FIG. 3.

FIG. 5 is a sectional view showing the dead bolt assembly of the invented lock in the locked position taken at 5—5 of FIG. 4.

FIG. 6 is a sectional view showing the dead bolt assembly in the open position taken at 6—6 of FIG. 4.

FIG. 7 is a broken sectional view of the invented lock showing the dead bolt in the locked position.

FIG. 8 is a broken sectional view of the lock showing the dead bolt in the open position.

FIG. 9 is a sectional view taken at 9—9 of FIG. 7 showing the push rod and associated springs.

FIG. 10 is a broken sectional partial view showing how the inside escutcheon is secured.

FIG. 11 is an exploded perspective view showing how the internal escutcheon assembly and retainer plate assemble.

FIG. 12 is a sectional view of the spring latch assembly taken at 12—12 of FIG. 3.

FIG. 13 is a sectional view of the spring latch assembly taken at 13—13 of FIG. 12.

FIG. 14 is a partial sectional view of the spring latch assembly taken at 14—14 of FIG. 13.

DETAILED DESCRIPTION OF THE INVENTION

Referring first to FIG. 1 wherein is shown a small section of the interior of a door 10 and its associated jamb 11 including a "panic proof" lock, designated generally by the numeral 12. On the face of jamb 11 is a striker plate 13 having two openings 14 and 15 to receive dead bolt 16 and spring latch 17 respectively. The jamb is cut out behind the openings with a pair of recesses 18 and 19 which allow dead bolt 16 and spring latch 17 to pass through the striker plate 13 to lock the door. Guides 20 and 21 position the dead bolt 16 and spring latch 17 so they will mate with the openings 14 and 15 in striker plate 13. When either dead bolt 16 or spring latch 17 is in its extended position, as is shown in FIG. 1, the door cannot be opened. Both must be retracted in order to open the door.

Spring latch 17 can be retracted by turning either inside knob 30 or outside knob 31, however, as will be described below, turning inside knob 30 also retracts dead bolt 16, whereas outside knob 31 operates spring latch 17 only. Dead bolt 16 can be extended or retracted by turning thumb turn 32 or key 33. Thus, the door may be locked or unlocked by thumb turn 32 or key 33 and opened, when unlocked, by turning either of the knobs 30 or 31. In case of a panic situation, the door can also be opened from the inside even though dead bolt 16 is extended, by merely turning knob 30.

The knobs 30 and 31 are coupled to square drive spindles 34 and 35 respectively, and are spring loaded so that the knobs may be turned in either direction approximately a quarter turn against a spring, but when released the spring will cause the knob to return to its initial position. Outside knob 31 is carried by rosette assembly 39 and interior knob 30 by escutcheon 38. This mechanism is old in the art and need not be further described here.

Each of the square drive spindles slips into corresponding square holes 40 and 41 in spring latch actuating cams 42 and 43. Cam followers 44 and 45, each resting against both cams 42 and 43 but on opposite sides of the cams, are linkage coupled to spring latch 17 so that the turning of the either knob 30 or 31 will cause its associated cam 42 or 43 to turn and displace cam follower 44 or 45 (depending on which direction the knob was turned) and thereby retract spring latch 17. This mechanism is also old in the art and has been briefly explained here to show how the two knobs can each retract the spring latch turning the other knob. The spring latch 17 itself is conventional having one side tapered so that the striker plate forces it to retract as the door is closed, but once closed, a knob must be turned to retract the latch before the door can be opened.

The dead bolt mechanism is best seen in FIGS. 5 and 6. Actuation is accomplished by a blade 51 inserted into slot 50. A quarter turn in one direction causes the dead bolt 16 to extend, and in the other direction to retract. Blade 51 extends between cylinder lock 36 and thumb turn 32 through slot 50 so that either key 33 or thumb turn 32 can be used to retract the dead bolt. Crank 37 is attached to thumb turn 32 and is arranged to be in the horizontal position toward the door jamb as shown in FIG. 7 when dead bolt 16 is extended. A quarter turn of the thumb turn 32 bringing the crank 37 to the vertical position retracts dead bolt 16. It should be noted that the same mechanism can be used for left opening doors as well as right opening doors. The crank 37 will rotate from the open vertical position a quarter turn to the horizontal position toward the door edge, whichever way that is, to extend the dead bolt and lock the door. Other dead bolt mechanisms, i.e. mechanisms which open by moving the crank from a position away from the edge of the door to the vertical, can also be advantageously used with the invented mechanism. In such a case, the motions are opposite those described herein but the principle remains the same.

Attached to inside knob 30 is a two lobed cam 60. Cam 60 is positioned such that when knob 30 is in its neutral position, the lobes 61 and 62 are substantially horizontally aligned, each being in contact with one leg of push rod 63, a generally "H" shaped part.

Interior knob 30, thumb turn 32 and push rod 63 are all carried by interior escutcheon 38. Shafts coupling knob 30 and thumb turn 32 to the interior parts pass through holes in the escutcheon and push rod 63 runs reciprocally in a channel formed on the inner portion of the escutcheon by ribs 64 and 65. The push rod is retained within the hollow escutcheon by retainer plate 72. Each of the legs 66 and 67 of push rod 63 is cut out to receive compression springs 68 and 69. The springs bear against the bottom of the cutouts and projections 70 and 71 urging push rod 63 downward, thereby maintaining it in contact with cam 60. As knob 30 is turned, lobes 61 and 62 on cam 60 will engage leg 66 or 67 of

push rod 63, depending on which direction the knob is turned, and force it upward. If crank 37 is in the position as shown in FIG. 7, corresponding to the dead bolt being extended, the crank will be forced upward turning blade 51 such that the dead bolt will retract. The final position of crank 37 as knob 30 is turned as far as it will go is shown in FIG. 8 corresponding to a fully retracted dead bolt. The same result will be obtained if knob 30 were turned in the opposite direction. It will be recalled that knob 30 is also coupled to spring latch 17 so that the latch also will be retracted as the knob is turned, allowing the door to open. Knob 31 will retract the spring latch, if turned, but unless the dead bolt has been retracted otherwise, the door will remain locked.

One of the problems in manufacturing and marketing of door locks is the matter of right and left-hand opening doors. Prior art "panic proof" locks require different parts to fit a left-hand opening door or a right-hand opening door. In addition to extra costs for tooling, manufacturing and inventory, it is often the case that a builder is not sure how his doors will open at the time of ordering, or his client changes his mind at the last minute which results in costly exchanges. The invented lock avoids all of these problems by being bidirectional. That is, the spring latch and dead bolt assemblies can approach the knob mechanism from either direction. If the bolt and latch assemblies approach the knob mechanism from the left, as the door is viewed in FIG. 7, thumb turn 32 is turned so that crank 37 moves to the left to extend the dead bolt and the upper end of the leg 67 of push rod 63 will bring crank 37 to the vertical to retract the dead bolt. On the opposite hand door, crank 37 moves to the right to extend the dead bolt and leg 66 serves to unlock the dead bolt. Thus, one set of parts are used for either kind of door, with consequent cost savings and convenience for the manufacturer, distributor, and user.

A second problem, one which has plagued "panic proof" lock designers is having to design the mechanism which couples the knob to the dead bolt so as to avoid the fasteners which retain the latch and bolt assemblies in place. It is conventional for the actuating mechanism for each assembly, (the spring latch assembly and the dead bolt assembly) to be in separate cavities formed by boring separate holes through the door, such as holes 80 and 81. The standard size for such holes is 2½ inches. The means coupling the interior knob to the dead bolt retraction mechanism is contained within the inside escutcheon. A pair of screws passing through each of the 2½ inch diameter holes, from the inside escutcheon to the knob rosette assembly or lock trim on the outside of the door, is commonly used to retain all assemblies and trim in place. The space within the inside escutcheon is limited and the presence of four screws passing through the space complicates the design of a suitable mechanism by a considerable amount.

The invented lock solves this problem by utilizing a retainer plate 90 as the inside member for holding the latch and lock mechanisms, and the outside trim in place. Two pairs of screws, 91, 92 and 93, 94, which are best seen in FIG. 3, pass through the holes 80 and 81 in the door into threaded holes in the outside lock and knob hardware. The screws also pass through holes in the dead bolt and spring latch assemblies within the door thereby holding these assemblies in proper posi-

tion for operation. The top and bottom of retainer plate 90 is dimpled and threaded at 95 and 96, and matching holes through the escutcheon 38 allow it to be attached to retainer 90 with screws 97 and 98. Thus, the screws holding the latch and bolt assemblies and the external hardware do not extend into the inside escutcheon cavity and thereby make the design of the mechanism therein less difficult.

I claim:

- 1. A panic proof lock including a spring latch and a dead bolt which comprises:
 - a. an interior escutcheon;
 - b. a knob coupled to said spring latch carried by said escutcheon;
 - c. means for operating said dead bolt carried by said escutcheon;
 - d. a crank coupled to said dead bolt operating means;
 - e. a push rod, said push rod being adapted to turn said crank either selectively clockwise or counterclockwise to a position generally corresponding to the open position of said dead bolt; and
 - f. means for moving said push rod in response to rotary motion of said knob whereby said dead bolt and said spring latch can be simultaneously retracted by turning said knob.
- 2. A panic proof lock including a spring latch and a dead bolt which comprises:
 - a. an interior escutcheon;
 - b. a knob coupled to said spring latch carried by said escutcheon;
 - c. means for operating said dead bolt carried by said escutcheon;
 - d. a crank coupled to said dead bolt operating means;
 - e. a push rod, said push rod having two legs one of which is adapted to turn said crank clockwise to a position generally corresponding to the open position of said dead bolt, and the other of which is adapted to turn said crank counterclockwise to a position generally corresponding to the open position of said dead bolt; and
 - f. means for moving said push rod in response to rotary motion of said knob whereby said dead bolt and said spring latch can be simultaneously retracted by turning said knob.
- 3. A panic proof lock including a spring latch and a dead bolt which comprises:
 - a. an interior escutcheon;
 - b. a knob coupled to said spring latch carried by said escutcheon;
 - c. means for operating said dead bolt carried by said escutcheon;
 - d. a crank coupled to said dead bolt operating means;
 - e. a push rod, said push rod having two legs one of which is adapted to turn said crank clockwise to a position generally corresponding to the open posi-

tion of said dead bolt, and the other of which is adapted to turn said crank counterclockwise to a position generally corresponding to the open position of said dead bolt; and

- f. means for moving said push rod in response to rotary motion of said knob, said means being a cam coupled to said knob, whereby said dead bolt and said spring latch can be simultaneously retracted by turning said knob.
- 4. A panic proof lock including a spring latch and a dead bolt which comprises:
 - a. an interior escutcheon;
 - b. a knob coupled to said spring latch carried by said escutcheon;
 - c. means for operating said dead bolt carried by said escutcheon;
 - d. a crank coupled to said dead bolt operating means;
 - e. a push rod, said push rod having two legs one of which is adapted to turn said crank clockwise to a position generally corresponding to the open position of said dead bolt, and the other of which is adapted to turn said crank counterclockwise to a position generally corresponding to the open position of said dead bolt; and
 - f. means for moving said push rod in response to rotary motion of said knob, said means being a cam coupled to said knob, said cam being adapted to bear against said push rod as said knob is turned in either direction, whereby said dead bolt and said spring latch can be simultaneously retracted by turning said knob.
- 5. A panic proof lock including a spring latch and a dead bolt which comprises:
 - a. an interior escutcheon;
 - b. a knob coupled to said spring latch carried by said escutcheon;
 - c. means for operating said dead bolt carried by said escutcheon;
 - d. a crank coupled to said dead bolt operating means;
 - e. a push rod, said push rod having two legs one of which is adapted to turn said crank clockwise to a position generally corresponding to the open position of said dead bolt, and the other of which is adapted to turn said crank counterclockwise to a position generally corresponding to the open position of said dead bolt; and
 - f. means for moving said push rod in response to rotary motion of said knob, said means being a cam coupled to said knob, said cam being adapted to bear against said push rod as said knob is turned in either direction causing said push rod to move in substantially reciprocal motion, whereby said dead bolt and said spring latch can be simultaneously retracted by turning said knob.

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