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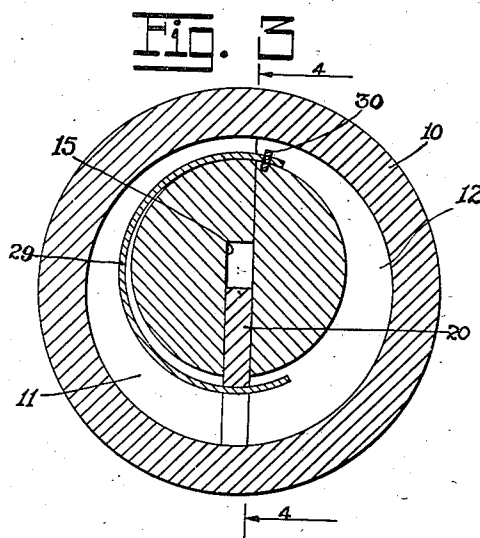
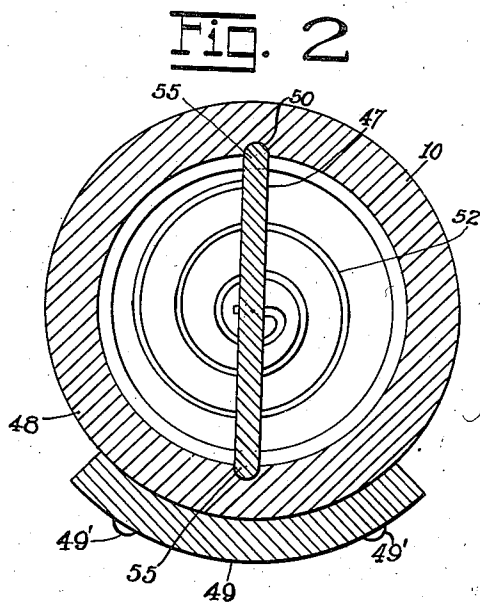
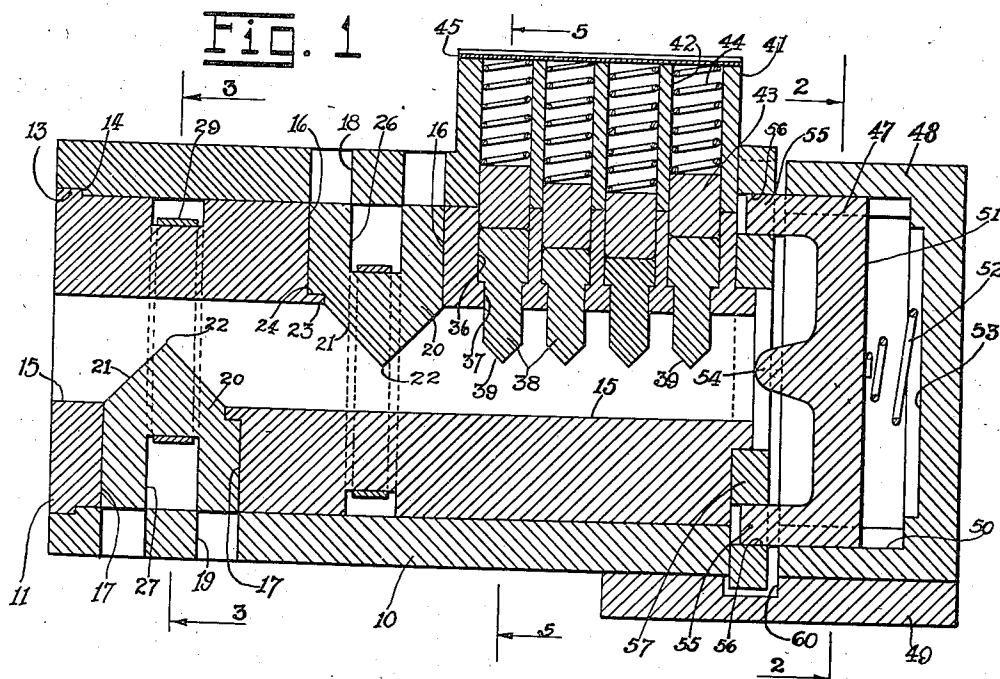
S. SINGER ET AL

2,064,955

LOCK

Filed April 18, 1934

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

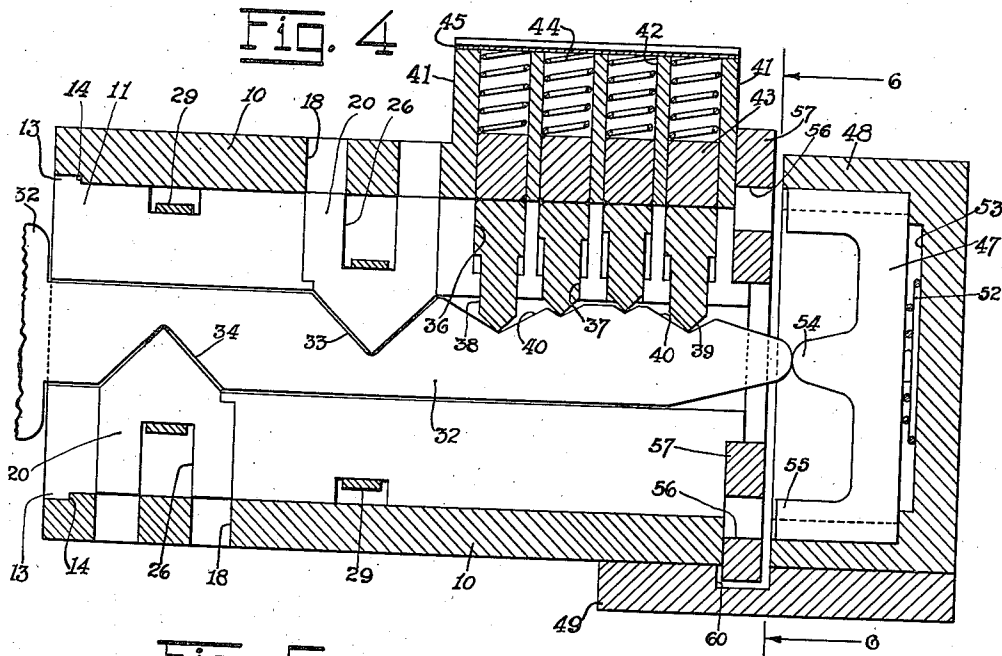
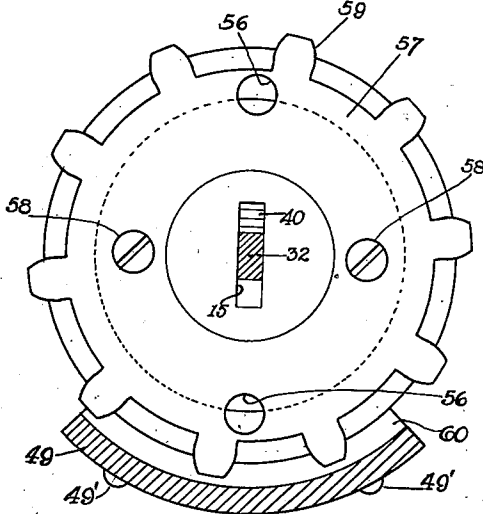
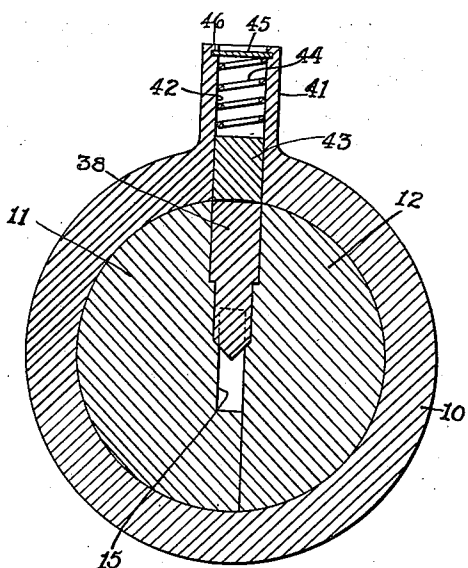


Fig. 5

Fig. 6



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UNITED STATES PATENT OFFICE

2,064,955

LOCK

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10 Claims. (Cl. 70—47)

This invention relates to improvements in locks and relates more particularly to a novel lock of the pin tumbler type wherein a new combination of elements is employed to produce a positive locking device which cannot be actuated unless the proper key is used.

The pin tumbler lock in its several variations is relatively old in the lock art, and up until recent years has been regarded as substantially pick-proof. It has been found, however, that some of the persons more skilled in the surreptitious and unauthorized opening of locks have experienced little difficulty in opening, without the aid of a key, even the highest grade of pin tumbler locks, fine needles or picks being employed to move the individual tumblers in order that the cylinder or barrel may be revolved to perform its bolt operating function.

The present invention has for its principal object the provision of an improved lock having a new combination of elements which render it virtually impossible to actuate without the proper key.

To this end the invention includes the provision of a lock having a modified arrangement in the pin tumbler structure and having a plurality of opposed key hole guards which normally close the key aperture and which, when they are moved out of their normal position, by the introduction of some foreign lock opening means into the aperture, positively lock the barrel against rotation. The invention further includes the provision of a rear locking dog which is releasable only by means of engagement with a member which is held rigidly in a proper position within the slot, the end of the special key being employed for this means.

Another object of the invention is the provision of a novel lock having a plurality of releasable locking elements which must be actuated at the same instant to effect a movement of the bolt.

Still another object of the invention is the provision of an improved lock having a plurality of locking elements, which is simple and inexpensive in construction and reliable in operation.

Other objects and advantages of the invention will be hereinafter specifically pointed out, or will become apparent, as the specification proceeds.

With the above indicated objects in view, the invention resides in certain novel constructions and combinations and arrangements of parts, clearly described in the following specification and fully illustrated in the accompanying draw-

ings, which latter show embodiments of the invention as at present preferred.

In said drawings:

Fig. 1 is a vertical longitudinal section taken substantially through the center of the embodiment in its presently preferred form.

Fig. 2 is a transverse vertical section taken on line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical section taken on line 3—3 of Fig. 1.

Fig. 4 is a longitudinal vertical section taken on line 4—4 of Fig. 3, this view showing the position of the key when the tumblers and the other elements are in position to be actuated.

Fig. 5 is a transverse vertical section taken on line 5—5 of Fig. 1.

Fig. 6 is a transverse vertical section taken on line 6—6 of Fig. 4.

The preferred embodiment of the invention which is chosen for illustration in the drawings, includes a cylindrical casing 10 within which is mounted a cylindrical barrel structure which is formed from two elongated semi-cylindrical portions 11 and 12. The two portions of the barrel are provided with an annular flange 13 around the outer end thereof, said flange engaging a seat 14 formed in the outer casing, in order to limit the inward movement of the barrel structure.

The section in Fig. 1, as heretofore stated, is taken substantially through the center of the barrel, whereas the section shown in Fig. 4 is taken slightly to the right thereof, this view showing a side elevation of the flat vertical face of the semi-cylindrical portion 11. This portion 11 is provided with a longitudinal slot 15 which is substantially rectangular in transverse section, as shown in Figs. 3 and 6, this slot functioning as the aperture into which the key is inserted. The barrel portion 11 is further provided with a vertical slot 16 extending from the upper edge thereof to the slot 15, and also with another slot 17 extending from the lower surface thereof, upwards to the slot 15.

Aligned with slots 16 and 17, respectively, in the barrel portion 11, are a pair of slots 18 and 19 respectively, in the outer casing 10, all as shown in Figs. 1 and 4. A substantially U shaped flat steel slot guard or zero tumbler 20 having an angular point 21 at the inner end thereof, is positioned in the upper vertical slot 16, and also in the lower vertical slot 17.

It will be noted from Figs. 1 and 4 that the point 22 which forms the inner end of the upper and lower slot guards, respectively, extends slightly more than half the depth and height, 55

respectively, of the slot 15, in order that any foreign member which may be introduced into the slot horizontally will engage one or the other of these slot guards.

5 The inward movement of the slot guards is limited by means of a horizontal extension portion 23 in the barrel 11, said extension portion engaging a cut-away portion 24 in the slot guards. The following means are provided for
10 normally urging the slot guards inwardly to the position shown in Figs. 1 and 4. The barrel structure is provided with annular slots 26 and 27, respectively, said slots being positioned in the center of the slots 16 and 17, respectively.

15 It will be noted from an examination of Figs. 1 and 3, that the annular slots 26 and 27 are formed eccentrically of the barrel, the slot 26 being formed somewhat below the center of the barrel, and the slot 27 being formed above the
20 said center, the latter slot being illustrated in detail in Fig. 3. Within each slot a flat annular spring 29 extends substantially two-thirds of the periphery of the slot, each of said springs being secured at one end thereof by a pin 30. The
25 opposite end of the spring is free to move outwardly when the slot guards are actuated as stated heretofore. The flat springs 29 also function to retain the two portions of the barrel together when the lock is unassembled, although
30 no such support is needed when the lock is completely assembled.

It is obvious that when a key or other member is inserted into the slot 15, the first members which will be engaged by the key will be
35 the slot guards 20. Any such engagement, however slight, will move said slot guards rearwardly into the slots 18 and 19 in the outer casing, thereby positively securing the barrel against any rotative movement. In order to
40 permit the slot guards to return to their normal position when the proper key, which is designated 32, is inserted in its key aperture, said key is provided with a triangular cut-away portion 33 on the upper longitudinal edge thereof,
45 and another triangular cut-away portion 34 on the lower edge, said cut-away portion being positioned relative to the slot guards 20.

The pin tumbler arrangement, which constitutes the primary locking element, is as follows:
50 The barrel member is provided with a plurality of vertical apertures 36 extending downwardly from the upper surface thereof to the slot 15, said apertures having a reduced portion 37 to form a seat to limit the downward movement of
55 a plurality of headed tumblers 38, said tumblers having tapered lower end portions 39. The tumblers are of varying lengths, as shown in Figs. 1 and 4, in order that when the key is inserted within the key aperture, the upper ends
60 thereof will be moved upwardly, by the varying slots 40 in the key, to the same level, to wit, level with the upper surface of the barrel structure, as shown in Fig. 4.

The outer casing is provided with an upwardly
65 extending portion 47 having apertures 42 which are aligned with the apertures 36 in the barrel structure. A plurality of short pins 43 are normally positioned in both apertures, said pins engaging the upper surfaces of the tumblers.
70 The pins are urged downwardly by means of small coil springs 44, said springs being supported at their upper ends by means of a retaining plate 45 which is positioned in a slot 46 in said upwardly extending portion 41.

75 Thus, it will be seen that before the barrel

member may be revolved, the slot guards 20 must return to their normal position and the pin tumblers elevated so that their upper surfaces will be flush with the upper surface of the barrel structure. The embodiment, however,
5 provides one further releasable locking means which must be actuated before the barrel may be turned. A substantially E shaped locking dog 47 is mounted in a circular cap-shaped housing 48 which is connected with the outer casing 10
10 by means of an elongated plate 49 which is arcuate in transverse section, said plate being secured to the casing and the housing 48 by means of screws 49'. The housing is provided
15 with opposed slots 50 in which the semi-circular end portions of the locking dog are positioned. The rear vertical edge 51 of the locking dog is engaged by a relatively heavy conical compression coil spring 52, the larger end of which rests
20 in a recess 53 in the inner vertical face of said housing. The central protruding portion 54 of the locking dog is rounded or substantially ball-shaped, and the end portions 55 of the upper
25 and lower protruding portions normally reside in opposed apertures 56 in a circular member 57 which is secured to the inner end of the barrel member by means of screws 58. The circular
30 member 57 is shown in Fig. 6 as being provided with spaced teeth 59 to provide a gear to transmit the motion of the cylinder to the lock mechanism when said cylinder is revolved. It will be appreciated, of course, that this gear structure
35 may be replaced by a cam or any other means well known in the lock art. In order to provide ample clearance for the rotative movement
40 of the gear, the plate 49 is provided with a transverse slot 60.

As just stated, the upper and lower protruding portions 55 of the locking dog are normally urged by the spring 52 in the apertures 56 in the circular member 57, which is rigidly carried by the barrel structure. Thus, it will be appreciated that no rotative movement of the barrel
45 member can take place, regardless of the position of the slot guards and the pin tumblers until the locking dog has been moved rearwardly to a point where the upper and lower protruding portions 55 thereof have moved completely
50 out of the apertures 56 as shown in Fig. 4. When all three things are accomplished, the barrel may be readily revolved one complete revolution, thereby performing its bolt operating function.

From the foregoing construction, it will be apparent that practically any effort to move the
55 locking dog rearwardly will be thwarted because of the rounded construction of the central protruding portion 54, inasmuch as unless the instrument is firmly supported from without, it will certainly pass to one side or the other of
60 the central portion 54 which will cause the locking dog to jam in its guiding slots. Also, in view of the fact that the spring 52 is of substantial strength, any means which could be employed to retain the locking dog in its retracted position would most assuredly engage
65 one or the other of the slot guards, thereby preventing rotative movement of the cylinders. Even though, in an exceptional case, the slot guards are permitted to stay in their normal
70 position, there would still be no room left in the slot to actuate the tumblers by wires or otherwise.

The hereinbefore described construction admits of considerable modification without de- 75

parture from the invention; therefore, it is the wish not to be limited to the precise arrangements shown and described, which are as aforesaid, by way of illustration merely. In other words the scope of protection contemplated is to be taken solely from the appended claims, interpreted as broadly as is consistent with the prior art.

What we claim is:

1. In a combination of the type described, a substantially cylindrical housing having a cylindrical bore therethrough, said housing having two pairs of spaced apart opposed radial openings therein, a cylindrical barrel having a centrally disposed aperture therethrough rotatively disposed in the bore of said housing, a pair of retractable opposed slot guards carried by said barrel, and normally extending into the aperture therein, said slot guards being provided with integral feet adapted upon actuation of the guards to engagement with the housing at the radial holes therein, means for normally causing said guards to extend into the central aperture in said barrel, an integral extension of the main housing radially extending therefrom at one end thereof, a plurality of tumblers carried in said extension, means for resiliently normally urging said tumblers into the aperture extending through the center of the barrel, means adapted to receive said tumblers when forced out of their normal position within the barrel, a bolt actuating means secured to the end of said rotatable barrel, said last mentioned means being provided with a plurality of longitudinal orifices, an end cap for said housing, means for securing said end cap to said housing, said end cap being provided with longitudinal slots therein, a dog adapted to slide within said slots, said dog having a pair of opposed feet adapted to engagement in the longitudinal holes in the bolt actuating means, and a central integral projection thereon adapted to extend into the aperture in the barrel at one end thereof, and means between the inner surface of the cap and said dog for normally urging said dog into engagement with the bolt actuating means.

2. In a lock having a housing provided with opposed spaced-apart apertures therein, a rotatable member positioned within said housing, a longitudinal key aperture in said rotatable member, and a primary locking element, the combination of yieldable means normally lying within said rotatable member and extending into said key aperture, said means comprising a pair of flat, substantially U shaped opposed spaced-apart key aperture guards adapted to move into the opposed apertures in the housing when a member is inserted into said key aperture, thereby securing the rotatable member against rotation, said guards being of substantially the same width as that of the apertures, the inner terminals of each of said guards, respectively, normally lying at a point beyond one half the depth of said aperture, and a pair of spaced annular springs engaging said key aperture guards and urging same inwardly.

3. In a lock having a housing, a rotatable member positioned within said housing, a longitudinal key aperture in said rotatable member and a primary locking element, the combination of a plurality of supplemental locking elements, one of said supplemental locking elements comprising a pair of opposed spaced-apart key aperture guards normally lying within the rotatable member and extending into the key

aperture and adapted to be moved outwardly to engage the housing when a member is inserted into the key aperture, the other of said supplemental locking elements comprising a latch member positioned at the rear end of the rotatable member and normally securing same against rotation, an outwardly protruding portion formed substantially at the center of said latch member and adapted to be engaged by the end portion of a key to move the latch member out of locking engagement.

4. In a lock having a housing, a rotatable member positioned within said housing, a longitudinal key aperture in said rotatable member, and a primary locking element, the combination of yieldable means positioned at the rear end of said rotatable member to normally secure the latter against rotation, said yieldable means comprising a locking member, the end portions of which normally engage the end of the rotatable member, the central portion of said locking member being rounded and positioned adjacent to the end of the key aperture and adapted to be engaged by the end portion of a key.

5. In a lock having a housing, a rotatable member positioned within said housing, a longitudinal key aperture in said rotatable member, and a primary locking element, the combination of yieldable means positioned at the rear end of said rotatable member to normally secure the latter against rotation, said yieldable means comprising a substantially E shaped locking member, the transverse end portions of which normally engage the end of the rotatable member, the central portion of the locking member being rounded and positioned adjacent to the end of the key aperture and adapted to be engaged by the end portion of a key.

6. In a lock of the class described, a cylindrical housing, an elongated, rotatable apertured member disposed within said housing, yieldable means normally extending from said elongated member into the housing to secure the former against rotation, a second yieldable means normally disposed wholly within said elongated member but being outwardly moveable in the same plane as said first yieldable means, and a third yieldable means positioned at one end of said elongated member normally securing same against rotation, said third means comprising a locking member having end portions which engage the elongated member, a central portion adapted to be engaged by means within the aperture, and slideways for supporting the end portions of said locking member.

7. In a lock of the class described, a cylindrical housing, an elongated rotatable apertured member disposed within said housing, yieldable means normally extending from said elongated member into the housing to secure the former against rotation, a second yieldable means positioned in advance of the first yieldable means normally disposed wholly within said elongated member but being outwardly moveable in the same plane as said first yieldable means, said means comprising a pair of opposed, spaced apart, substantially U-shaped tumblers normally in unlocking position, annular springs passing between the arms of said tumblers for urging said tumblers inwardly of the elongated member, a third yieldable means positioned to the rear of said first yieldable means normally securing said elongated member against rotation.

8. A lock of the class described including, in combination, a housing, an apertured rotatable

member positioned within said housing, a primary locking element comprising pin tumblers normally extending into the housing and into the aperture in the rotatable member to lock
5 said rotatable member against rotation, a supplemental locking element positioned in advance of the primary locking element, said supplemental locking element normally residing wholly within the rotatable member and being
10 outwardly moveable in the same plane as said primary locking element, and a second supplemental locking element positioned at the rear of said rotatable member and being operable by
15 means extending into the aperture therein, said latter locking element comprising a yieldable member having terminal portions which engage the rear end of the rotatable member, a centrally disposed portion adapted to be engaged by the
20 means insertable into the aperture, and supporting means having slideways to receive the end portions of said yieldable member.

9. In a lock of the class described, a cylindrical housing, an elongated rotatable apertured member disposed within said housing, yieldable
25 means for locking said member against rotation normally extending from said elongated member into the aperture thereof, a pair of spaced, opposed guard tumblers normally in unlocking position carried by said rotatable member and movable in
30 the same plane as said yieldable means, annular

springs engaging said tumblers and urging same inwardly, the inner terminals of each of said guard tumblers normally lying in the aperture in the rotatable member at a point beyond one-half the depth thereof.

10. In a lock having a cylindrical housing, an elongated rotatable apertured member disposed within said housing, yieldable means normally extending from said elongated member into the aperture thereof for locking said member against
10 rotation and having means adapted to extend into said aperture for forcing said last mentioned means out of locking engagement, the combination of a second yieldable means disposed within said elongated member, said means
15 comprising a pair of opposed, spaced apart, substantially U-shaped slot guards which are normally out of engagement with said housing, the rotatable member having a pair of spaced annular recesses, annular springs positioned within
20 said recesses and passing between the arms of said slot guards to urge said guards inwardly, each of said slot guards extending into the aperture in said elongated member substantially half the depth thereof.

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