

Aug. 22, 1950

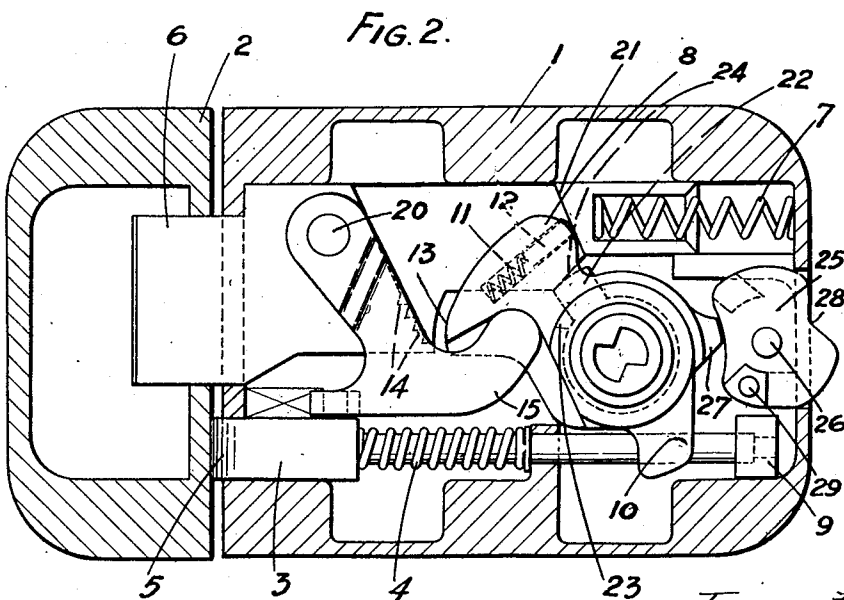
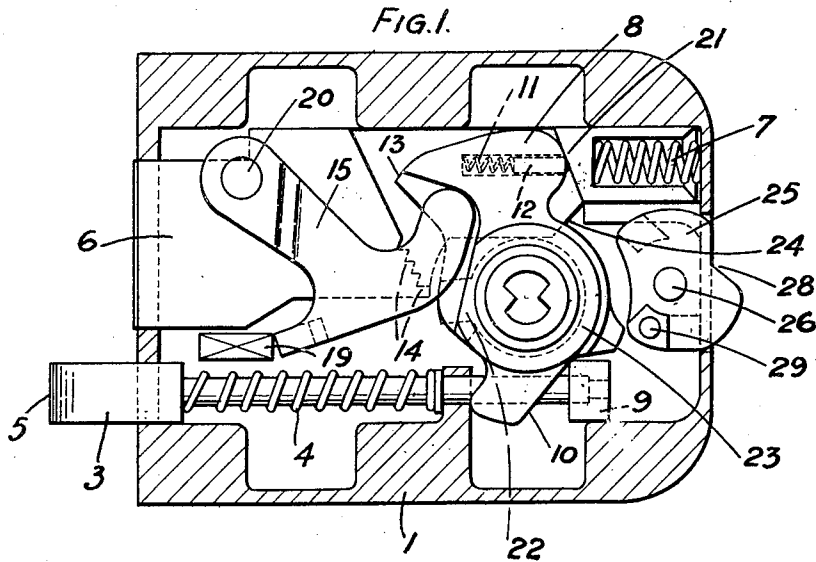
L. W. YOUNG ET AL

2,519,808

DOOR LOCK

Filed Sept. 9, 1947

3 Sheets-Sheet 1



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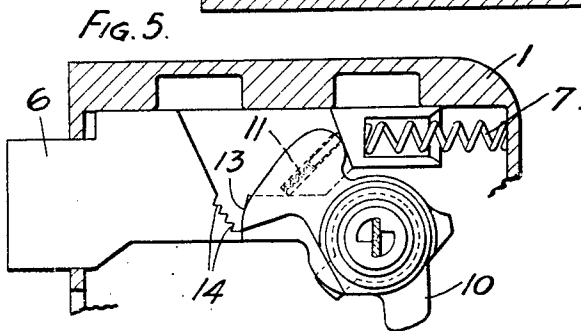
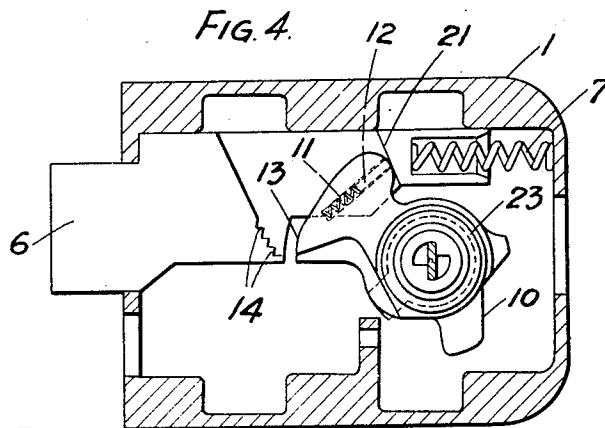
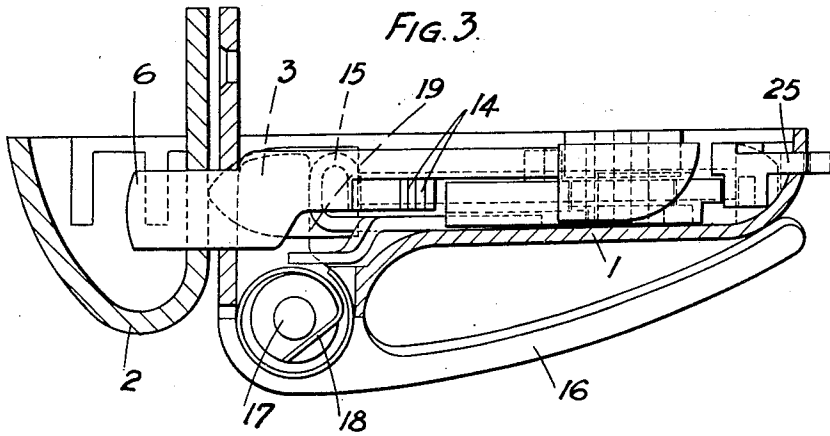
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DOOR LOCK

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3 Sheets-Sheet 2



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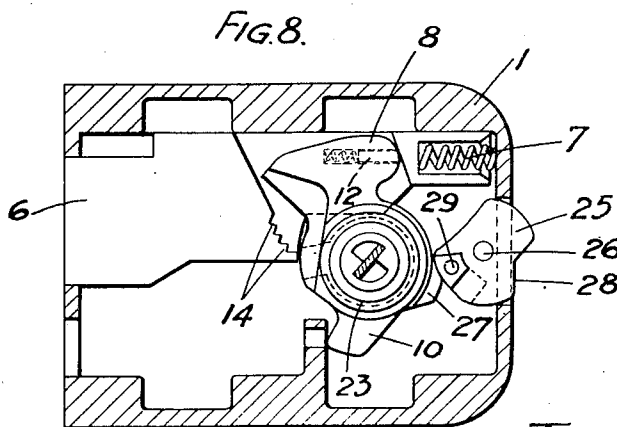
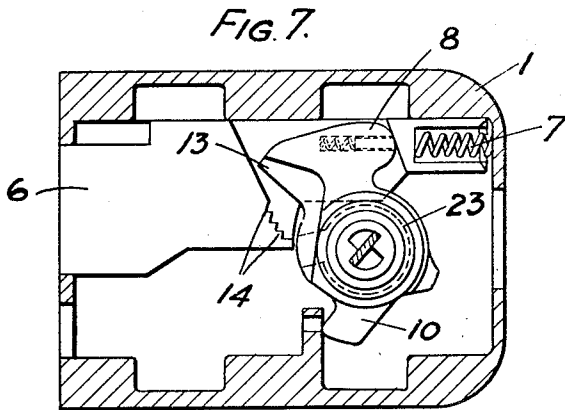
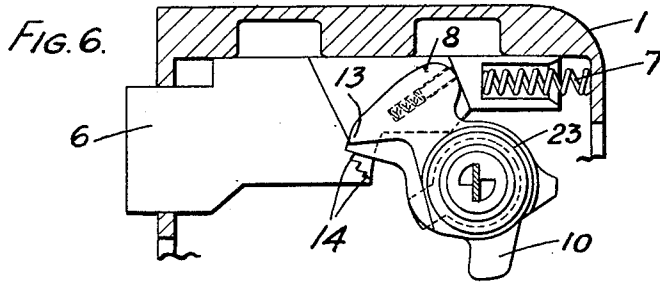
L. W. YOUNG ET AL

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DOOR LOCK

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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE

2,519,808

## DOOR LOCK

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10 Claims. (Cl. 70—151)

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This invention relates to door and like locks of the kind which include a bevelled springbolt and a deadbolt, the latter normally occupying a retracted position when the door is open, but being shot automatically into the keeper upon the bevelled springbolt being forced back as a result of its engagement with the keeper on the door or the like being shut in which position the deadbolt cannot be retracted to open the door except by the use of the appropriate key or by operation of the door handle or equivalent member.

Hitherto in such constructions the deadbolt was mounted in the keeper and was retracted under the action of an associated spring on the springbolt being withdrawn under the action of a door handle or key. In further arrangements which involved the use of a bevelled springbolt automatic deadlocking mechanism was fitted to prevent any possibility of the bevelled springbolt being retracted by end pressure applied by an instrument inserted between the front edge of the door and jamb. Such mechanisms could not be regarded as satisfactory as depression of the springbolt when the door was open caused the springbolt to be deadlocked and to remain so until the key or knob was turned. Consequently subsequent slamming of the door to the closed position was taken by the deadlocked springbolt, and consequently damage to the lock mechanism was likely to occur. Furthermore, in cases wherein the deadlocking mechanism was operated by depression of an auxiliary bolt projecting from the latch on the flat side of the bevelled springbolt, such arrangements did not permit sufficient margin of deadlocking to offset the varying space between the door and jamb.

The chief object of the present invention is to evolve a more efficient form of automatic deadlock than has hitherto been proposed and which will not suffer from the disadvantages hitherto associated with more or less automatic deadlocking arrangements at present commonly in use.

An automatic deadlock in accordance with the present invention includes a casing, a bevelled springbolt slidably mounted therein and movable into a projected position under the action of an associated spring, a deadbolt slidable within said casing and interconnected with said springbolt so as to be shot automatically into the keeper under the closing action of the door, a door handle or its equivalent and key actuated mechanism for withdrawing said deadbolt to permit of opening the door, means for preventing said deadbolt being forced back by end pressure when the door

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is closed and key actuated mechanism for deadlocking said deadbolt to prevent its withdrawal except by the aid of the appropriate key. In order that the invention may be clearly understood and readily carried into effect the invention is hereinafter described with reference to the accompanying drawings in which:

Figure 1 is a vertical section of an automatic deadlock according to the invention in the unlocked position:

Figure 2 is a similar sectional view through the lock and keeper showing the mechanism in the dead-locked position:

Figure 3 is a sectional plan view:

Figure 4 is a section illustrating more clearly the general shape of the deadbolt and operating cam:

Figures 5 and 6 show the range of locking engagement between the deadbolt and cam:

Figure 7 shows the deadbolt and operating cam in the unlocked position:

Figure 8 shows the deadbolt held in its retracted unlocked position by means of the stopwork cam.

In the construction illustrated the lock mechanism includes a casing 1 and a keeper 2 the casing containing a springbolt 3 which is urged into the projected position shown in Figure 1 by a coiled spring 4 the springbolt having a double bevelled face 5 which as a result of its engagement with the curved face of the keeper results in retraction of the springbolt against its associated spring when the door is closed as shown in Figure 2. The casing also contains a slidably mounted deadbolt 6 which is urged into a projected position by means of an associated coil spring 7. The deadbolt 6 and springbolt 3 are interconnected through the medium of an operating cam 8 capable of operation from the outside of the door by means of the appropriate key and from the inside by a door handle or equivalent member. Springs 4 and 7 operate in opposition, the tension of spring 4 being such as to maintain (through the medium of operating cam 8) deadbolt 6 in the retracted position shown in Figure 1 until such time as the springbolt by its engagement with the keeper is forced inwards against its associated spring, a collar or abutment 9 on the springbolt being moved clear of cam face 10 to permit the deadbolt to move into a projected position under the action of its associated spring 7.

When the deadbolt is in its projected position, shown in Figures 2 and 3, the operating cam is held in the position shown by its engagement by the deadbolt. To take up any play between

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the operating cam and deadbolt the former contains a coil spring 11 located in position in a recess in the cam and bearing on a plunger 12 the latter engaging the inclined face 21 on the deadbolt. The cam 8 at the opposite end 13 to the face 10 is shaped to engage the stepped inclined rearward face 14 of the deadbolt to retain the deadbolt in its projected position against endwise pressure applied to the deadbolt. The normal position of the cam when the deadbolt is retracted is shown in Figure 1, the cam being maintained in that position as a result of engagement of the collar 9 with the cam face 10 under the action of the spring 4. The deadbolt is shown in a fully projected position in Figures 2 and 4 but will be held by the cam 8 against endwise pressure in any other projected position between and including the maximum and minimum locked positions shown by Figures 5 and 6 in which the cam actually contacts the stepped part of the deadbolt, the notches being individually engaged by the cam to hold the deadbolt firmly against endwise pressure according to the depth of penetration of the deadbolt into the keeper. Each step provides a flat surface for engagement by the cam, the point of contact between the cam and deadbolt being situated approximately on a line passing horizontally through the centre of rotation of the cam. In this way endwise pressure applied to the deadbolt when the door is shut, for example, by means of an instrument inserted between the door and jamb, will not result in the deadbolt being forced back while the arrangement of steps on the inclined part of the deadbolt ensures locking despite varying space between the door and jamb and incorrect fitting of the lock or staple, the disposition of the point of contact between the cam and deadbolt and cam pivot point ensuring that there is no tendency for the cam to rotate under endwise pressure applied to the deadbolt. Angular movement of the key in the direction of movement necessary to open the door results in pivotal movement of the operating cam 8 and by virtue of its engagement with the deadbolt results in withdrawal of the deadbolt against the action of its associated spring 7.

For the purpose of withdrawing the deadbolt through the medium of a door handle or equivalent operating mechanism, the casing contains a pivotally mounted operating lever 15 which is engaged by the handle mechanism and this lever engages the operating cam and results in its angular movement in the required direction to withdraw the deadbolt under the action of the door handle.

It is preferred that the handle shall take the form of a lever 16 pivoted to the casing about a pivotal point 17 and maintained in the position shown in Figure 3 by an associated spring 18, the lever when it is desired to open the door being grasped and pulled to cause pivotal movement of the lever and the rearwardly projecting part 19 of the lever to engage the operating lever 15 to turn the latter about its pivotal point 20 and, as shown in Figure 1, force back the cam 8 out of engagement with the notched face 14 of the deadbolt, the cam by its engagement with the inclined face 21 on the deadbolt forcing back the latter against the action of its associated spring 7. Alternatively, the handle may take the form of the more usual rotatable knob.

To result in the deadbolt being deadlocked when required, that is to say, to prevent withdrawal of the deadbolt except by the use of the

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appropriate key, a locking cam 22 is pivotally mounted about the axis of rotation of the operating cam 8, the locking cam being movable into a position, shown in Figure 2, in which it constitutes an abutment between a projection 23 on the operating cam 8 and an inclined face 24 on the deadbolt, thereby preventing rotational movement of the operating cam by the handle to cause withdrawal of the deadbolt from its shot position. To deadlock the deadbolt, the key is turned in the opposite direction to the direction in which it is normally operated to unlock the door.

In order to maintain the deadbolt in its withdrawn position when required, a stopwork cam 25 is pivotally mounted at 26 in the casing, but projecting therefrom to provide a finger tip control, the stopwork cam, in its operative position shown in Figure 3, abutting against a projection 27 on the operating cam to prevent rotation of the operating cam in the direction necessary to permit projection of the deadbolt under the action of its associated spring. The stopwork cam is preferably provided with a suitable recess 28 to provide two projecting finger pieces that may be easily actuated by means of the thumb or forefinger. Furthermore, the cam is preferably fitted with a spring urged plunger 29 which will click into either of two spaced recesses in the casing to maintain the stopwork cam in either position.

It will be appreciated from the foregoing that owing to the stepped formation of the deadbolt, that the deadbolt may be locked in various positions other than in its maximum projected position, and, consequently, any variation in spacing between the door and jamb will be automatically compensated for, the stepped arrangement, as previously stated, providing a series of spaced parallel faces with any one of which the extremity of the operating cam can contact and thus prevent inward movement of the deadbolt resulting from endwise pressure applied thereto.

Furthermore, the locking cam provided for deadlocking the deadbolt provides a very simple arrangement for effectively deadlocking and thus preventing any possibility of the deadbolt being withdrawn except by the operation of the appropriate key.

What we claim is:

1. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt being stronger than said deadbolt spring, an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt to retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position to prevent retraction of said deadbolt by end pressure.

2. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slid-

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ably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, and an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to hold said deadbolt in a retracted position while the springbolt is projected said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam having a deadbolt engaging portion forming a stop when the deadbolt is projected to prevent retraction of said deadbolt by end pressure.

3. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to a projected position, said springbolt spring being stronger than said deadbolt spring, and an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw and hold said deadbolt in retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam having a deadbolt engaging portion forming a stop when the deadbolt is projected to prevent retraction of said deadbolt by end pressure, said deadbolt having an inclined stepped face, any one of which steps is engageable by the deadbolt engaging portion of the operating cam according to the projection of the deadbolt into the keeper.

4. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt to retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position to prevent retraction of said deadbolt by end pressure, and a stopwork cam mov-

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ably mounted within the casing for movement to and from a position to form a stop for said operating cam to hold said deadbolt in retracted position.

5. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt to retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position to prevent retraction of said deadbolt by end pressure, a stopwork cam movably mounted within the casing for movement to and from a position to form a stop for said operating cam to hold said deadbolt in retracted position, and snap latch means for holding said stopwork cam in its extreme positions.

6. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt to retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position to prevent retraction of said deadbolt by end pressure, and operating means for independently actuating said operating cam to withdraw said deadbolt.

7. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam pivotally mounted within said casing and engageable with the deadbolt and the springbolt, said operating cam being operable by

the springbolt under the influence of its stronger spring to withdraw and hold said deadbolt in retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam having a deadbolt engaging portion forming a stop when the deadbolt is projected to prevent retraction of said deadbolt by end pressure, an operating member for independent actuation of said operating cam to withdraw said deadbolt, and a pivotally mounted operating lever interconnecting said operating cam with said operating member.

8. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt to retracted position while the springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position for preventing retraction of said deadbolt by end pressure, operating means for independently actuating said operating cam to withdraw said deadbolt, a locking cam movably mounted in said casing for movement to form a stop for engagement with said operating cam to prevent retraction of the deadbolt under the action of said operating means, and key actuated locking mechanism controlling the movement of said locking cam.

9. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam pivotally mounted in said casing and engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt while said springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement

with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position for preventing retraction of said deadbolt by end pressure, operating means for independently actuating said operating cam to withdraw said deadbolt, a locking cam pivotally mounted in said casing concentrically with said operating cam for movement to form a stop for engagement with said operating cam and with said deadbolt to prevent retraction of the deadbolt under the action of said operating means, and key actuated locking mechanism controlling the movement of said locking cam.

10. An automatic deadlock for cooperation with a keeper, comprising a casing, a deadbolt slidably mounted in said casing for movement between an inoperative position within said casing and an operative position projecting beyond said casing for insertion in the keeper, a spring biasing said deadbolt to its projected operative position, a springbolt slidably mounted in said casing for movement between a retracted position within said casing and a projected position protruding from said casing, a spring biasing said springbolt to projected position, said springbolt spring being stronger than said deadbolt spring, an operating cam pivotally mounted in said casing and engageable with the deadbolt and the springbolt and operable by the springbolt under the influence of its stronger spring to withdraw said deadbolt while said springbolt is projected, said deadbolt spring projecting the deadbolt when the springbolt is retracted by engagement with the keeper, said operating cam being movable under the projecting action of the deadbolt by its spring to a stop position for preventing retraction of said deadbolt by end pressure, an operating member for independent actuation of said operating cam to withdraw said deadbolt, a locking cam pivotally mounted in said casing and concentrically with said operating cam for movement to a position in which it engages said operating cam and forms a stop to prevent retraction of the deadbolt under the action of the operating member, key actuated locking mechanism for operating said locking cam, and a stop-work cam pivotally mounted within the casing for movement to form a stop for the operating cam to hold the deadbolt in retracted position.

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