The present invention relates to locks. More particularly, it relates to a lock combined with an alarm actuable upon attempted forcing of said lock.

Combinations of locks and alarms have been used for a comparatively long time in protecting premises against burglaries or other unauthorized entries. Prior alarm means, however, are generally actuable only after the successful forcing of the lock. The door or other closure secured by the lock may thus be open for a time sufficient for the person forcing the lock to accomplish his purpose before the arrival of police officers or other investigators. It is therefore a general object of the invention to provide a combined lock and alarm.

A more particular object of the invention is to provide a lock having an alarm which is actuable upon an attempted forcing of the lock.

A further object of the invention is to provide a lock capable of sounding an alarm upon an attempt at forcing the lock and which subsequent to the sounding of the alarm will maintain a secure closure.

Another object of the present invention is to provide a lock having an alarm soundable upon attempted forcing of the lock together with means for testing the operability of the alarm.

Other objects and many advantages of the present invention will become evident as an understanding of the invention is gained through study of the following detailed description together with the accompanying drawings, wherein:

Fig. 1 is a perspective view of the lock of the present invention;
Fig. 2 is a section taken along the line 2—2 of Fig. 3, the parts thereof being shown in an unlocked condition of the lock;
Fig. 3 is cross section taken along the line 3—3 of Fig. 2;
Fig. 4 is a horizontal section taken along the line 4—4 of Fig. 6;
Fig. 5 is a fragmentary view corresponding to Fig. 2 in which the parts are shown advancing toward a locked condition;
Fig. 6 is a fragmentary view corresponding to Fig. 2 in which the parts are fully advanced to a locked condition;
Fig. 7 is block diagram of the alarm circuit of the invention.

As seen in Fig. 1, the embodiment of the present invention to be described in detail is of the rim type mount but it will be clear that the invention can be embodied in mortise type locks as well. The lock 10 is mounted on the interior surface of a door 11. The usual cylinder 14 and tang 26 are provided for operating the lock by key. The strike receiving the bolt 28 is not illustrated as it is of conventional design. The lock cage 22 is rectangular in section. The cover plate 24 also serves as a mounting plate for the lock 10, and is provided with holes 25 (Fig. 2) for receiving mounting screws.

Referring now to the various sectional views and particularly to Figs. 2, 5, and 6 which illustrate the progress of bolt 28 from an unlocked to a locked position. The bolt 28 projects through an aperture 32 in case 23 to engage the strike. The bolt mounting means is novel and will later be described. Presently, however, the bolt 28 and its operating mechanism will be described.

As seen in Fig. 4, bolt 28 is formed with a heavy end section for engaging the strike and a thinner tongue-like body 30. Again referring to Fig. 2, the body portion 30 carries a horizontal rib 32 which serves as a stiffener and as a bearing for a spring 48. Beneath rib 32 a rectangular aperture 34 is formed in the bolt body 30. A boss 44 projects from cover plate 24 to pass through bolt aperture 34 and serve to guide the bolt 28 during the forward travel of said bolt to a locked position. A stop face 56 formed on the rear vertical wall of aperture 24 arrests the forward motion of bolt 28 by abutment against boss 44.

Referring to Fig. 4, the body 30 of bolt 28 is centered by coil springs 66 and 68 mounted on a screw 58 plate against a face washer 60. The springs 66 and 68 bear on washers 62 and 64 placed on opposite sides of the bolt body 30 and maintain bolt 28 aligned with its direction of travel during normal operation of the lock. Upon the application of an exceptional force transversely to the bolt 28, springs 66 and 68 yield to permit transverse displacement of said bolt.

Again referring to Fig. 2, a pawl 46 is pivotally secured to bolt 28 by means of a screw 50. Pawl 46 is biased upwardly by a spring 48 having one of its ends secured to said pawl and the opposite end bearing on rib 32. Formed on the upper side of pawl 46 are a depressor lug 52 and a locking ratchet 54. Depressor lug 52 extends upward between lugs 28 and 40 formed along the side walls of a U-shaped groove in the bolt body 30. As seen in Fig. 5, tang 26 engages a cam 16 to rotate said cam upon the turning of a key in cylinder 14. As cam 16 rotates, lug 40 is engaged to move bolt 28 forward. Simultaneously, depressor lug 52 is moved to force pawl 46 downward. The bolt 28 then slides freely into the locked position shown in Fig. 6. In the locked position, pawl 46 moves upward allowing the vertical face 56 of a ratchet 54 to engage a boss 42 projecting from cover plate 24. The bolt 28 is thus jammed into a locked position which can only be released by reverse rotation of cam 16 or by forcibly distorting the working arrangement of the lock. In opening the lock, cam 16 is moved in the reverse direction by opposite rotation of the key. Depressor lug 52 is encountered to release ratchet 54 from boss 42 allowing stop face 56 of said ratchet to clear said boss, as shown in Fig. 5. Upon release of ratchet 54, cam 16 engages lug 38 to slide bolt 28 into an unlocked position, the rearward motion of said bolt being arrested by the abutment against boss 42 of a stop face 39 formed on lug 38.

As seen in Fig. 3, the lock is operated from the inside by means of a second cylinder 12, rotated by means of a key 20, indicated in outline form. A second cam 18 is secured to cylinder 12 to be rotated by said cylinder. Cam 18 is illustrated with the elongated portion thereof rotated to an upright position. Cam 18 is aligned with cam 16 and engages the lock operating mechanism including lugs 38, 40, and 52 in the same manner as does cam 16.

The construction and operation of the alarm for indicating an attempt at forcing or otherwise tampering with the lock will now be described. Referring to Fig. 2, a sensitive switch 70 of the single-pole, single-throw type is mounted beneath the tongue-like body portion 20 of bolt 28. Switch 70 contains internal springs biasing the contacts thereof toward a closed position. The contacts, however, are held open by means of a lever having a
roller 72 at its outer end. Inasmuch as switch 70 is of the type commercially available under the mark of "microswitch" it is deemed unnecessary to illustrate or describe in detail the construction thereof. Roller 72 rests on the under surface 76 of bolt body 20, the spacing of switch 70 from said body being such that the contacts of said switch are held open in the normal locked and unlocked position of the bolt 28, the motion of bolt body 30, a depression 78 is formed therein which permits sufficient upward movement of the roller 72 to close the contacts of switch 70. Depression 78 allows a momentary closure of switch 70 as bolt 28 is moved to a locked or unlocked position by means of a key. The alarm will thus be momentarily actuated to indicate its operability.

Referring to Fig. 7, the alarm in its simplest form comprises a bell 86, or similar signal, located on the protected premises or at some remote guard station. A battery 84 powers the alarm 86 and is connected thereto in a circuit including leads 80 and 82. Leads 80 and 82 are connected to switch 70, the circuit thus being open pending the closure of switch 70.

Referring now to Fig. 4, wherein the means for actuating the alarm upon tampering with the lock are seen. Springs 66 and 68 maintain bolt 28 aligned with its direction of sliding motion under normal circumstances, but if an attempt is made to jimmy or force the bolt by prying, the springs yield to permit a limited pivotal motion of the bolt. Upon pivoting the bolt to either of two positions indicated by the dotted outlines of the bolt, roller 72, being approximately equal to the thickness of bolt body 30 in width, is released to move upward and thereby close the alarm circuit. However, the alarm cannot be silenced unless the lock is disassembled. It will be understood that the alarm will be operated prior to any successful forced entrance into the protected premises, as the more pivotal motion of the bolt will not release locking ratchet 54 from engagement with boss 42. As continued effort is required after operation of the alarm to destroy the lock and gain entry, the sounding of the alarm, if located on the premises, will attract immediate attention and very likely discourage further forcing. If the alarm is located remotely at a guard station, it is very probable that alerted guards will apprehend the persons attempting to force entrance.

Obviously, many modifications and variations are possible in the light of the above teachings. It should therefore be understood the invention is limited solely by the scope of the appended claims.

What is claimed is:
1. In a lock, a sliding bolt, spring means bearing on said bolt for centering said bolt during sliding motion thereby and yieldable to permit limited pivotal motion by said bolt, and switch means including a switch actuating lever, said lever being aligned with said bolt during normal sliding motion of said bolt to maintain said switch inoperative, said switch being operable on pivotal motion of said bolt to move said bolt from alignment with said lever.
2. In a lock, a sliding bolt having an end portion of substantial thickness for engaging a strike, the remainder of said bolt being of reduced thickness, means bearing on said reduced portion of said bolt for permitting limited pivotal motion of said bolt, and switch means including a switch actuating lever, said lever being aligned with said bolt during normal sliding motion thereof, and switch means bearing on said reduced portion for actuating an alarm upon pivotal motion of said bolt.
3. A lock, comprising, a case, a bolt having a tongue in said case, means mounting said bolt for sliding motion, spring means bearing on said tongue to maintain said bolt aligned with the direction of sliding motion, a switch including a lever bearing on said tongue and disposable with said tongue upon motion of said bolt transverse to the direction of sliding motion of said bolt, locking means in said case to prevent sliding motion of said bolt, and means mounted exterior to said case for releasing said locking means.
4. A lock as claimed in claim 3, wherein said locking means includes a dog mounted in said case and a ratchet mounted on said bolt for bearing on said dog.
5. A lock as claimed in claim 4 wherein means for releasing said locking means comprises the combination of a cam in said case rotatable to bear on said ratchet, a tang engaging said cam and extending through said case, and a cylinder rotatable by means of a key for rotating said tang.
6. A lock comprising a case having an aperture therein, a bolt having a tongue mounted for reciprocating movement through said aperture, and for limited pivotal movement, said tongue being carried within said case, one edge of said tongue being straight and aligned with the direction of reciprocating of said bolt, a switch, a lever for actuating said switch and bearing on the straight edge of said tongue, locking means carried by said bolt, and means for releasing said locking means and for causing the reciprocating motion of said bolt, said last named means being operable externally of said case by a key, said switch lever being displaceable from said straight edge of said tongue upon pivotal motion of said bolt to effect the actuation of said switch.
7. A lock as claimed in claim 6 wherein said straight edge of said tongue is formed with a depressed portion so arranged that said switch lever will be momentarily displaced and said switch will be momentarily actuated thereby during reciprocation of said bolt.

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