July 10, 1934. J. W. FITZ GERALD 1,965,888

LOCK

Filed Nov. 3, 1933

Fig. 1.

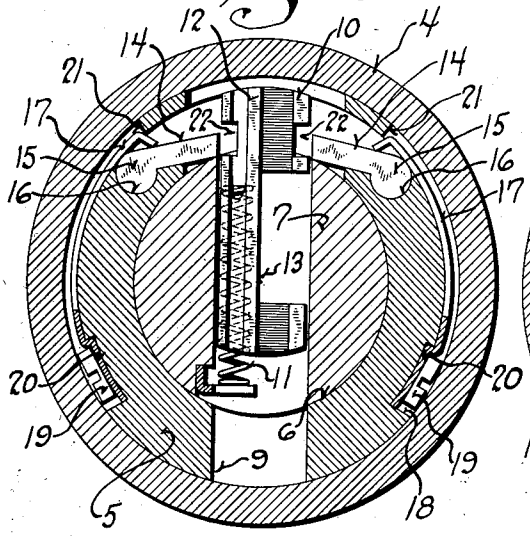


Fig. 2.

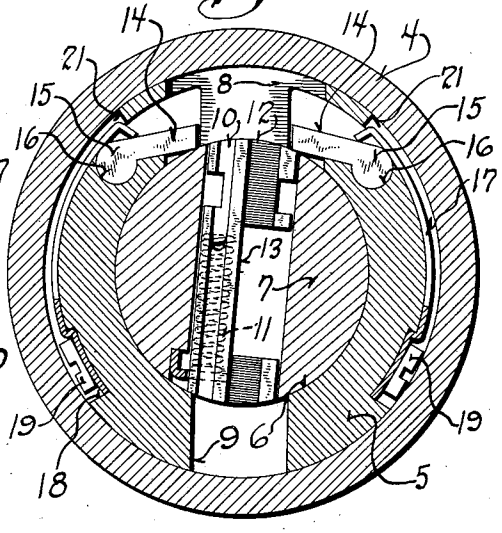


Fig. 3.

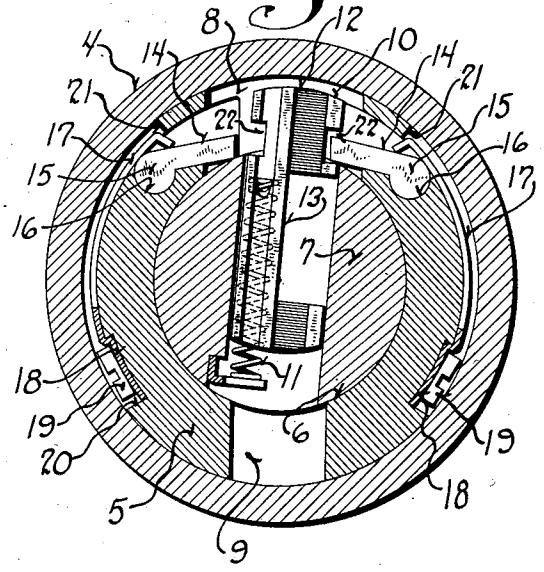
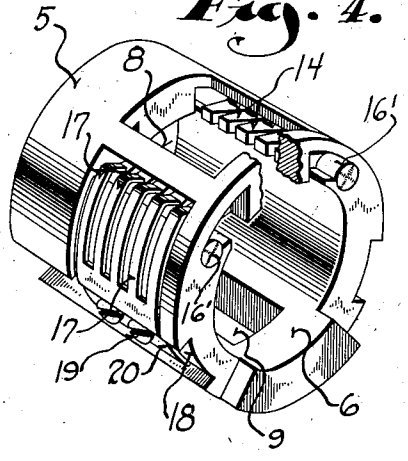


Fig. 4.



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1,965,888

LOCK

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13 Claims. (Cl. 70—46)

This invention relates to certain new and useful improvements in locks and refers more particularly to key controlled tumbler locks.

It is an object of this invention to provide a tumbler lock constructed so as to make picking extremely difficult if not impossible.

With this primary object in mind, it is a further object of this invention to provide a lock in which the abutment with which the tumblers engage to prevent movement of the lock cylinder out of locked position, is movable.

It is also an object of this invention to provide independent abutments for the tumblers movable independently of each other under certain conditions.

A further object of this invention is to provide independent abutments for the various tumblers, which are normally yieldably held in one position and are movable by the tumblers upon engagement of a corner thereof beneath the abutment, so that the tumblers cannot be held in retracted position by engaging them under the corners of their abutments as in an attempt at picking.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawing, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, in which:

Figure 1 is a cross section view through a tumbler lock embodying this invention, illustrating a tumbler in its normal locked position;

Figure 2 is a cross section view through the lock illustrating the same tumbler retracted by some picking tool and with the lock cylinder twisted to dispose the tumbler beneath the edge of its abutment;

Figure 3 is a view similar to Figures 1 and 2, but illustrating the tumbler extended to its normal position with the abutment engaged in a notch in the side of the tumbler after having been raised by the tumbler to an inclined position from which it entered the notch; and

Figure 4 is a perspective view of a cylinder casing per se.

Referring now more particularly to the accompanying drawing, in which like numerals indicate like parts throughout the several views, the numeral 4 designates an outer supporting shell in which a cylinder mounting casing or barrel 5 is positioned. The casing 5 is bored as at 6, to rotatably receive a lock cylinder 7, and has two diametrically opposite longitudinal openings 8 and 9 for the reception of the ends of the tumblers 10, which are mounted in the lock cylinder in the usual monner. Each tumbler is provided with an individual spring 11 adapted to yieldably project its end 12 into the opening 8. As is customary, the tumblers are operable to retract their ends 12 to lie within the periphery of the cylinder upon the insertion of a proper key (not shown) which passes through keyways 13 in the tumblers.

During the retraction of the tumbler ends 12 out of the opening 8, the opposite ends of some of the tumblers are temporarily projected into the opening 9. The opening 9 thus has no locking function but merely affords clearance for the tumblers during the insertion and withdrawal of the key.

Heretofore, the opening 8 or its equivalent, which might be any form of channel, into which the operative ends of the tumblers project, has been just slightly wider than the width of the tumblers with the sides thereof parallel and the edges thereof solid parts of the casing 5. With this construction, it was possible to pick the lock with the aid of certain picking tools. Some of these tools have elongated fingers insertable into the keyway for engagement with the key engaging portions of the successive tumblers. Upon vibration of the tumblers by means of this finger and the application of a constant twisting force on the cylinder, as might be applied by means of a suitable tool inserted into part of the keyway, it was possible to shake the successive tumblers down beneath the edge of the opening 8 where they would catch, due to the fact that the cylinder was under a twisting stress. Obviously, after all of the tumblers had been caught beneath the edge of the opening in this manner, the cylinder was free to be turned from its locked position.

The present invention precludes the picking of a lock in this manner by eliminating the solid edges of the tumbler receiving opening and substituting in lieu thereof individual movable abutments in the form of pivoted fingers or levers indicated generally by the numeral 14. To accommodate these movable abutments of locking

levers, the opening 8 is enlarged as shown. It is also noted that the movable abutments are duplicated on opposite sides of the opening as the lock cylinder is arranged to be turned in either direction from its normal locked position.

Any suitable means may be employed to pivotally mount the locking fingers or levers 14 and in the present instance, the fingers are provided with cylindrical heads 15, which are received in correspondingly shaped grooves 16 formed in the casing 5 and communicating with the opening 8. The length of the grooves 16, is, of course, sufficient to receive all of the locking fingers 14 and the width of the fingers 14 is such that one finger is aligned with each tumbler. The ends of the grooves 16 are closed to retain the levers therein by plugs 16′ driven into grooves.

The slots communicating the grooves 16 with the tumbler receiving opening 8 are of such size that the chord connecting the edges thereof is disposed outwardly of the axis of the groove 16 so that after the fingers 14 are assembled therein, they will be retained against displacement but will be permitted a degree of pivotal movement.

The locking fingers are yieldably urged to the position illustrated in Figure 1 with their outer ends just engaging the periphery of the lock cylinder and lying directly adjacent the tumblers, by leaf springs 17. The springs 17 are preferably formed as the teeth of combs, and the combs are mounted in shallow recesses 18 in the outer wall of the cylinder 5 being secured in place by screws 19 passing through the backs 20 of the combs and threaded in the casing. The outer ends of the comb teeth which provide the springs are bent inwardly and project through slots 21 in the casing at opposite sides of the opening 8, to engage the tumblers.

In an attempt to pick the lock in the manner hereinbefore described, vibration of the first tumbler accompanied by the application of a twisting force on the cylinder may dispose this tumbler beneath the outer end of its locking finger as illustrated in Figure 2, but as soon as the picking tool is moved off of this first tumbler to reach the next one the spring 11, of the first tumbler being stronger than its respective leaf spring 17, will project said first tumbler back to its operative position.

However, inasmuch as the operative ends 12 of the tumblers are notched on their opposite side edges as at 22, it will be highly improbable that the tumblers can be retracted by a picking tool, sufficiently far to engage their operative ends under the locking levers.

Also, the initial application of twisting force on the cylinder which usually accompanies an attempt at picking, will cause the ends of the locking levers to engage in the notches and thus positively preclude retraction of the tumblers.

This interlocked condition will also be obtained if the attempt at picking is successful in retracting the tumblers, for as hereinbefore noted upon freeing of any tumbler so retracted, its spring 11 will push it back to its operative position raising its respective locking lever until the end of the lever aligns with the notch 22 whereupon the leaf spring of the locking lever will snap the same into the tumbler notch.

As the picking operation continues, the successive tumblers and their associated locking fingers will take positions as depicted in Figure 3 so that when the picking operation should be complete all tumblers having been vibrated down, the cylinder will be as effectively secured against turning as it was before the picking operation began.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which this invention appertains, that this invention affords novel means to prevent the picking of a lock by any known method, and that it attains the desired degree of protection against picking merely by positively precluding the freeing of the cylinder by any method of picking, and does not resort to means for interlocking the cylinder and the casing upon an attempt at picking, as in past devices intended to afford protection against picking.

What I claim as my invention is:

1. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a locking tumbler carried by the lock cylinder and yieldably urged to project one end beyond the cylinder and into a channel in the casing, said channel being wider than the width of the tumbler, and a movable stop carried by the casing and having a part disposed in said channel to form an abutment with which the tumbler is engageable when the cylinder is in its normal locked position to restrain rotation of the cylinder toward unlocked position.

2. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a locking tumbler carried by the lock cylinder and yieldably urged to project one end beyond the cylinder and into a channel in the casing, said channel being wider than the width of the tumbler, and a movable stop carried by the casing and having a part disposed in said channel to form an abutment with which the tumbler is engageable when the cylinder is in its normal locked position to restrain rotation of the cylinder toward unlocked position, said movable stop being movable out of its normal position by the projection of the tumbler outwardly of the cylinder upon engagement of the tumbler beneath the stop.

3. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a locking tumbler carried by the cylinder and yieldably urged to project one end outwardly thereof and into a channel in the casing communicating with its bore, said channel being wider than the width of the tumbler, a locking element carried by the casing and having a part adapted to swing in an arc within said channel, said part normally being in a position engageable with the side of the tumbler when the cylinder is in its locked position to prevent movement of the cylinder toward unlocked position except upon retraction of the tumbler, and said locking element being movable out of said normal position by the projection of the tumbler outwardly of the cylinder in the event the tumbler is caught beneath the edge of the locking element part, and said locking element part being of such length that as the tumbler is projected outwardly the locking element part will move off of the end of the tumbler and engage the side edge thereof.

4. In a lock device comprising a bored casing and a lock cylinder rotatably mounted therein, a locking tumbler carried by the cylinder and yieldably urged to project one end outwardly of the cylinder, and a movable abutment carried by the casing and engageable directly with the tumbler when the lock cylinder is in normal locked position to restrain movement of the cylinder toward unlocked position except upon retraction of the tumblers.

5. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a tumbler carried by the cylinder and yieldably urged to project one end outwardly thereof, and an abutment carried by the casing with which the locking tumbler engages when the cylinder is in its locked position and said abutment being yieldable in the direction of the outward projection of the tumbler.

6. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a tumbler carried by the cylinder and yieldably urged to project one end portion outwardly of the cylinder and into a defined space in the casing, and a member defining one side of said space and with which the tumbler engages when the cylinder is in its locked position to prevent movement of the cylinder toward unlocked position except as the tumbler is retracted beneath said member, and said member being yieldable in the direction of the outward projection of the tumbler so that the tumbler cannot be held in retracted position by the engagement of a corner thereof with the edge of said side of the defined space.

7. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a tumbler carried by the cylinder and yieldably urged to project one end portion outwardly thereof and into a channel in the casing, a locking finger pivotally mounted on the casing in one side portion of said channel, and means yieldably urging said locking finger to a normal position with its outer end portion directly engageable with the side of the tumbler when the cylinder is in its locked position to restrain rotation of the cylinder toward unlocked position except as the tumbler is retracted.

8. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a locking tumbler mounted in the cylinder, a spring to project one end portion of the tumbler outwardly of the cylinder and into a channel in the casing communicating with its bore, a locking finger pivotally mounted on the casing in one side portion of said channel, and a spring to yieldably maintain the locking finger in a position with its outer free end portion engageable directly with the side edge of the tumbler projected end portion when the cylinder is in its locked position to restrain movement of the cylinder toward unlocked position, and said spring holding the finger in said normal position being weaker than the spring projecting the tumbler outwardly, whereby upon engagement of a corner of the tumbler beneath said outer end of the locking finger as in an attempt to pick the lock, the spring of the tumbler overcomes the spring holding the finger in position and moves the tumbler outwardly, lifting the locking finger with it.

9. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a plurality of tumblers carried by the cylinder and yieldably urged to project outwardly thereof and into a channel in the casing, a plurality of locking elements pivotally mounted on the casing and projecting into one side portion of said channel to lie in the direct path of the tumblers and preclude rotation of the cylinder out of its locked position except upon proper retraction of the tumblers, individual spring means to yieldably urge said locking elements to their normal operative positions, and common means to mount said individual spring means on the casing.

10. In a lock comprising a bored casing and a lock cylinder rotatably mounted therein, a plurality of locking tumblers carried by the cylinder and yieldably urged to project into a defined space communicating with the casing bore, a plurality of locking elements pivotally mounted on the casing with their free ends defining one side of said space to be directly engageable by the tumblers when the cylinder is in its locked position to restrain rotation of the cylinder out of said locked position, and spring means mounted on the exterior of the casing with portions thereof projecting through the casing wall to engage the pivoted locking elements and yieldably maintain the same in their operative positions.

11. In a lock comprising a casing having a bore and a rotatable lock cylinder therein, a tumbler transversely movable in the cylinder and yieldably projected to engage one end thereof in a channel formed in the casing in communication with its bore, a movable locking element carried by the casing with a part projecting into said channel to be directly engageable by the tumbler's projected end portion and said tumbler projected end portion having a notch with which the tumbler engaging portion of said locking element engages upon rotation of the cylinder effected while said tumbler is projected to preclude retraction of the tumbler.

12. In a lock comprising a casing and a rotatable lock cylinder mounted in the casing, the combination of notched tumblers carried by the cylinder, and movable locking elements carried by the casing and engageable in the notches of the tumblers upon rotation of the cylinder while said tumblers are projected to their operative positions.

13. In a lock comprising a casing and a lock cylinder mounted therein, the combination of spring pressed locking tumblers carried by the cylinder and yieldably urged to project an end from the cylinder, said projected ends of the tumblers being notched, and movable locking elements carried by the cylinder and normally yieldably maintained in a position aligned with the notches of the tumblers when the tumblers are projected so that turning of the cylinder while the tumblers are projected engages the locking elements in the tumbler notches to preclude retraction of the tumblers, and the movable mounting for said elements being such that the locking elements are moved out of their normal positions by the projection of the tumblers in the event the tumblers are engaged beneath said locking elements.

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