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Sosin et al.

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[54] COMBINED LOCK AND ALARM

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[51] **Int. Cl.** **G08b 13/08**

[58] **Field of Search** 340/274, 276, 61.64, 61.67, 200/61.73, 61.76, 61.79, 61.8

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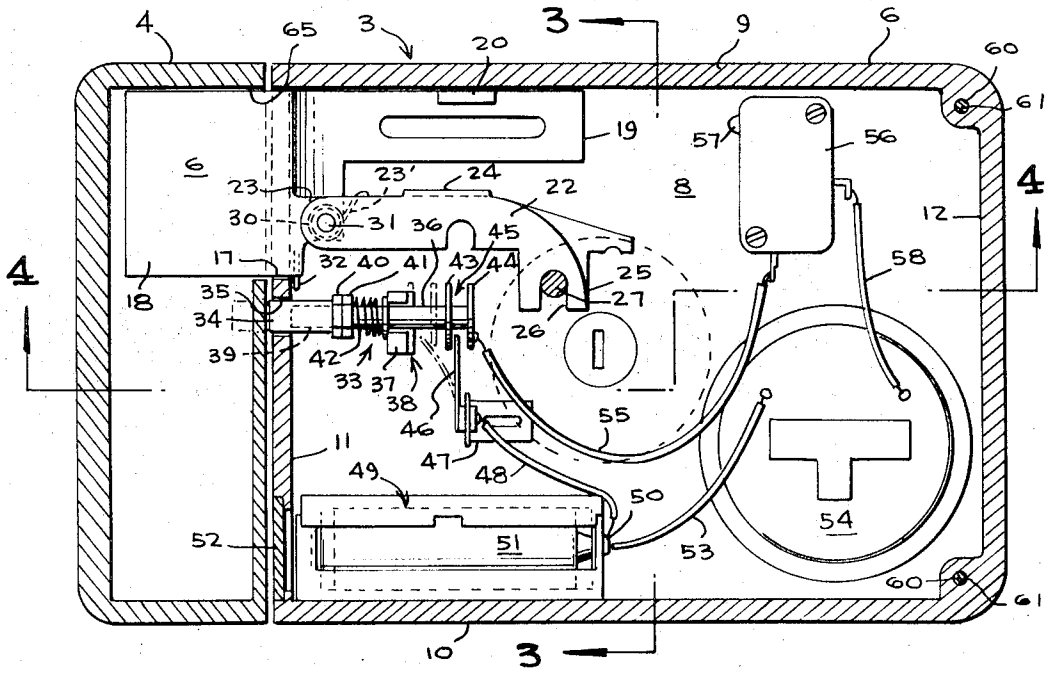
[57] **ABSTRACT**

A combined lock and alarm in which a dead bolt is moved to a release position within a housing and to a locked position projecting from the housing into a keeper plate. A locking bracket releasably holds the bolt in locked position. A lost motion connection permits the bolt to move an alarm plunger into contact with the keeper plate and override to lock, leaving the plunger spring-urged toward the plate. Movement of the door on which the lock is mounted from closed position allows the plunger to drop into an opening in the keeper plate and close a circuit to an alarm. Retraction of the bolt also retracts the plunger and opens a switch to render the alarm circuit inoperative.

10 Claims, 6 Drawing Figures



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SHEET 1 OF 2

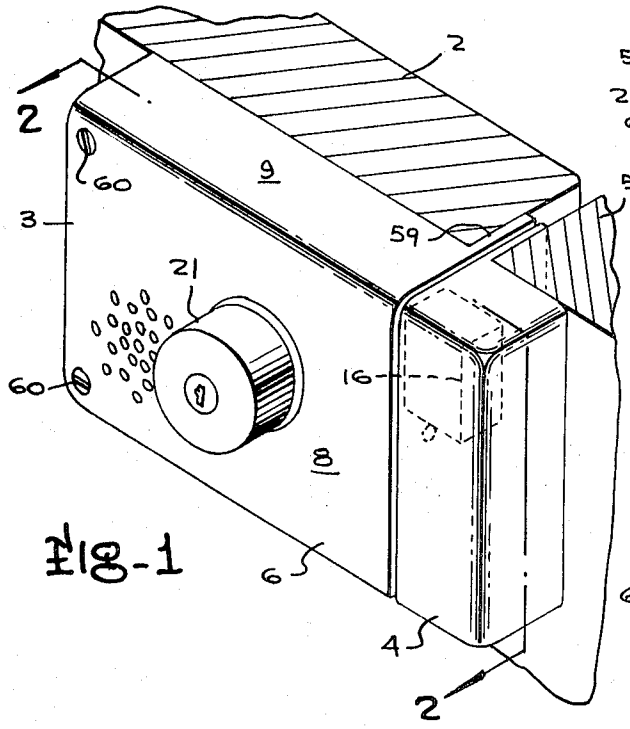

Fig-1

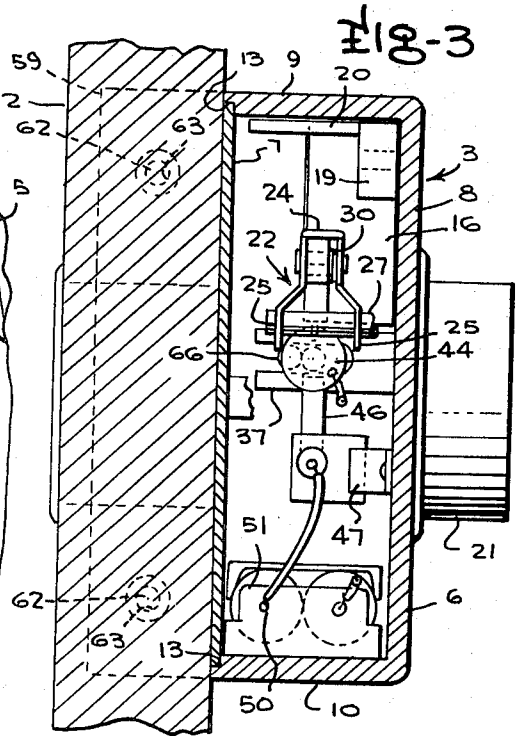

Fig-3

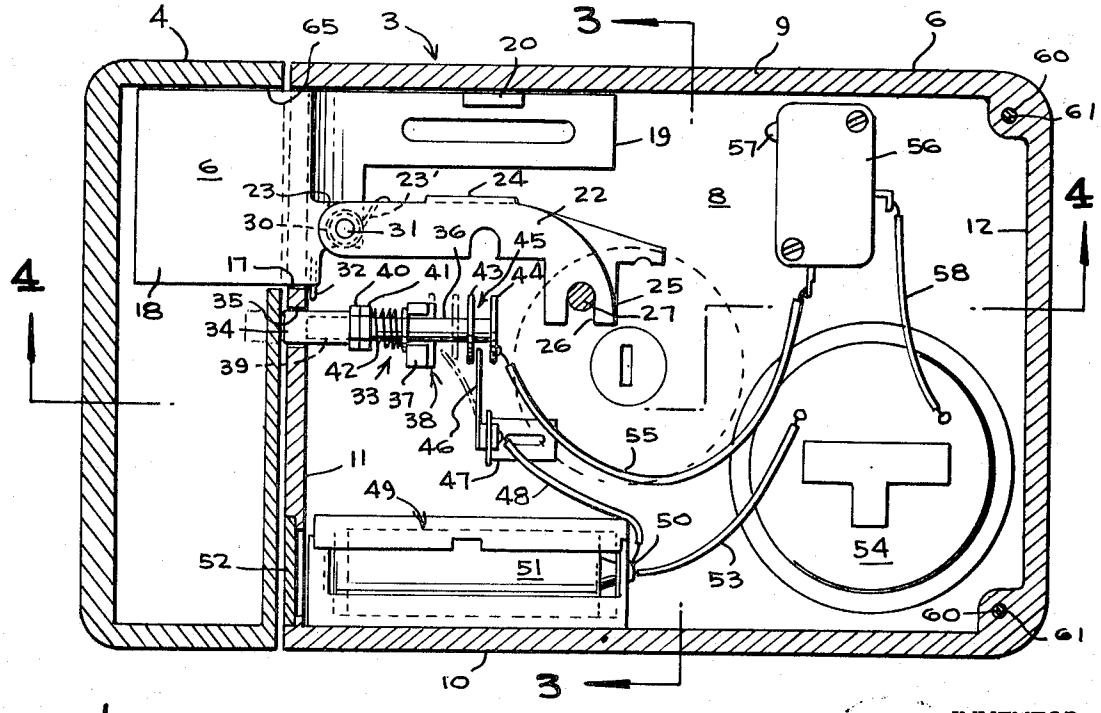

Fig-2

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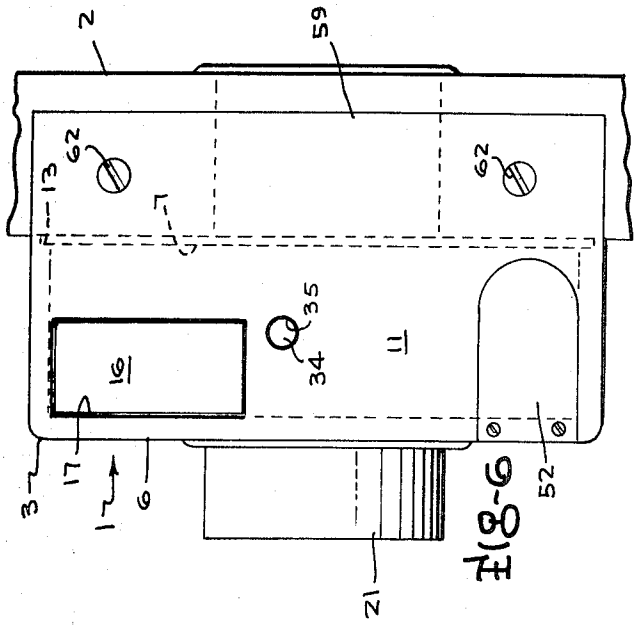

FIG-6

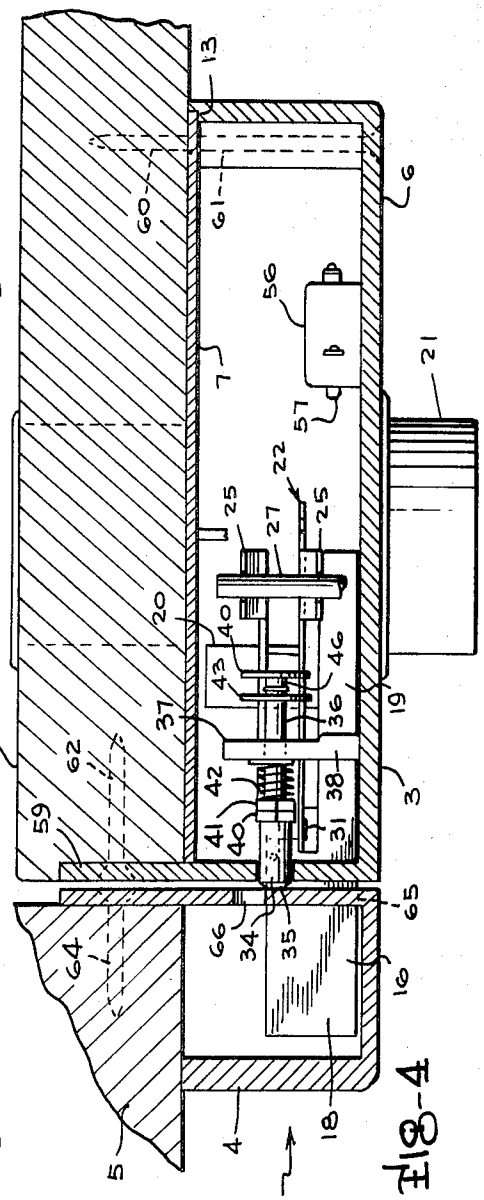

FIG-4

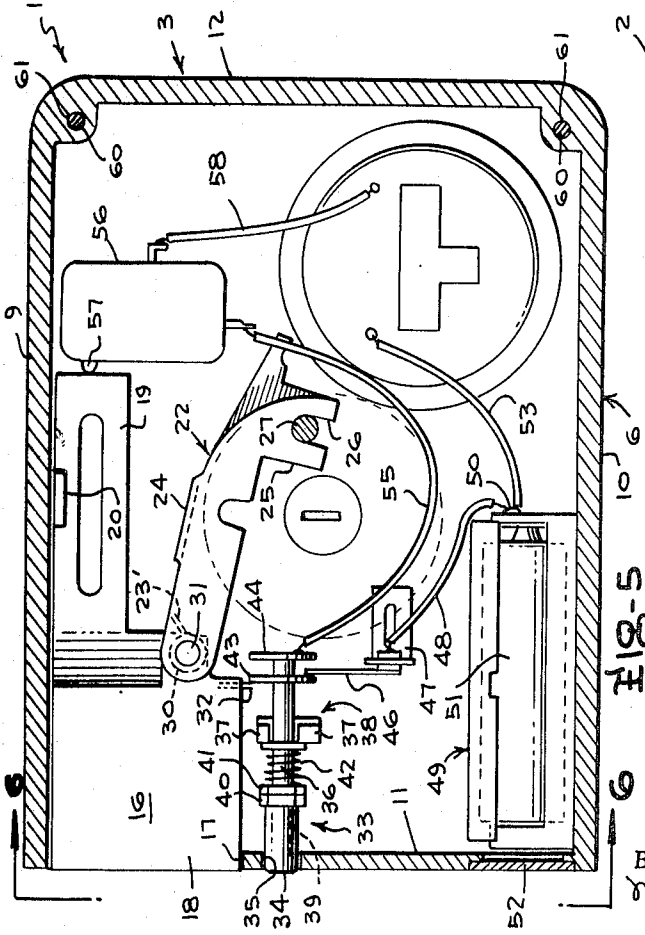

FIG-5

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COMBINED LOCK AND ALARM

BACKGROUND OF THE INVENTION

This invention relates to locks and to burglar alarms, and particularly to locks having alarm systems built into them.

Unauthorized entries through doors are made in many different ways, some by force, others by manipulating locks and some by the use of keys variously acquired. If a key is used, there is nothing to warn others that an illegal entry is being made. The same is true if the lock is manipulated with metal strips and other devices to push back the locking bolt and release the door. If the door is jimmied, or forced, or the hinge bolts removed, the operation is usually noisy, but nevertheless such entries occur with startling frequency.

Various types of burglar alarm systems have been used, some being installed in the lock to sound an alarm if the lock, or door, is moved. One type, which is quite practical, employs a spring-pressed member placed in yielding engagement with the lock keeper plate when the alarm is set, so that if the door is moved the spring can cause the member to assume a different position and sound an alarm. Lock alarms of this sort proposed in the past have had some deficiencies which prevented them from operating under all well known procedures for unlawful attempts to open locked doors.

SUMMARY OF THE INVENTION

The general object of the present invention is to provide an improved lock alarm which will operate to sound a signal upon any unauthorized entry, even if the entry should be by a proper key.

A more specific object of the invention is the provision of a lock alarm which utilizes a spring-pressed plunger to close contacts to sound an alarm at any time that the door is moved from its normal locked position toward open position.

A further object is to provide such a device which will sound an alarm when a key is turned to release the lock, whether the key is inserted from the inside or the outside.

Another object is the provision of a lock alarm which cannot be removed from a door when the door is in closed position, and which will sound if it is forcefully removed from the door.

It is also an object of the invention to provide a lock alarm which is entirely self-contained, and can be installed on a door as a unit, as simply as installing a conventional lock.

Other objects of the invention will become apparent from the following description of one practical embodiment thereof, when taken with the drawings which accompany, and form part of, this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the improved lock alarm and keeper plate, mounted on a door and door frame;

FIG. 2 is a vertical section through the structure shown in FIG. 1, and is taken on the line 2—2 of FIG. 1;

FIG. 3 is a vertical transverse section taken on the line 3—3 of FIG. 2;

FIG. 4 is a horizontal section taken on the line 4—4 of FIG. 2;

FIG. 5 is a view similar to FIG. 2 but with the bolt and alarm plunger in retracted position; and

FIG. 6 is an end elevation of the bolt housing, shown attached to a door.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in detail, the combined lock and alarm 1 is adapted to be secured to the inside and edge surfaces of a door 2 with which it is to be used. All of the parts are contained within a casing 3, which is screwed to the door, as will be described. A bolt receptacle, or keeper, plate 4 is fixed to the door frame 5.

Casing 3 consists of a housing 6 and a cover plate 7, removably secured to the housing. The housing is a box-like member, having a side wall 8, top and bottom walls 9 and 10, a front wall 11 and a back wall 12. The edges of the top, bottom, front and back walls are rabbeted to provide a seat 13 for the cover plate. The cover plate seats in the recess, and is flush against the door when the lock is mounted.

A dead bolt 16 is slidable in and out of the housing through a bolt opening 17 in the housing front wall 11. The bolt is of generally conventional form, having the usual locking bolt end portion 18 of substantial cross section, slidable through opening 17 for seating in the bolt receptacle in normal manner. The bolt has an elongated projection 19, of reduced cross section, rearwardly extending into the casing and carrying a laterally projecting operating arm 20 by which the bolt is moved longitudinally to extended locking position or retracted, unlocked position.

The actual, key-operated lock, and the mechanism of that lock which causes the movement of bolt 16 to extended and retracted positions can be of any suitable construction. Whether the means engaging the operating arm 20 is a rocking fork, a notched disk, or other conventional bolt operator, is unimportant to the present disclosure. Therefore, for clarity of illustration and simplification of description, no details of the lock mechanism are shown. Lock barrel 21 is shown merely as illustrative of any lock mechanism, and to show that the bolt can be operated by a key inserted from either inside or outside the door.

The bolt has a locking bracket 22 pivotally connected to an ear 23 at the rear of the bolt proper. The bracket is of double arm construction, with the arms bridged by cross over 24. The arms have opposed depending portions 25 containing similar notches 26 in their lower edges. These notches are adapted to fit over a locking pin 27, extending transversely of the housing, and the bracket holds the bolt when extended to prevent it from being retracted. To insure the bracket engaging the locking pin on each forward operation of the bolt, a spring 30 is mounted on pivot pin 31 and has an arm 23′ hooked over the side of the bracket. This will cause the bracket to make firm contact with pin 27.

The bolt has a downwardly projecting pin 32, near the rear of the bolt proper, and this pin serves as a retractor for a spring-pressed alarm actuating plunger 33, mounted horizontally just below the bolt. The plunger has a forward end 34, slidable through an opening 35 in the front wall 11 of the casing 6. It also has a tail portion 36, slidable between guide arms 37 of a support bracket 38 projecting inwardly from the side

wall 8 of the casing. The forward end 34 of the plunger has a threaded recess 39 in its back end and terminates in a nut formation 40. The forward end of tail portion 36 is threaded and carries a nut 41. The tail portion is threaded into the recess of the forward end and nut 41 locks the two in the desired position of lengthwise adjustment. A spring 42 about the tail portion, between nut 41 and arms 37 of bracket 38, urges the plunger forwardly.

At the end of the tail portion 36 of the plunger, there are two electrical contact members 43 and 44, spaced apart longitudinally of the plunger. At least that part 45 of the plunger tail portion 36 which carries the contacts 43 and 44 is of electrical conductive material, but the remaining part should be insulated to event flow of current through the plunger to the lock casing. The contacts 43 and 44 close at different times with a fixed contact 46, carried by a bracket 47 fixed to the housing side wall 8. Contact 46 extends upwardly between the contacts 43 and 44, and can be closed with one or the other of these contacts, or located between the two and out of contact with both, depending upon the position of the plunger. When the bolt is retracted, pin 32 will strike contact 43 and retract the plunger.

Contact 46 is connected by a wire 48 to one side of a battery pack 49 in a clip 50 fitted into a compartment 51 in the housing bottom. An access door 52 is positioned over the front of the lock housing and screwed in place, to allow for replacing batteries. By having the access door in the front edge, it cannot be reached to disconnect the batteries when the door is closed. Wire 53 leads from the other battery terminal to one side of a buzzer, or other suitable alarm signal, 54, also fixed to, and within, the lock housing. A common wire 55 from the contacts 43 and 44 runs to a microswitch 56, mounted against the side plate 8 of the housing, and having its operating arm 57 in the path of movement of the extension 19 of locking bolt 16, so that the arm will be operated when the bolt is fully retracted. The microswitch is a normally closed switch, and pressure upon the arm 57 by the bolt extension opens, and holds open, the circuit which the switch controls. The other side of the switch is connected by a wire 58 to the buzzer 54, to complete the alarm circuit.

When the lock is to be installed, the housing is placed against the inside surface of a door, with a mounting flange 59, which projects inwardly from the housing front wall 11, against the front edge of the door, or in a recess in the door front edge if the space between the door and frame requires it, and attached to the door by means of screws 60, through openings 61 in the housing and into the door face, and screws 62, through holes 63 in the mounting flange 59 into the door edge. With this means for attachment, the lock housing cannot be removed from the door when the door is closed.

Keeper plate 4 is attached to the door frame by means of screws 64, to position the bolt-receiving pocket 65 in alignment with bolt 16, outside the door frame. The keeper plate also has an opening 66, designed to receive plunger 33 when the plunger is in its fully extended position under the influence of spring 42. Opening 66, however, is slightly out of line with plunger 33 when the door is closed and locked, with the opening being located off of the plunger axis in a door-opening direction, so that the plunger will not enter opening 66 when the door is in normal locked position, as will be explained.

When the lock is mounted and ready for use, the threaded connection between the front and tail members of the plunger will have been adjusted so that the contacts 43 and 44 on the plunger will be out of contact with fixed contacts 46 when the plunger forward end is resting against the keeper plate.

When it is desired to close and lock the door, the door is moved to closed position and the lock mechanism (not shown) is operated by a key from either side of the door to throw the bolt to its extended, locking position. As this occurs, microswitch 56, no longer held open by pressure of the bolt, closes completing a circuit to the buzzer. As plunger 33 also moves forward with the bolt, under the influence of its spring, it soon strikes the keeper plate and stops. The bolt is free to move full distance into the pocket 65 as pin 32 will continue to move with the bolt away from contact 43, leaving the plunger spring-urged toward extended position. At this time, fixed contact 46 is between the movable contacts 43 and 44 so that the circuit to the buzzer is open.

With the door in locked condition, any movement of the door, or manipulation of the lock will cause the alarm to sound. If the door is forced inwardly, the alarm plunger is aligned with the hole 66 in the keeper plate and immediately jumps to extended position under the influence of spring 42. As soon as the plunger moves forward, contact 44 closes with fixed contact 46, completing the circuit to the buzzer and sounding the alarm. There is no way that the alarm can be shut off, except by use of a proper key to retract the lock and the plunger, and to actuate the microswitch and open the buzzer circuit. By use of the key, the locking bracket will be retracted, and the bolt will be drawn back. As the bolt moves back, pin 32 will move against contact 43 and draw back the plunger against the pressure of spring 42. This will break the connection between contacts 44 and 46 and stop the buzzer. Although the contact 43 may meet, and close with, contact 46 as the plunger moves back, the circuit will be again broken as the extension of the bolt presses switch operating arm 57 and holds the circuit open until the alarm is again set.

If, when the door is locked, the bolt locking bracket could be actuated and the bolt pushed partway back, the plunger would be moved back so that contact 43 would close with the fixed contact 46 and sound the alarm. If the door hinge pins are removed and the door pulled out of the frame at the hinge end, the alarm plunger will be free to move outwardly closing the buzzer circuit. Thus, any movement of the door from its normal locked position, or any manipulation of the lock bolt, will actuate the alarm and sound the signal. This makes the alarm effective under all circumstances attendant to improper efforts to open the door.

While in the above one practical embodiment of the invention has been disclosed, it will be understood that the particular details of structure shown and described are merely by way of illustration, and the invention can take other forms within the scope of the appended claims.

We claim:

1. A combined lock and alarm comprising, a housing, a dead bolt mounted for movement relative to the housing to a release position wholly within the housing and to a locked position projecting partially from the housing, a keeper plate having an opening to receive the bolt when projecting from the housing, a plunger within the housing movable along a path parallel to the path of movement of the bolt, a lost-motion connection between the bolt and plunger for moving the plunger to a predetermined displaced position within the housing responsive solely to the movement of the dead bolt substantially to said release position, means yieldingly urging the plunger from the housing, the keeper plate having an opening to receive the plunger, the plunger opening being laterally offset from the plunger axis when the bolt is in locked position within the bolt opening in the keeper plate, an alarm within the housing, and means carried by the plunger to cause the alarm to sound when the plunger reaches said displaced position and to sound when the plunger seats in the plunger opening in the keeper plate or otherwise reaches an extended position relative to the housing.

2. A combined lock and alarm as claimed in claim 1 wherein, there is an electric circuit for the alarm including a fixed contact, and the means carried by the plunger to cause the alarm to sound comprises a contact in the circuit and closable with the fixed contact when the plunger is in extended position.

3. A combined lock and alarm as claimed in claim 2 wherein, there is a second contact on the plunger spaced axially of the plunger from the first-mentioned plunger contact to close with the fixed contact when the plunger is retracted to said displaced position, and the fixed contact is located between the plunger contacts.

4. A combined lock and alarm as claimed in claim 3 wherein, the contacts on the plunger are spaced and positioned on the plunger so that neither contact is closed with the fixed contact when the plunger is bearing against the keeper plate.

5. A combined lock and alarm as claimed in claim 4 wherein, the circuit includes a switch having an operating arm in the path of movement of the bolt, whereby the movement of the bolt to extended position will allow the switch to close and moving the bolt to retracted position opens the switch.

6. A combined lock and alarm as claimed in claim 5 wherein, there are batteries within the housing as part of the circuit.

7. A combined lock and alarm as claimed in claim 6 wherein, there is a battery compartment within the housing and an access door removable from the housing for removal and replacement of the batteries within the compartment, the access door being on the side of the housing from which the bolt projects to lock.

8. A combined lock and alarm comprising, a housing, a dead bolt mounted for movement relative to the housing to a release position wholly within the housing and to a locked position projecting partially from the housing, a keeper plate having an opening to receive the volt when projecting from the housing, a plunger within the housing movable along a path parallel to the path of movement of the bolt, a lost-motion connection between the bolt and plunger, means yieldingly urging the plunger from the housing, the keeper plate having an opening to receive the plunger, the plunger opening being laterally offset from the plunger axis when the bolt is in locked position within the bolt opening in the keeper plate, an alarm within the housing, means carried by the plunger to cause the alarm to sound when the plunger seats in the plunger opening in the keeper plate or otherwise reaches an extended position relative to the housing, and an electric circuit for the alarm including a fixed contact, the means carried by the plunger to cause the alarm to sound comprising a contact in the circuit and closable with the fixed contact when the plunger is in extended position, the connection between the bolt and plunger including a pin depending from the bolt to strike one of the contacts carried by the plunger.

9. A combined lock and alarm as claimed in claim 8 wherein, there are means to adjust the point of meeting of the pin and the contact on the plunger when the bolt is retracted.

10. A combined lock and alarm as claimed in claim 2 wherein, there is a locking bracket pivotally connected to the inner end of the bolt to restrain the bolt from retraction when extended.

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