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Cothron

[11] **3,890,813**

[45] **June 24, 1975**

[54] **COMBINATION LATCH & DEAD BOLT LOCK ASSEMBLY**

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[73] Assignee: **Labann Corporation,** Calif.

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[52] **U.S. Cl.** **70/92;** 70/139; 292/92; 292/198; 292/210

[51] **Int. Cl.**[2] **E05B 65/10;** E05C 3/02

[58] **Field of Search** ... 70/92, 135, 139, 142, 151 R, 70/151 A; 292/198, 210, 216

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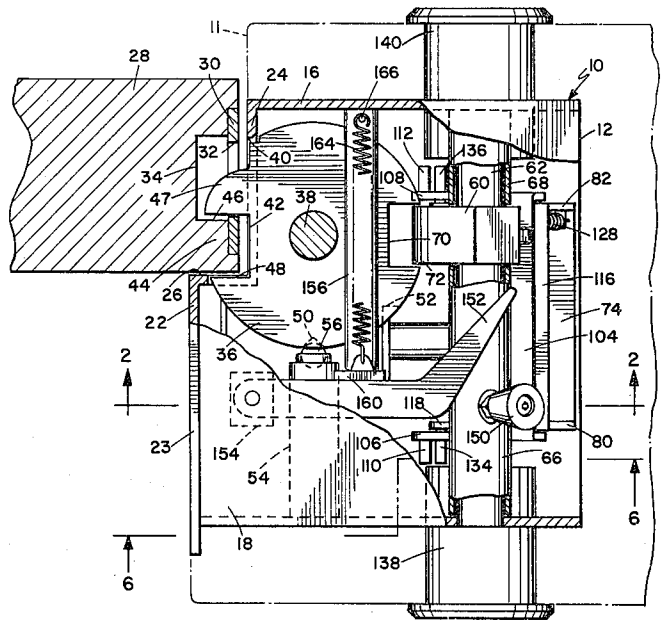
Primary Examiner—Albert G. Craig, Jr.

Attorney, Agent, or Firm—Ralph S. Branscomb

[57] **ABSTRACT**

The lock utilizes a rotatable disc latch element operated by movement of the door and a dead bolt type locking element spring biased against the latch and orthogonally received into a slot in the disc latch in the locked position. The lock is actuated by an appropriate means such as a key and also has an externally projecting panic pin on one side which disengages the locking element.

3 Claims, 7 Drawing Figures



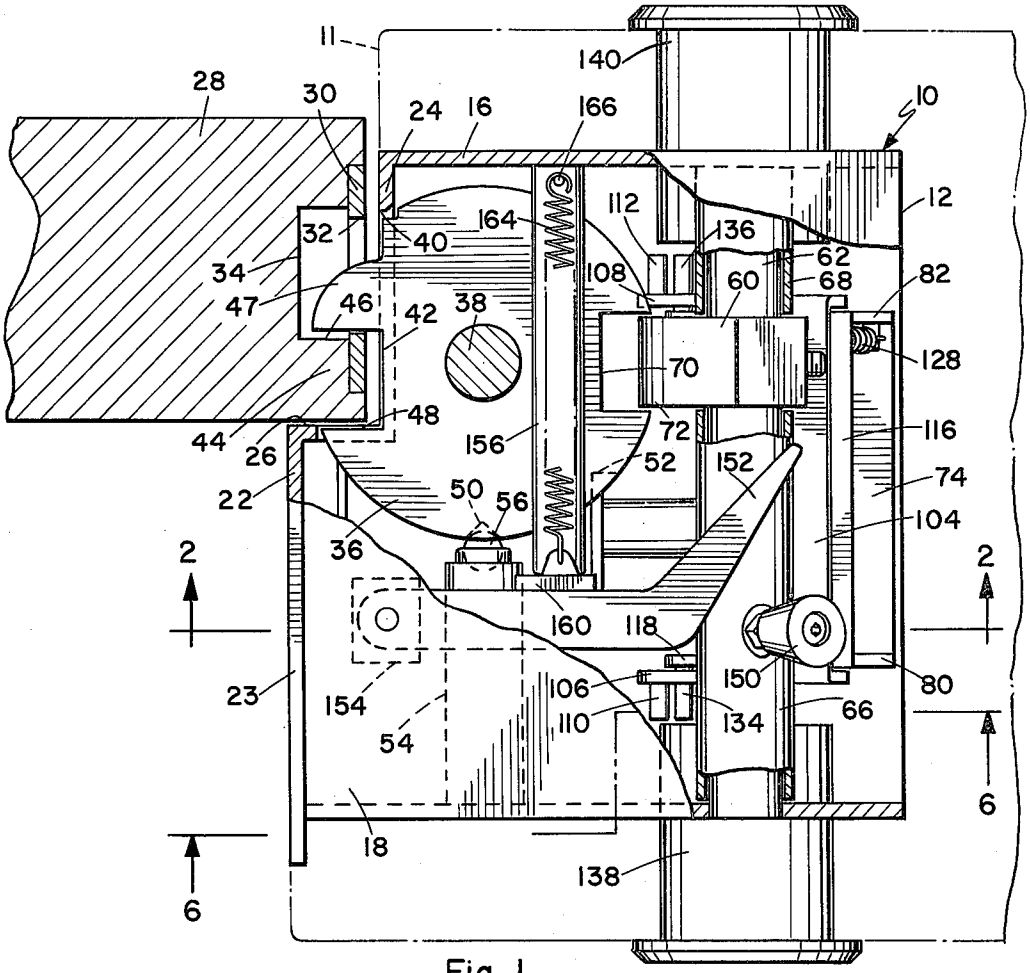

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Fig. 1

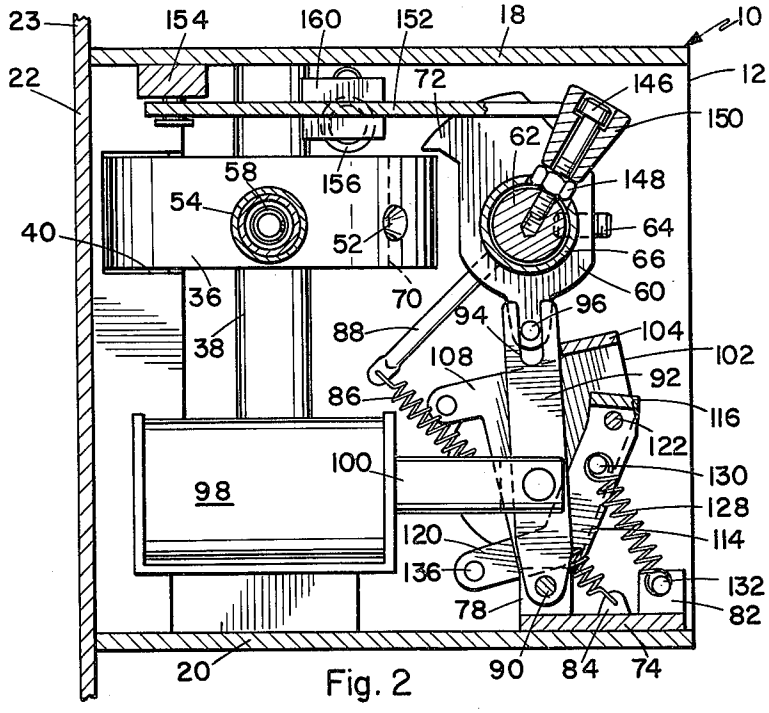

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Fig. 2

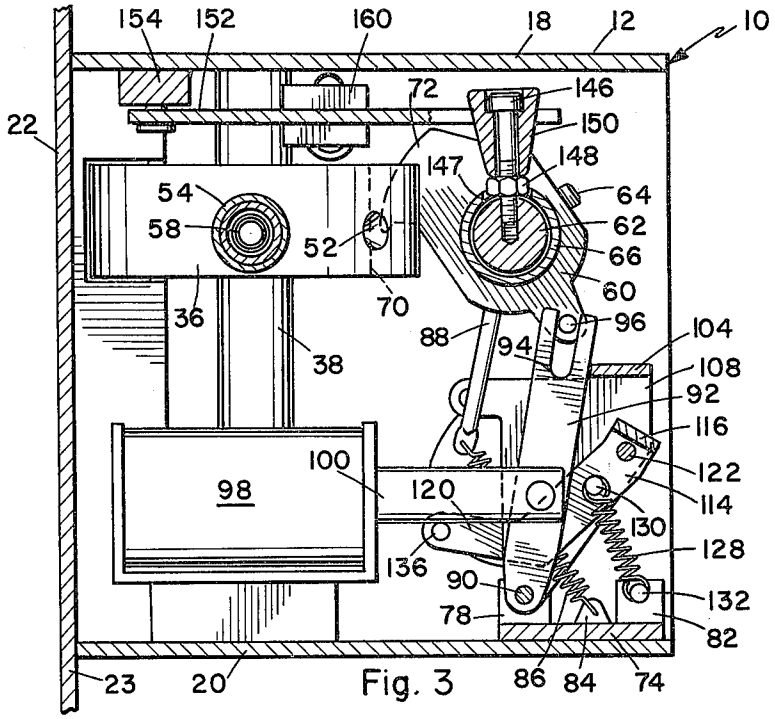

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Fig. 3

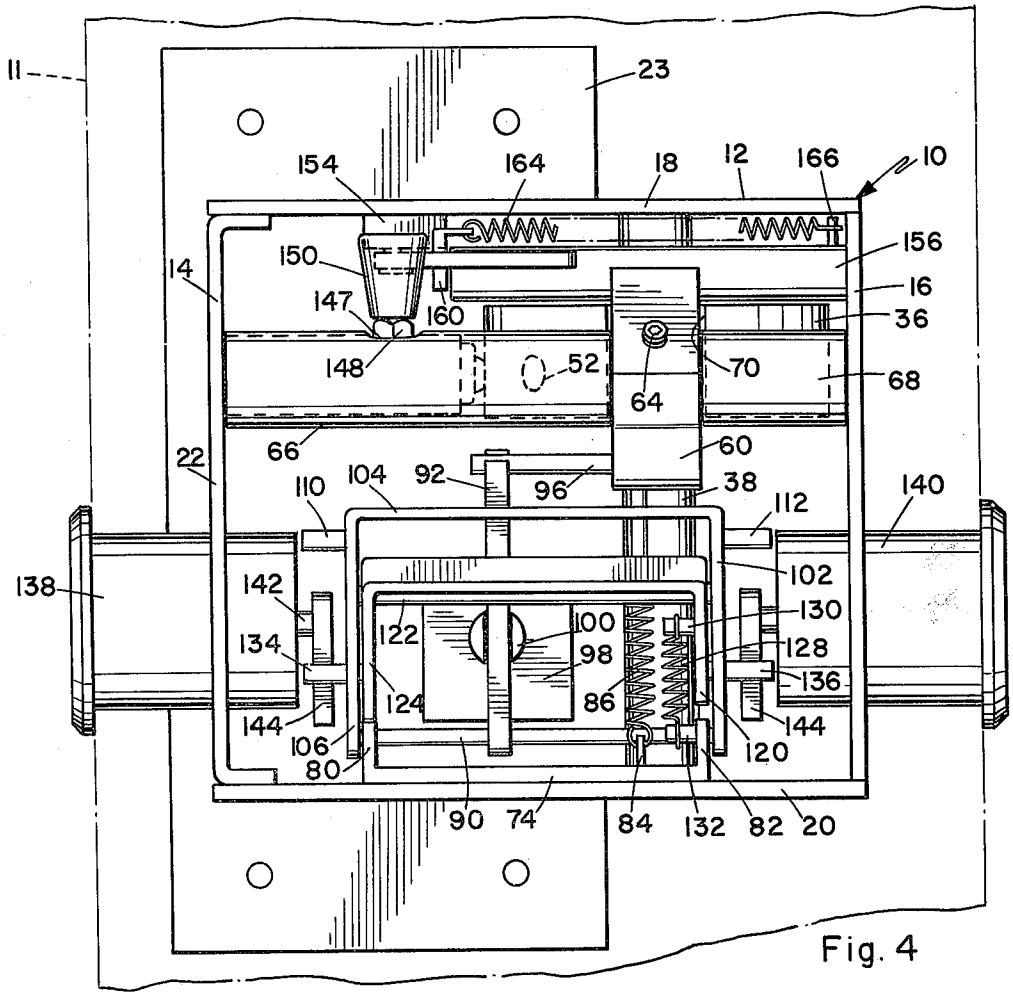

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Fig. 4

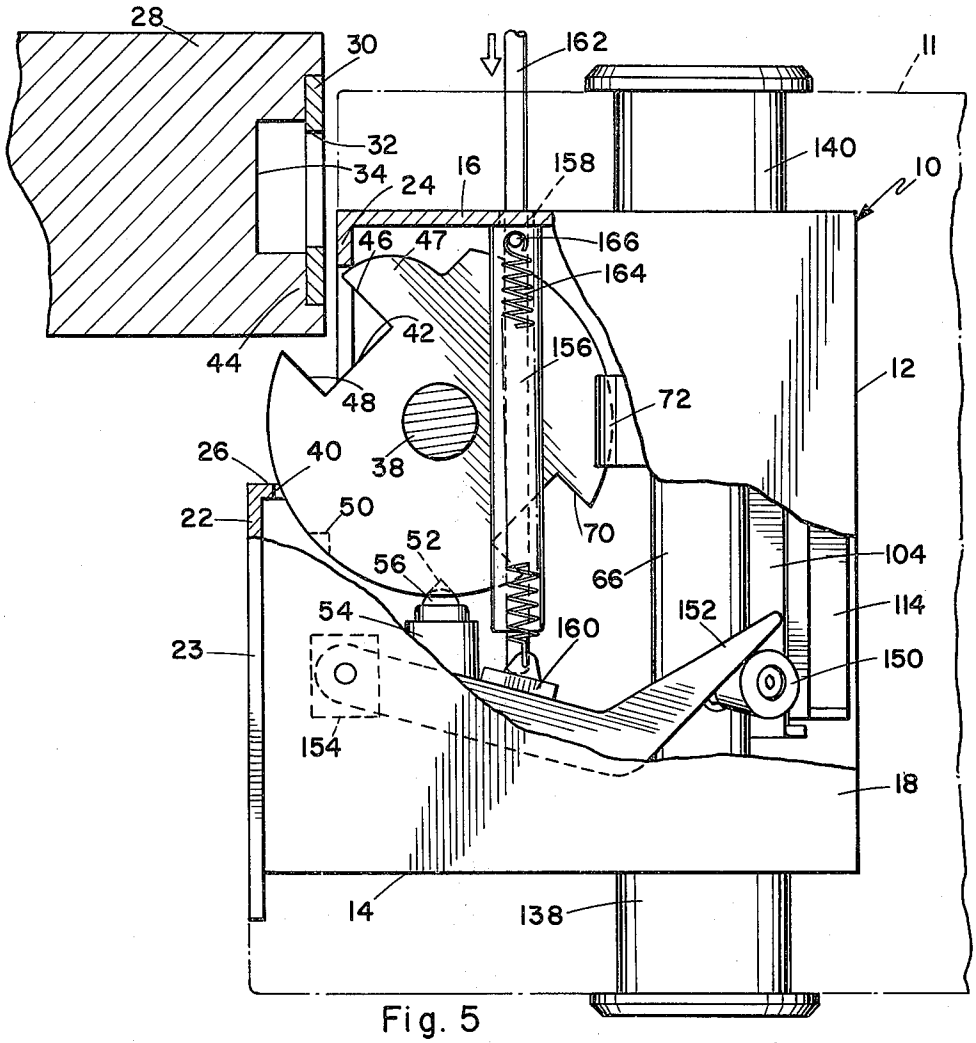


Fig. 5

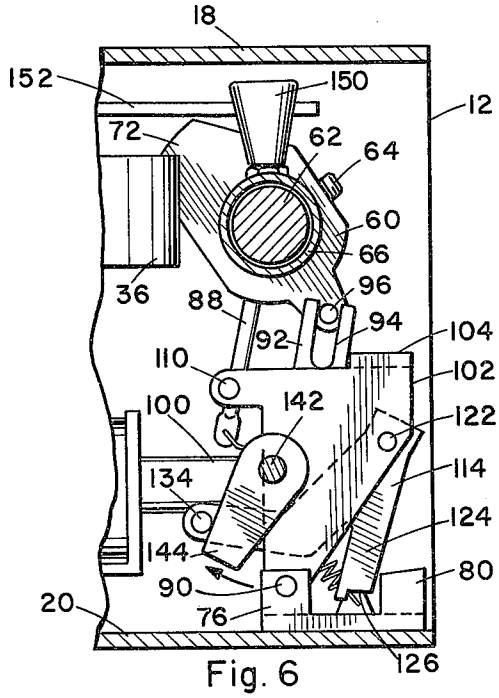


Fig. 6

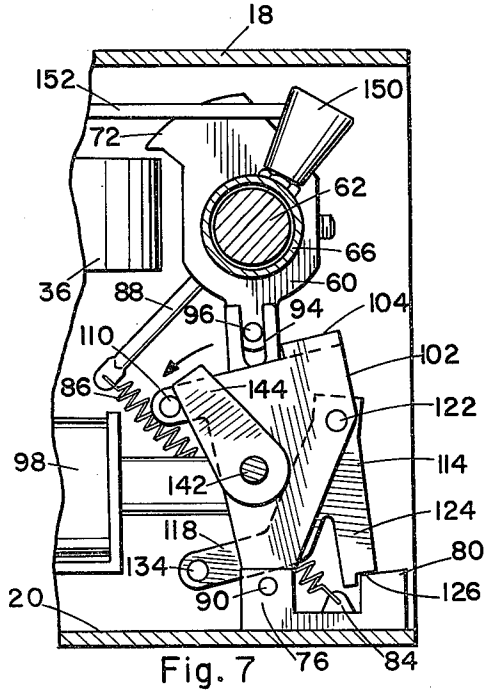


Fig. 7

COMBINATION LATCH & DEAD BOLT LOCK ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention is an improvement in my invention of a Combination Latch and Dead Bolt Lock, U.S. Pat. No. 3,451,704, issued June 24, 1969. The device described in those letters patent is a lock having only two moving parts, a disc latching element operated solely by the opening and closing of the door, and a locking element orthogonally interfitting with the latching element, each element having a slot at one position to allow the other to move.

That invention provided the security of a dead bolt lock and the convenience of a spring latch lock in one device. However, that lock would not automatically lock upon closing of the door, and there was no provision for a panic bolt.

SUMMARY OF THE INVENTION

The lock described herein solves the above-mentioned problems by providing a combination latch and deadbolt lock with a spring means which enables the lock to be self-locking upon closing the door, and externally operable panic bolt on one side to prevent inadvertant an entrapment. The spring means biases a dead bolt type locking element against a rotatable disc latching element. Upon closing the door, the disc is rotated by the door, aligning a slot in the disc with the locking element which snaps into locked position in the slot. The locking element can be held away from the latching element by a brace, allowing the door to be opened and closed freely without locking.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the lock assembly, with portions cut away;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1, the mechanism being in unlocked position;

FIG. 3 is a sectional view similar to FIG. 2, but with the mechanism in locked position;

FIG. 4 is a rear elevation view as taken from the right hand side of FIG. 3;

FIG. 5 is a top plan view showing the motion of the bolt and the emergency unlocking action;

FIG. 6 is a sectional view taken on line 6—6 of FIG. 1, showing the unlocking action; and

FIG. 7 is a sectional view similar to FIG. 6, showing the locking action.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The lock **10** is shown in FIG. 1 as being installed in a door jamb or well, indicated in broken line **11**, but could be installed in a door of suitable thickness, the location depending on the size of the lock and the operating requirements. Lock **10** is contained in a frame, illustrated as a generally rectangular box-like casing **12**, having strong protective walls including side walls **14** and **16**, a top wall **18** and a bottom wall **20**. At the exposed end the end wall **22** has a mounting panel **23** and a set back jamb wall **24** which forms a stop shoulder **26**, against which the swinging door **28** closes. On the edge of door **28** is a striker **30** illustrated here as a simple striker plate, with an opening **32**, behind which is a cavity **34**.

In side casing **12** is a horizontally disposed latch element **36**, illustrated as a disc, but which may be of other configurations to suit particular purposes. Latch element **36** is rotatable about a vertical post **38** fixed between top and bottom walls **18** and **20** and projects through a slot **40** in the jamb wall **24** which continues into stop shoulder **26**. In the periphery of latch element **36** is a latching notch **42** in which the door is held. The small portion of the door **28**, between cavity **34** and the face of the door which confronts stop shoulder **26**, forms a latching bar **44** which fits into notch **42** when the door is against the stop shoulder. When door **28** is opened the motion of the striker is substantially tangential to the rotation of the latch element **36**, so the latching bar **44** engages one side **46** of notch **42** and rotates the latch element until the door is released as indicated by the solid line arrows in FIG. **4**. Side **46** thus constitutes the opening face and also defined the front surface of tongue **47** which secures the door in locked position, the other side of the notch **42** being the closing face **48**, which latching bar engages when the door is closed and rotates the latching element to the latched position.

Latching disc **36** is thus actuated by the door itself and holds the door in the closed position. To keep the door in place and to maintain alignment of latching notch **42** for re-engagement by the door in the unlatched position, latching element **36** is provided with a pair of appropriately spaced sockets **50** and **52**, which are engaged by a detent **54**. As illustrated, the sockets are in the periphery of the latching element **36** and the detent is a simple ball element **56** biased by a spring **58**, but other arrangements may be equally suitable.

Deadbolt locking action is provided by a locking element **60** which is mounted on a horizontal post **62** and secured against rotation by a set screw **64**. Post **62** is rotatably mounted between end walls **14** and **16**, substantially in the plane of latch element **36**, and preferably has some measure of axial play. Two rigid cylinders **66** and **68** are somewhat loosely fitted coaxially on the post **62**, on each side of the locking element, substantially extending the distance between the locking element and the respective side wall. Because the post **62** has longitudinal play, any lateral force exerted on the locking element will be transmitted to a side wall through one of the cylinders, and not through the post **62**, so that set screw **64** is not overly stressed. The latch element **36** has a locking notch **70** which receives a chuck **72** of the locking element **60** when the locking element is rotated forward. In this position, the latch element **36** is securely held against rotation, the locking element **60** acting as an orthogonally interfitting deadbolt.

A generally rectangular mounting plate **74** is secured to the rear of the bottom wall **20** and has two pairs of upwardly bent lateral tabs, a forward pair **76** and **78**, and a rearward pair **80** and **82**. The tabs serve as attachment and support points for various elements of the lock mechanism, and a hook **84** is also mounted on a rear portion of the plate **74** near the tab **82**. A return spring **86** is attached under tension to and between hook **84** and a radial arm **88** projecting from the latch element **36**. Due to the action of the spring, when the door **28** is open and the latch element **36** is in the unlocked position, the chuck **72** will be biased against latch element in lock-ready position, and when the door is closed the locking element **60** rotates forward

snapping the chuck 72 into the aligned locking notch 70 and locking the device. The lock can thus be actuated by the closing of the door 28 in a fashion similar to that of an ordinary spring latch but with the added advantage of the deadbolt locking action, eliminating the possibility of jimmying to which ordinary locks are susceptible.

A horizontal mounting pin 90 extends through both forward tabs 76 and 78, spanning the mounting plate 74 and providing a pivotal attachment point for a lever 92. The lever has an open slot 94 in the upper end which carries a rod 96 extending from a lower lobe of the locking element 60. The lock can be released by pivoting the lever forward, thus rotating the chuck 72 clear of the locking notch 70 and freeing the latch element 36. When the forward force on the lever is removed, the spring 86 will return the locking element 60 in its forward position.

The primary means of opening the lock is by actuation of the lever 92, which can be accomplished electrically or mechanically. A solenoid 98 may be included, and is diagrammatically illustrated as being mounted in a forward portion of the lock frame and having a rearwardly-extending armature 100 which is pivoted to the lever and withdraws the lever when activated. The solenoid can be wired to an external control switch, not shown, enabling the lock to be remotely released.

The mechanical control for the lock includes a saddle bracket 102 comprising a top crossbar 104 and two side panels 106 and 108. The bottoms of the side panels straddle the mounting plate 74 close to the tabs 76 and 78 to prevent lateral movement of the saddle bracket and are pivoted to the mounting pin 90. The lever 92 is biased toward and rests against the crossbar 104 due to the spring 86 so that when the bracket 102 is rotated forward the lever is moved also unlocking the apparatus. Two actuating pins 110 and 112 project outwardly from forward portions of the side panel 106 and 108 and are used to operate the saddle bracket as described hereinafter.

The lock as described thus far can be opened by operation of the solenoid 98 or the saddle bracket 102, but in either case will subsequently be returned to the locked or lock-ready position by the spring 86. There is clearly more than one conceivable means for blocking the lock in the open position to allow free operation of the door. In the particular embodiment disclosed herein, a blocking brace 114 is provided which can be set to brace the saddle bracket 102 in its forward position. The brace 114 has a top bar 116 with two depending, forwardly-angled dog legs 118 and 120 which fit between said panels 106 and 108. A hinge pin 122 passes through the upper portions of the legs 118 and 120 and the side panels 106 and 108 so that the blocking brace 114 and saddle bracket 102 are pivotally related. At least one rigid straight leg 124 depends from the top bar 116 and has a blocking notch 126 which engages the forward edge of tab 80 when the saddle bracket 102 is pivoted forwardly and the blocking brace 114 is pivoted rearwardly as shown in FIG. 7. In this blocked position, the saddle bracket, and thus the lever 92, is held forward so that the lock remains disengaged and the door 28 can be opened and closed at will without engaging the lock.

To promote the positive engagement of the notch 126 on the tab 80, a blocking spring 128 is stretched between a stud 130 projecting inwardly from the dog leg 120 below the hinge pin 122 and a second stud 132 mounted on the tab 82. The spring maintains a rearward bias on the leg 124, causing the leg to slide along the tab 80 as the saddle bracket rotates forward, and finally snapping the notch 126 securely onto the tab 80.

It will be recalled that the saddle bracket can be displaced forwardly by the application of a forward force on either of the actuating pins 110 or 112. When this is done, the blocking spring 128 snaps the blocking brace 114 into blocked position as described above, setting the lock in its open mode. In this position no further manipulation of the pins 110 and 112 will re-lock the apparatus.

A second pair of actuating pins 134 and 136 which project outwardly from the dog legs 118 and 120, and are spaced generally below and parallel to the pins 110 and 112, will release the blocking brace 114 upon being displaced forwardly, returning the lock to the locked or lock-ready position.

The lock can then be completely operated by selective actuation of one of the pins 110 and 112 and one of the pins 134 and 136. The pins could be operated by a variety of means, such as a knob or handle coupled directly thereto, slide-bar type mechanisms, or locks of different types. The arrangement shown utilizes the high degree of security offered by the mechanism and includes a pair of barrel type locks 138 and 140, one on each side for operation of the lock from either side of the door. It will be obvious that a single lock will suffice if the door is required to be locked from one side only. Both locks are operated by a key and are identical except the senses are reversed, one being left handed and the other right handed, so only one lock is described in detail. Barrel lock 138 has an extended shaft 142 which is rotated by the key, the end of the shaft carrying a radially extending cam 144. The cam is disposed rearwardly of both the actuating pins 110 and 134 and rotates in a circle which encompasses both pins. When the cam is rotated clockwise as shown in FIG. 6, pin 134 is displaced forwardly setting the mechanism in the lock or lock-ready position and reverse rotated, pin 110 is actuated, and the lock is set in the open position as shown in FIG. 7. The cam does not remain fixed in the forward position after rotation, but either remains freely rotatable or snaps back to a neutral position, allowing each of the barrel locks to be operated independently without interference from the other.

It is desirable for safety reason and in some instances is required by law, to include a "panic bolt" operable from the inside, on a door lock which locks automatically upon closing of the door. Many different panic bolt arrangements are conceivable in the present lock. The described embodiment is fairly simple and effectively circumvents the previously mentioned electrical and mechanical locking mechanisms. Radially mounted at an appropriate angle on the horizontal post 62 is a bolt 146 which is preferably simply screwed into a hole in the post through an opening 147 in cylinder 66 and secured by a lock nut 148. The bolt carries a rotatable, conical bearing 150. A boomerang-like horizontal arm 152 is pivoted for horizontal motion from a mounting 154 on the top wall 12 of the lock frame. A horizontal guide cylinder 156 is mounted on the side wall 14 and leads from an opening 158 in the side wall to a strike plate 160 mounted on the arm 152. The panic bolt itself consists of a rod 162 which rides in the

cylinder **156** and rests against the plate **160.** Upon pressing the rod **162** inwardly, the arm **152** pivots against the bearing **150.** The post **60** will not move axially, so the force against the bearing is translated into rotation of the post, removing the chuck **72** from the locking notch **70** and disengaging the lock. To return the panic bolt to the normal position after use, a spring **164** is attached under tension between a fastener **166** on the cylinder **156** and the plate **160.**

Once locked, the door can be opened by either the solenoid **98,** one of the barrel locks **138** and **140,** or the panic bolt **162.** When the door is closed, the lock can be locked by either of the barrel locks **138** or **140,** and when the door is open the lock can be put in the lock-ready position by either barrel lock so that the lock is actuated by the closing of the door. The convenience of this arrangement, coupled with the security of the deadbolt construction, will be apparent. The stress-bearing elements can be made very rugged to resist damage, as opposed to the delicate cams, springs and the like in other locks of comparable type.

I claim:

1. A combination latch and dead bolt lock assembly, comprising:

a lock unit for attachment to one portion of a structure and a striker for attachment to another portion of a structure to be locked in the first portion;

said lock having a frame;

a disc latch element mounted in said frame for rotation about an axis substantially perpendicular to the direction of motion of the striker relative to the adjacent lock unit;

an edge portion of said latch element having a locking notch therein and another edge portion having latching notch therein to receive and retain a portion of said striker, said latching notch being disposed at an angle to the corresponding radious of the disc latch element and defining a tongue portion with the adjacent edge portion of the latching element to engage said striker in the locked position;

a locking element rotatably mounted in said frame on an axis substantially perpendicular to said latch element axis and having a portion engageable in said locking notch to lock the latter against rotation;

a spring means capable of biasing said locking element against said disc latch element whereby upon rotation of said disc latch element into locked position, said locking element engages said locking notch;

a means of disengaging said locking element from said disc latching element; and

retaining means for maintaining said locking element clear of said latching element;

means for disengaging said retaining means to render same ineffective, whereby said lock assembly can be rendered inoperable to permit free movement of said one portion relative to said other portion of said structure; and

said locking element being mounted on a shaft journalled in said frame and said shaft has a radially projecting bearing element, and said means of disengaging said locking element includes an externally projecting panic bolt manually operable from outside said lock unit comprising a rod axially slidably mounted on said frame and having an angled arm mounted thereto and extending therefrom into proximity with said bearing element such that axial movement of said rod cause said arm to angularly displace said bearing element to rotate said locking element on said shaft clear of said locking notch.

2. A combination latch and dead bolt lock assembly comprising:

a lock unit for attachment to one portion of a structure and a striker for attachment to another portion of a structure to be locked in the first portion;

said lock having a frame;

a disc latch element mounted in said frame for rotation about an axis substantially perpendicular to the direction of motion of the striker relative to the adjacent lock unit;

an edge portion of said latch element having a latching notch therein to receive and retain a portion of said striker, said latching notch being disposed at an angle to the corresponding radius of the disc latch element and defining a tongue portion with the adjacent edge portion of the latch element to engage said striker in the locked position;

a locking element rotatably mounted in said frame and having a portion engageable with said latch element to lock the latter against rotation;

a spring means capable of biasing said locking element against said disc latch element whereby upon rotation of said disc latch element into locked position, said locking element engages said latch element;

a means of disengaging said locking element from said disc latch element comprising at least one key operated lock operatively connected to said locking element and capable of rotating said locking element against the bias of said spring means; and

a brace capable of holding open said locking element to prevent engagement of said latch element by said locking element, said brace being actuated upon disengagement of said latch element by said key-operated lock.

3. The structure of claim **2** wherein said brace is deactivatable by said key-operated lock.

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