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O. A. SHANN

2,028,171

LOCK

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FIG. 1

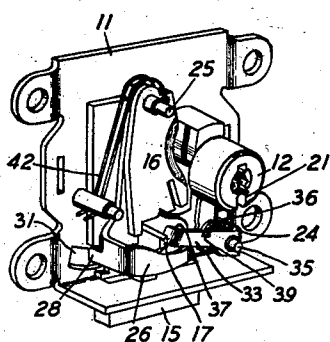


FIG. 2

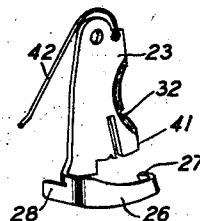


FIG. 3

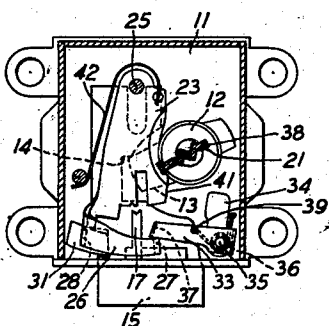


FIG. 4

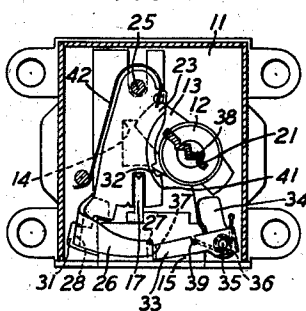


FIG. 5

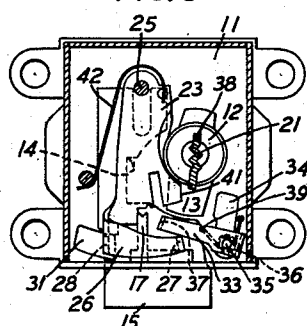


FIG. 7

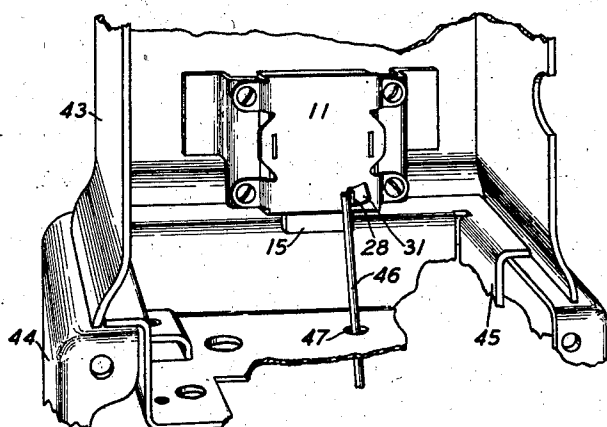
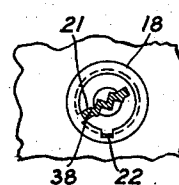


FIG. 6



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LOCK

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10 Claims. (Cl. 70—73)

This invention relates to locks and particularly to locks of the key operated type.

An object of the invention is to trap keys, by means of which unauthorized persons may be attempting to operate the lock, and to prevent the removal of the key from the lock by such unauthorized persons.

Another object of the invention is to permit the removal of the trapped keys by authorized persons without necessitating dismantling the lock or in any way damaging the lock itself or the enclosure.

It is, of course, well-known that unscrupulous persons often attempt to gain access to locked enclosures for fraudulent purposes by "picking" the lock. In order to defeat such attempts improvements in the lock mechanisms, in order to render them as nearly as possible "pick-proof", have been made from time to time. It quite often happens, however, that unscrupulous persons come into possession of the proper key for unlocking a certain lock and "pick-proofing" arrangements are, of course, no protection against such persons.

According to a feature of the invention, should an authorized person, who has come into possession of a key as above mentioned, attempt to utilize such key to operate the associated lock, not only is the lock held in a locked condition but the key itself is trapped in the lock and its removal by the unauthorized holder is prevented. Means are included, however, whereby an authorized person may "collect" the key, that is, remove it from the lock, without damaging the lock or the enclosure in any way. The "collected" key is then, of course, returned to the proper authorities.

Locks of the nature contemplated by the invention may be used, to mention one specific application, on telephone coin collectors of the general type disclosed in Forsberg U. S. Patent 1,043,219 of November 5, 1912.

In accordance with a preferred arrangement of the lock contemplated by the invention, one of the tumblers of the lock is provided with a notch of sufficient width to receive the edge of a key designed to operate the lock. Now when an attempt is made to unlock the lock, the key is inserted and rotated, the edge of the key rubbing along the tumblers until the notch is reached whereupon the edge of the key drops therein and further movement of the key in either direction is thereby prevented. The unauthorized holder of the key is therefore prevented from rotating the key further in the direction to unlock the lock and also from rotating the key in the other direction to its original position at which removal of the key would be possible.

In order that authorized persons may be able

to remove the trapped key without damaging the lock, the "trapping" tumbler, that is, the tumbler which is provided with the notch, is also preferably provided with an arm which has an extension thereon which projects through an opening in the case of the lock. An authorized person may, by inserting and manipulating a tool, in a manner to be described in detail subsequently, raise the arm by pressure on the projecting portion and thereby move the tumbler in such a manner that the key is no longer held in the notch. The tumbler is held in this raised position by a latching arrangement, to be described in detail subsequently, in order that the key may, if desired, be manipulated to unlock the lock. However, as the key is rotated to the "locked" position where it may be removed from the lock, the latching arrangement is tripped thereby permitting the trapping tumbler to drop back in position to catch a key subsequently inserted in the lock.

A thorough understanding of the operation of the arrangement contemplated by the invention as well as an appreciation of its various features may be gained from consideration of the following detailed description in connection with the attached drawing in which:

Fig. 1 is a perspective view of a lock provided with key trapping means in accordance with the invention, the cover of the lock being removed to show the inner mechanism;

Fig. 2 is a perspective view of one of the tumblers of the lock;

Fig. 3 is a top view of the lock, a key being shown trapped by the mechanism;

Fig. 4 is a top view of the lock with the trapping mechanism latched in neutral position and the bolt retracted;

Fig. 5 is a top view of the lock showing the latching means tripped by rotation of the key;

Fig. 6 is a view of a portion of the lock cover, and

Fig. 7 is a rear view of a portion of a telephone coin collector showing the lock in place and a special tool being used to free a trapped key.

Referring now to the drawing, a lock 11 is shown which may be, so far as the bolt, key operated tumblers, key barrel etc. are concerned, of ordinary construction, for example of the type fully described in U. S. Patent 1,793,254 granted to me February 17, 1931. While it is not believed necessary to describe these parts of the lock or their operation in detail, it might be pointed out, in order to aid in the understanding of the key trapping means with which the present invention is concerned, that key barrel 12 is provided with a projection 13 which, when the barrel is rotated, strikes shoulder 14 of bolt 15 and causes retraction thereof, a plurality of key operated tumblers or levers 16 are arranged adjacent the key barrel

having faces of different lengths to correspond to notches in the operating key. (Only one of these levers is shown in order to avoid unnecessary complication of the drawing). The lower portions of the tumblers have projections which extend into the path of lug 17 provided on bolt 15 and prevent retraction of the bolt unless the projections are aligned and withdrawn from the path of the lug by rotation of a properly designed key in the key barrel.

As usual in locks of this general type, and as shown in Fig. 6, a portion 18 of the lock cover is extended and encloses key barrel 12, the edge of the extended portion overlapping the end of the key barrel in such a manner that a key designed to operate the lock can be inserted into key slot 21, or removed therefrom, only if the barrel is rotated to the point at which the end of the key slot registers with recess 22 provided in the extended portion of the cover. This point of rotation of the key barrel corresponds to the fully extended position of the bolt.

In addition to the above described parts of more or less standard design, the lock is provided with a special trapping tumbler 23 and a latching member 24. Tumbler 23 is rotatably mounted on pin 25, as are the other key operated tumblers, and is provided with extension 26, the ends 27 and 28 of the extension being bent at right angles to its major length. One of these ends, 28, passes through slot 31 provided in the rear cover of the lock. A notch 32 is provided in the key operative face of the tumbler, the width of the notch being sufficient to receive the edge of a key designed to operate the lock.

The latch member 24 comprises two arms 33 and 34 the major axes of which are, roughly, at right angles to each other. The two arms are connected by a bridging member, the assembly being pivotally mounted on pin 35. Coiled spring 36 is associated with the latch member and acts to normally rotate it in a counterclockwise direction, one end of the spring being attached to the case of the lock and the other end being positioned in notch 39 provided in arm 33. One end, 37, of arm 33 is bent at right angles to the major length of the arm as shown in Fig. 1.

Let us assume now that an attempt is made to unlock the lock by the use of a key properly designed to operate the lock. The various parts of the lock will be assumed to be in their normal position, as shown in Fig. 1. Assuming that a key, 38, be inserted in key slot 21 and key barrel 12 rotated therewith, the key operated tumblers 16 will be moved in the usual manner and the special tumbler 23 will also be moved in the same way due to the action of the key on its face 41. As the key edge passes over face 41 however, the point is reached at which notch 32 registers with the edge of the key, whereupon tumbler 23 due to the action of spring 42, drops back, as shown in Fig. 3, and catches the edge of the key in notch 32.

As clearly shown in Fig. 3, rotation of the key in either direction is now prevented and it is apparent, therefore, that the holder of the key is prevented both from rotating the key in a clockwise direction to unlock the lock and from rotating it in a counterclockwise direction to remove the key. Obviously the key cannot be removed from the key barrel when it is in the position shown in Fig. 3 for, as more clearly illustrated in Fig. 6, the end of key slot 21 is not in registry with recess 22.

Let us assume now that an authorized person

visits the premises and, finding the trapped key, wishes to remove it. There is shown in Fig. 7 a portion of a telephone coin collector which may be of the general type described in Forsberg U. S. Patent 1,043,219 of November 5, 1912. The view is taken from the rear of the collector, the usual back plate being omitted to facilitate illustration of the invention. It will be understood however that this back plate is to be provided as usual and that it acts to close the rear openings of upper housing 43 and lower housing 44 and also that it cooperates with certain portions of the housings in such a manner that upper housing 43 can not be removed from lower housing 44 unless bolt 15 of lock 11 be fully retracted. It will be understood that wall 45 is rigidly attached, for example by welding, to housing 44.

The authorized person in order to free the trapped key, first gains access to the interior of the lower housing by unlocking and removing the door of the cash receptacle housing which comprises the greater portion of the lower housing. He next inserts the end of tool 46 through the cash receptacle housing and up through hole 47, provided in upper wall 45 thereof, and then manipulates the tool to push end 28 of tumbler 23 sideways.

It will be remembered that before the above operation, that is when the key was trapped, the mechanism was in the position shown in Fig. 3.

As extension 28 is moved to the left (looking at the front of the lock as in Fig. 3) tumbler 23 of course moves in this direction thereby releasing the edge of key 38 from notch 32. Now as extension 26 of the tumbler is moved to the left, end 27 is moved out of contact with end 37 of latch arm 33 whereupon latch member 24, due to the action of spring 36, rotates about its pivot in a counterclockwise direction until the lower edge of arm 33 strikes the lower end of the lock case (the position shown in Fig. 4). Now when the pressure applied to end 28 by tool 46 is removed spring 42 tends to cause tumbler 23 to assume its previous position of Fig. 1. This is prevented however by contact of end 27 with end 37 of the latch member so that, as shown in Fig. 4, the tumbler is now held or latched in neutral position and the key may be rotated to retract the tumbler.

In order to remove the key it will, of course, be necessary to rotate the key barrel in a counterclockwise direction until the end of the key slot 21 registers with recess 22. Assuming that this be done, it is shown in Fig. 5 how latch member 24 is tripped just before this point of registry is reached in order that the mechanism be returned to the position of Fig. 1 to trap a key subsequently inserted. Referring, then, to Fig. 5, as the key barrel is rotated in a counterclockwise direction the point is reached where the edge of extension 13 contacts with the edge of arm 34 and, as rotation of the barrel continues, the latch member is rotated against the action of spring 36 and end 37 of arm 33 is carried out of the path of end 27 whereupon tumbler 23 due to the action of spring 42, returns to its normal position of Fig. 1.

While certain embodiments of the invention have been selected for detailed description, the invention is not of course limited in its application to the embodiments described. These embodiments should be taken as illustrative of the invention rather than restrictive thereof.

What is claimed is:

1. A lock comprising a casing having a hole

therein, a barrel having a slot therein for reception of a key, a bolt, a plurality of key operated tumblers for controlling the retraction of the bolt, one of said tumblers having a notch on its key operative face of sufficient width to receive the edge of the proper operating key, said notch being so located that the key is engaged thereby and held from further rotation before sufficient rotation thereof to cause retraction of the bolt, and an arm on said tumbler extending through said hole in the casing whereby the tumbler may be manipulated independently of the key action.

2. A lock comprising a casing having an aperture therein, a bolt, a barrel having a slot for the reception of a key, means for trapping a key inserted in said slot and preventing its removal and an arm associated with the trapping means, a part of said arm passing through the aperture in the casing of the lock and providing a slidable projection the manipulation of which is effective to free a trapped key, said trapping means being effective to prevent sufficient rotation of the key to cause retraction of the bolt.

3. In a lock of the key operated type, means for trapping a key inserted therein and preventing its removal, means for manipulating the trapping means to free a key trapped thereby and means effective upon the key being freed for holding the trapping means in neutral position.

4. In a lock of the key operated type, means for trapping a key inserted therein and preventing its removal, means for manipulating the trapping means to free a key trapped thereby, means effective upon the key being freed for holding the trapping means in neutral position and means for rendering said last mentioned means ineffective before the freed key is removed from the lock.

5. In a lock of the type comprising a bolt, a barrel having a slot for the reception of a key, a key operated tumbler for controlling retraction of the bolt, means for trapping a key inserted in the slot and preventing its removal therefrom, means for manipulating the trapping means to free a key trapped thereby and means effective upon such manipulation for holding the trapping means in neutral position to permit complete rotation of the key in the direction to retract the bolt and limited rotation in the opposite direction, a complete rotation of the key in said opposite direction rendering said holding means ineffective.

6. In a key operated lock of the type comprising a casing, a bolt, a barrel having a slot for the reception of a key, a portion of the casing being so arranged with respect to the barrel that a key can be inserted therein or removed therefrom only when the slot registers with a certain definite point in said portion of the casing, a key operated tumbler for controlling the retraction of the bolt, key trapping means effective after partial rotation of a key inserted in the barrel to prevent additional rotation of the key in either direction, the point at which the key is held being so chosen that the slot in the barrel is out of registry with the point in the portion of the casing at which a key may be inserted or removed, means whereby the trapping means may be manipulated from the exterior of the casing to free a trapped key and means effective upon such manipulation, to hold the trapping mechanism in neutral position.

7. In a key operated lock of the type comprising a casing, a bolt, a barrel having a slot for the

reception of a key, a portion of the casing being so arranged with respect to the barrel that a key can be inserted therein or removed therefrom only when the slot registers with a certain definite point in said portion of the casing, a key operated tumbler for controlling the retraction of the bolt, key trapping means effective after partial rotation of a key inserted in the barrel to prevent additional rotation of the key in either direction, the point at which the key is held being so chosen that the slot in the barrel is out of registry with the point in the portion of the casing at which a key may be inserted or removed, means whereby the trapping means may be manipulated from the exterior of the casing to free a trapped key and means effective upon such manipulation to hold the trapping mechanism in neutral position, said last mentioned means remaining effective during limited rotation of the key barrel, rotation of the key barrel to the point at which the key may be removed from the lock rendering said last mentioned means ineffective.

8. A lock comprising a casing, a barrel having a slot therein for reception of a key, a bolt, a plurality of key operated tumblers for controlling the retraction of the bolt, one of said tumblers having a notch on its key operative face of sufficient width to receive the edge of the proper operating key, an arm on said tumbler by means of which the face of the tumbler may be moved out of the path of the key and means effective upon the tumbler being moved out of the path of the key for holding said tumbler in such position.

9. A lock comprising a casing, a barrel having a slot therein for reception of a key, a bolt, a plurality of key operated tumblers for controlling the retraction of the bolt, one of said tumblers having a notch on its key operative face of sufficient width to receive the edge of the proper operating key, an arm on said tumbler by means of which the face of the tumbler may be moved out of the path of the key and means effective upon the tumbler being moved out of the path of the key for holding said tumbler in such position, said last mentioned means remaining effective during complete rotation of the key in the direction to cause retraction of the bolt, a complete rotation of the key in the opposite direction rendering said last mentioned means ineffective.

10. A lock comprising a casing, a barrel having a slot therein for reception of a key, an extension on said barrel, a bolt, a plurality of key operated tumblers for controlling the retraction of the bolt, one of said tumblers having a notch on its key operative face of sufficient width to receive the edge of the proper operating key, an arm on said tumbler by means of which the face of the tumbler may be moved out of the path of the key, a latch including two arms, one arm being effective upon the tumbler being moved out of the path of the key for holding said tumbler in such position during complete rotation of the key in the direction to cause retraction of the bolt, contact between said barrel extension and the other arm of said latch resulting from rotation of the key in the opposite direction being effective to move the first mentioned arm out of the tumbler holding position.

OSCAR A. SHANN.