July 3, 1934. J. W. FITZ GERALD 1,965,336

LOCK

Filed March 12, 1934

Fig. 1.

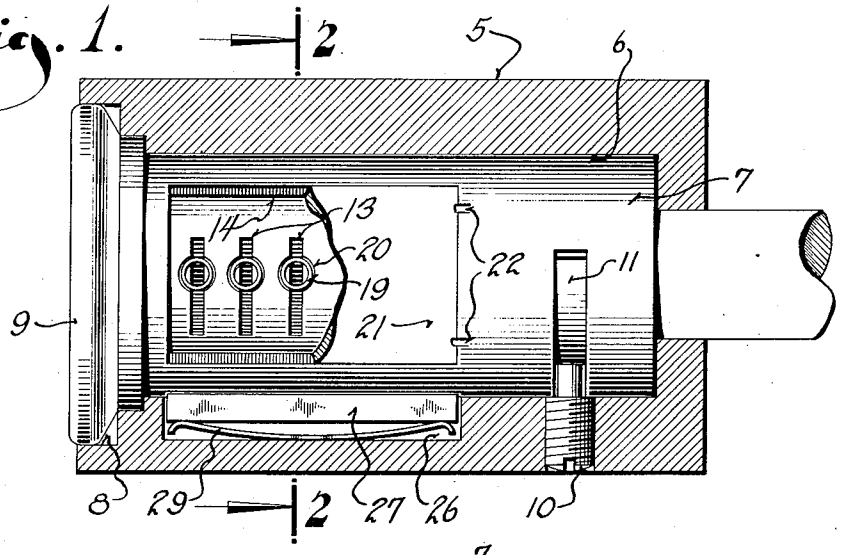


Fig. 2.

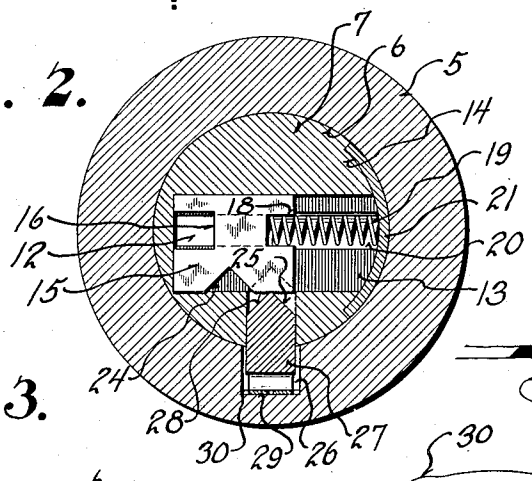


Fig. 4.

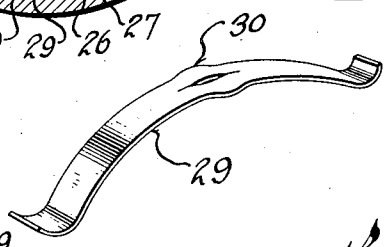
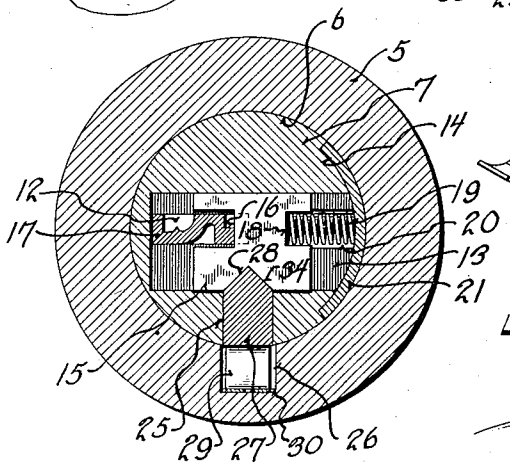


Fig. 3.



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UNITED STATES PATENT OFFICE

1,965,336

LOCK

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Application March 12, 1934, Serial No. 715,135

6 Claims. (Cl. 70—46)

This invention relates to new and useful improvements in locks and refers more particularly to cylinder locks.

It is an object of this invention to provide a non-pickable lock.

More specifically, it is an object of this invention to provide a lock in which the cylinder is secured against rotation by an auxiliary locking member or tumbler which is held in its operative locking position as long as any one of the regular key operable tumblers is in any but its fully retracted position.

Another object of this invention is to provide a lock in which the individual springs for the key operable tumblers are retained in position by a cover plate which also completely closes the tumbler slots so that the tumblers are entirely enclosed within the cylinder.

Another object of this invention is to provide an improved manner of securing a lock cylinder against rotation in its mounting member, wherein the locking function is performed by a member disposed longitudinally of the cylinder to have a large area thereof engaged with the cylinder and the mounting member to preclude the possibility of forcing the cylinder from its locked position.

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 herein disclosed invention may be made as come within the scope of the claims.

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

Figure 1 is a longitudinal section view through a lock embodying this invention, the cylinder being shown in elevation with a part thereof broken away;

Figure 2 is a cross section view taken through Figure 1 on the plane of the line 2—2, and illustrating the parts in their locked positions;

Figure 3 is a view similar to Figure 2, but showing the lock with the key inserted and the cylinder freed for rotation; and

Figure 4 is a perspective view of the spring provided to project the auxiliary tumbler or locking bar to its inoperative position.

Referring now more particularly to the accompanying drawing, in which like numerals indicate like parts throughout the several views, the numeral 5 designates the mounting member or casing of a lock, bored as at 6 to receive a lock cylinder 7. The mouth of the bore 6 is provided with a counterbore 8 to receive a flanged head 9 on the cylinder. Both the cylinder and the casing are preferably die-cast and any means, such as a screw 10, operating in an arcuate slot 11 in the cylinder, may be provided to secure the cylinder in the casing.

The usual key opening 12 extends into the cylinder from its front end to communicate with a plurality of transverse tumbler slots 13, closed at their inner ends and opening at their outer ends into a recess 14. Slidably received in the tumbler slots 13 are individual tumblers 15.

The tumblers are of the plate type and each has a recess 16 cut into one end to receive a key 17, which, as is customary, is inserted through the keyway from the front end of the lock. The opposite ends of the tumblers are cut out as at 18 to receive the adjacent ends of compression springs 19 disposed in cylindrical wells 20 in communication with the tumbler slots. The outer ends of the springs 19 bear against a curved plate 21, nested in the recess 14 and held in place by staking over portions of the cylinder as at 22 or in any other suitable manner. The thickness of the plate 21 is substantially equal to the depth of the recess 14, so that when the plate is in position, the outer surface thereof is flush with the cylindrical surface of the cylinder, thus giving the appearance of an uninterrupted surface.

At one side, all of the tumblers have V-shaped notches 24 so located with respect to the length of the tumblers that when the key is in place, the notches 24, in all of the tumblers are in line with a longitudinally extending opening 25 in the lock cylinder. The opening 25 is disposed substantially perpendicular to the plane of movement of the tumblers and communicates with all of the tumbler grooves 13 and when the cylinder is in locked position, is directly opposite a longitudinally extending groove 26 in the casing.

Disposed within the opening 25 is a longitudinal locking bar or auxiliary tumbler 27, which is movable flatwise in a plane radial to the cylinder and substantially perpendicular to the plane of movement of the key operable tumblers. The inner edge 28 of this bar or auxiliary tumbler is V-shaped and is of such size as to fit within the V-shaped notches 24 of the tumblers when the key is in position as illustrated in Figure 3. The width of the auxiliary tumbler or locking bar 27 is such that when its V-shaped edge is engaged in the notches of the tumblers, its outer edge lies within the circumference of the cylinder so that the cylinder is free to turn within the casing.

A light flat spring 29, in the bottom of the groove 26, serves to yieldably project the locking bar or auxiliary tumbler 27 toward the lock cylinder, causing the same to drop into the aligned V-shaped notches 24 upon their complete retrac-

tion by insertion of the key. It is, of course, understood that the metal of the lock cylinder between the tumblers is cut away or relieved to accommodate the locking bar.

If desired, the spring 29 may have its medial portion bulged out at opposite sides as at 30, so that when it is forced into place in the bottom of the groove 26, it will remain in position. The spring 29 is sufficiently light so that the spring 19 of any individual tumbler through the cam action of its groove 24 on the V-shaped edge 28 of the bar, overcomes the spring 29 and pushes the bar or auxiliary locking tumbler to its operative position projecting into the groove 26.

Hence, it will be seen that as long as any one tumbler is in any but its fully retracted position, the auxiliary tumbler or locking bar will be held in its operative position, securing the cylinder against rotation. In other words, to unlock the cylinder for rotation, it is essential that each and every one of the key operable tumblers be fully retracted to their positions aligning their notches 24 with the auxiliary tumbler or locking bar. With this construction, decoding and picking of the lock by any known method is precluded.

Fitting of the tumblers to the key in this construction is also a simple matter, for with the key in place, all of the notches 24 may be cut in a single operation by a suitable cutting tool. If desired, the cutting may be done by inserting a small milling cutter into the opening 25 and running it lengthwise of the cylinder, or the cylinder may be drilled endwise on a plane coinciding with the edge of the tumblers.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art, that this invention affords a very secure manner of locking the cylinder against rotation in its casing and that picking or decoding of the lock by any known method is entirely impossible.

What I claim as my invention is:

1. In a lock, a bored mounting member having a lock cylinder in the bore, a plurality of key operable tumblers in the lock cylinder, an auxiliary tumbler carried by the lock cylinder and movable to and from operative locking engagement with the mounting member to secure the lock cylinder against movement, said key operable tumblers having notches into which the auxiliary tumbler engages when all of the key operable tumblers are moved in a straight line into their unlocked positions by a proper key, and said notches being formed simultaneously in a single operation after the tumblers have been moved to unlocking position by the key.

2. In a lock, a bored mounting member, a lock cylinder rotatable in the mounting member bore, a plurality of key operable tumblers mounted in recesses in the lock cylinder, an auxiliary tumbler movable in an opening communicating at its inner end with said recesses to be engageable with said key operable tumblers for projection thereby outwardly of the lock cylinder and into operative locking engagement with the mounting member, said key operable tumblers having notches into which the auxiliary tumbler engages when the key operable tumblers are all in their unlocked positions to which they are moved by a proper key so that the auxiliary tumbler lies wholly within said opening in the cylinder to free the cylinder for rotation, and said notches being so located as to enable the formation of the notches of all of the tumblers simultaneously in a single operation by a tool projected through said opening.

3. In a lock, a bored mounting member, a lock cylinder movable in the mounting member bore, a plurality of substantially H-shaped key operable plate tumblers carried by the cylinder and yieldably urged to locked position and retractible by a proper key engageable with one side of the transverse portion of the H to unlocked position, an auxiliary tumbler to secure the cylinder against movement in the bore, said auxiliary tumbler being yieldably urged to an inactive position toward one longitudinal side of the H-shaped key operable tumblers, and means whereby said auxiliary tumbler is moved to its operative position by the yieldable projection of any key operable tumbler to its operative position.

4. In a lock, a bored mounting member, a lock cylinder in the mounting member bore, substantially H-shaped key operable plate tumblers carried by the lock cylinder, spring means nested in one end recess formed by the H-shape of said tumblers and bearing against the adjacent side of the transverse portion thereof to yieldably urge the tumblers to a locked position, said tumblers being retractible to an unlocked position by a proper key passing through the other recess of the H-shaped tumblers and engaging the adjacent edge of said transverse portion, each of said tumblers having a V-shaped notch in one of its longitudinal side edges, the notches of all of said tumblers being aligned upon the insertion of a proper key into the lock cylinder, an auxiliary tumbler mounted in the lock cylinder to project therefrom into locking engagement with the mounting member to restrain the cylinder against movement, said auxiliary tumbler being so positioned with respect to the tumblers as to have a part engageable in the notches of the tumblers when said key operable tumblers are retracted by insertion of the key, whereby said auxiliary tumbler is movable out of engagement with the mounting member to free the cylinder for movement, and means to move the auxiliary tumbler out of engagement with the mounting member.

5. In a lock, a bored mounting member, a lock cylinder movable in the mounting member bore, key operable tumblers movable in straight lines transversely of and entirely within the cylinder, said tumblers having key engaging portions medially of their ends, and locking means carried by the cylinder and operable by the tumblers into locking engagement with the mounting member, said locking means being retractible within the cylinder to free the cylinder for movement upon actuation of the tumblers to inactive positions by a proper key inserted into the cylinder.

6. In a lock, a bored mounting member, a lock cylinder movable in the mounting member bore, key operable tumblers movable in straight lines transversely of and entirely within the cylinder, said tumblers having key engaging portions and spring seats medially of their ends, locking means carried by the cylinder and operable by the tumblers into locking engagement with the mounting member, and springs engaging the spring seats of the tumblers to yieldably urge the tumblers to positions at which they hold the locking means in operative position, said locking means being retractible within the cylinder to free the cylinder for movement upon actuation of the tumblers to inactive positions against the force of their springs by a proper key inserted into the cylinder.

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