

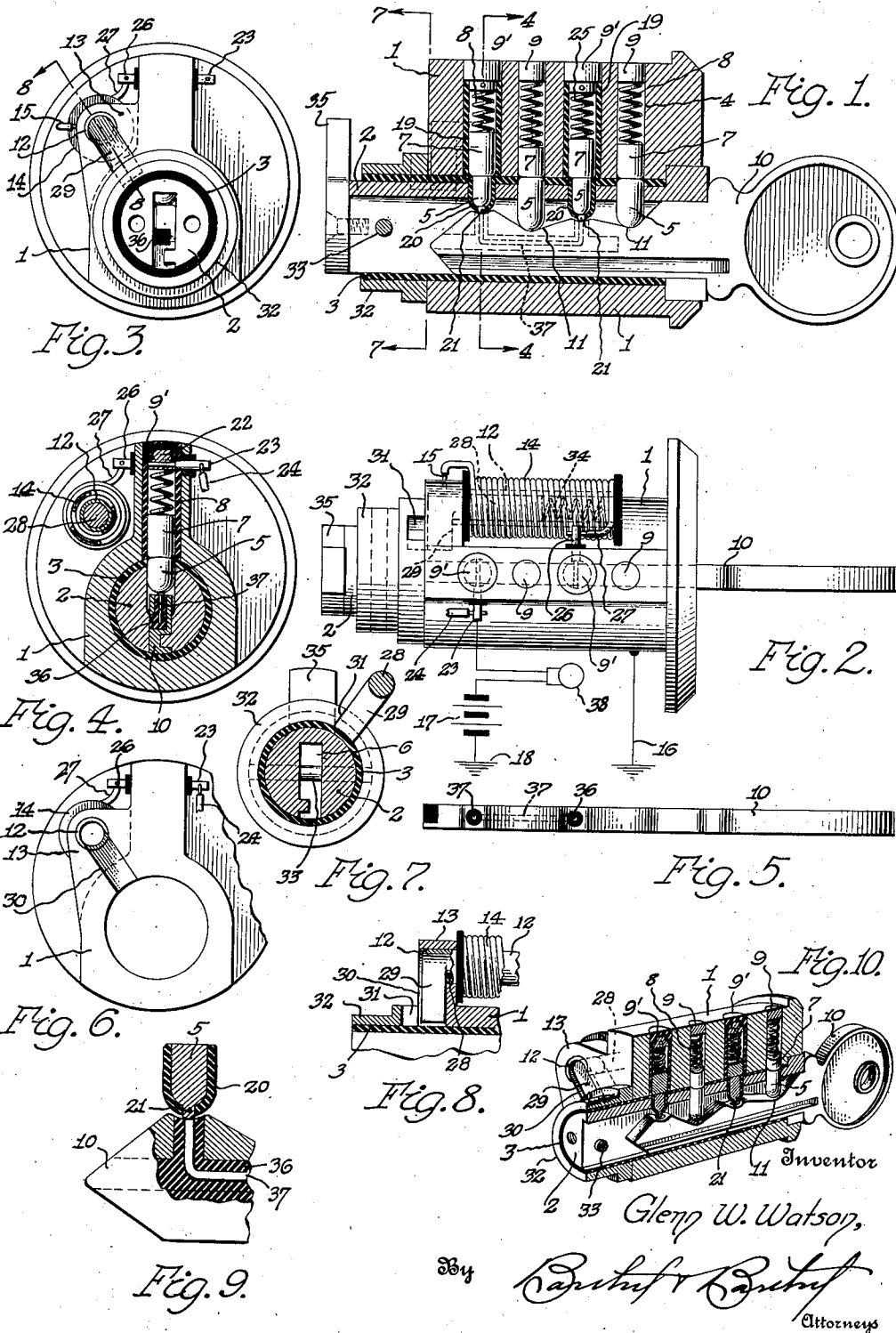
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ELECTRIC LOCK

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ELECTRIC LOCK.

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The present invention pertains to a novel lock controlled by a key which, in addition to its usual function, is modified to control an auxiliary locking mechanism which may be associated with the lock or with some independent device.

The principal object of the invention is to provide a lock which cannot unauthorizably be opened by mere duplication of the key. There is provided an auxiliary locking device between the relatively movable parts of the lock proper, and the release of the auxiliary device depends on the closing of a circuit governed by one or more conducting paths arbitrarily formed within the key. It is preferred that the circuit include at least two of the tumblers of the lock, and the bridging of these tumblers depends on the formation of a conducting path in the key between the notches or recesses thereof corresponding to said tumblers in the circuit. Such a device is of unlimited application and may in fact be employed wherever locks are necessary.

The invention is fully set forth by way of example in the following description and in the accompanying drawing, in which—

Figure 1 is a longitudinal section of a device constructed according to the invention;

Fig. 2 is a side elevation thereof;

Fig. 3 is an end view;

Fig. 4 is a transverse section on the line 4—4 of Figure 1;

Fig. 5 is an edge view of the key;

Fig. 6 is a detail end view with the barrel removed;

Fig. 7 is a transverse section on the line 7—7 of Figure 1;

Fig. 8 is a detail longitudinal section showing the auxiliary locking device;

Fig. 9 is a detail longitudinal section through one of the tumblers and a part of the key; and

Fig. 10 is a longitudinal perspective section.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The invention is described for purposes of illustration in connection with a lock of the tumbler type comprising a body 1 in which a barrel 2 is rotatably mounted. In the present instance however it is preferred to insert an insulating sleeve 3 between the body and the barrel for the purpose of isolating certain parts from electrical contact with each other as will presently appear.

The body is formed with a series of radial apertures 4, each of which contains a tumbler assembly including a tumbler pin 5 slidable through the sleeve and barrel into a slot 6 in the barrel, and a follower 7 backed by a spring 8 retained by a plug 9 inserted in the outer end of the aperture. In accordance with the usual practice, the tumbler pins are of unequal length, and when received in a key 10 having recesses or depressions 11 of proper depth, bring the planes of partition between the members 5 and 7 into the plane of separation between the body 1 and barrel 2 so that the latter may be turned.

Such a lock is modified for the purpose of the present invention by means of an auxiliary locking device operating on an electric circuit also controlled by the key. This device involves an electromagnet supported on a tube 12 having its ends secured in ears 13 formed on the body of the lock. The coil 14 of the magnet is wound on the tube 12 and has one end 15 grounded by attachment to the body which in turn is grounded as indicated by the numeral 16. Current is supplied to the coil from a battery 17 having one terminal grounded as at 18 and the other end joined to one of the tumblers. In order that such electrical connection between the battery and the tumbler may be made to the exclusion of other parts of the lock, the said tumbler is equipped with a surrounding insulating sleeve 19 in which it moves. The insulating sleeve is extended at 20 to surround the corresponding tumbler pin except the tip thereof and is merged at its upper end into the spring retaining nut 9' which must also be formed of insulating material. A metallic insert 22 is fitted into the nut and is engaged by a binding post 23 to which is connected the conductor 24 leading from the battery, so that the circuit is continued through the corresponding spring 8 and tumbler members to the tip of the tumbler pin.

Another tumbler assembly, designated by the numeral 25 is isolated from electrical contact with the body in the manner already described and is equipped at its upper end with a binding post 26 to which is connected the remaining end 27 of the coil 14. It will now be apparent that the circuit for supplying current to the coil has a gap between the two insulated tumbler assemblies and is inoperative unless the gap is bridged.

The auxiliary locking device further includes the magnet armature 28 which has at

one end a lug 29 movable through a slot 30 in one of the ears 13 and into a notch 31 formed in a sleeve 32 surrounding the insulating sleeve 3 at one end thereof and secured to the barrel 2 by a pin 33 passed through the several parts. A spring 34 bearing on one end of the armature 28 within the tube 12 normally forces the lug 29 into the slot 31 and is retracted only when the coil is energized. The lug thus holds the barrel 2 locked to the body independently of the tumblers. The inner end of the barrel further carries a lug 35 which may serve to lock still another device. The auxiliary locking device already described is an adjunct to the key 10 in controlling the movability of the barrel 2 but may however be associated with some device independent of the barrel.

If a key having the proper shape with respect to the tumbler receiving recesses, or in fact having any shape permitting entry for a considerable distance into the slot 6, be inserted in the slot, the insulated tumblers will be electrically connected, but the current will also flow from the key to the barrel 2, thence to the body 1 either by direct contact or through the pin 33, and finally to the ground without passing through the magnet nor operating the auxiliary device. It is therefore necessary that the key be adapted to form exclusive electrical communication between the insulated tumblers without permitting the current to be grounded before passing through the coil.

In order to satisfy this requirement I insert in the key 10 an insulating bushing 36 joining the points of the particular recesses 11 which are engaged by the insulated tumblers when the key is inserted to its entire extent. In this bushing is provided a conductor 37 having its bare ends exposed at the notched edge of the key and engageable only by the tips 21 of the insulated tumblers. This arrangement completes the circuit to the coil by connecting the insulated tumblers, and further prevents escape of current to the ground before passing through the coil. The ends of the isolated conducting path must be in the hills or valleys of the key edge, in order to meet the tips 21.

The positioning of the isolated conducting path between the proper points on the key constitutes another factor in the lock combination and doubles the complexity of the combination. Moreover, a key of given shape is capable of considerable variation merely by altering the position of the ends of the conducting paths, and in this way a single key profile is sufficient to serve a plurality of different locks, whereas in the present practice a single profile is useful for only one lock. It will readily be apparent that the completion of the circuit through the coil may be made to depend on the joining of several pairs of tumblers by means of isolated

conducting paths in the key, and the complexity of the combination is multiplied by the number of such paths. In the event that only one tumbler makes electrical contact with an end of the conducting path, the other end of the path will obviously be grounded through the body 1.

A lamp 38 is inserted in the conductor 23 between the battery 17 and the first tumbler in order to reduce the current flowing to the coil and thus prevent sparking at the tips of the insulated tumblers.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:

1. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device between said body and barrel, a broken circuit connected to said auxiliary device, and a key insertable in said barrel and adapted to complete said circuit.

2. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device between said body and barrel, a circuit for supplying current to said device, said circuit passing through at least one of said tumblers and having a gap at said tumbler, and a key insertable in said barrel for engagement with said tumblers and adapted to close said gap.

3. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device between said body and barrel, a circuit for supplying current to said auxiliary device, said circuit including two of said tumblers and being open between said tumblers, and a key insertable in said barrel and adapted to make electrical connection between said tumblers.

4. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device between said body and barrel, a circuit for supplying current to said auxiliary device, said circuit including two of said tumblers and being open between said tumblers, and a key having an isolated conducting path adapted to make electrical connection between said tumblers.

5. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device between said body and barrel, a circuit for supplying current to said auxiliary device, said circuit including two of said tumblers and being open between said tumblers, and a key insertable in said barrel and having depressions adapted

to receive the ends of said tumblers, said key having an isolated conducting path joining the depressions corresponding to the tumblers contained in said circuit.

5 6. In a locking device, a body, a barrel rotatably mounted therein, tumblers adapted to lock said barrel to the body, an auxiliary electrically controlled locking device, a broken circuit including said auxiliary de-
10 vice, and a key insertable in said barrel and adapted to complete said circuit.

15 7. In a locking device, a body, a barrel rotatable therein, tumblers adapted to lock said barrel to the body, an electromagnet mounted on said body and having an armature slid-
able therein, a keeper member fixed to said barrel and adapted to receive said armature; a spring device normally projecting the
armature into the keeper member, a broken

circuit including said magnet, and a key 20 adapted to complete said circuit.

8. In a locking device, a body, a barrel ro-
tatable therein, tumblers adapted to lock said
barrel to the body, an electromagnet mount- 25
ed on said body and having an armature slid-
able therein, a keeper member fixed to said
barrel and adapted to receive said armature,
a spring device normally projecting the
armature into the keeper member, a circuit
for supplying current to said magnet, said 30
circuit including two of said tumblers and
being open between said tumblers, and a key
insertable in said barrel and having an iso-
lated conducting path adapted to make elec-
trical connection between said tumblers. 35

In testimony whereof I affix my signature.

GLENN W. WATSON.