A. MANTANFEL.

LOCK.

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1,406,573. Patented Feb. 14, 1922.

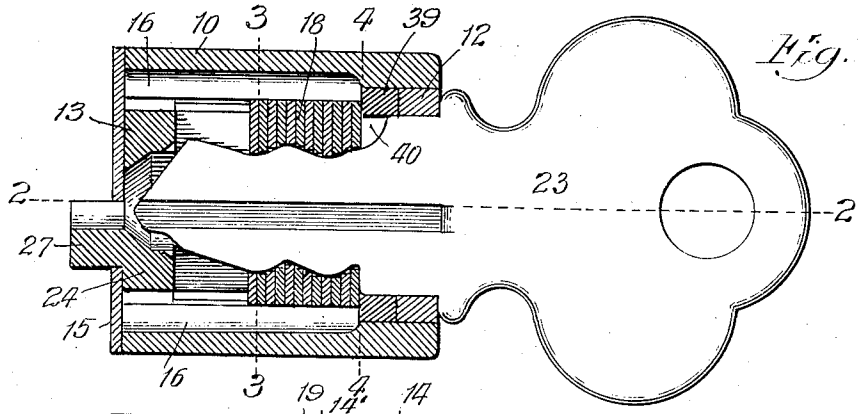



Fig. 1.

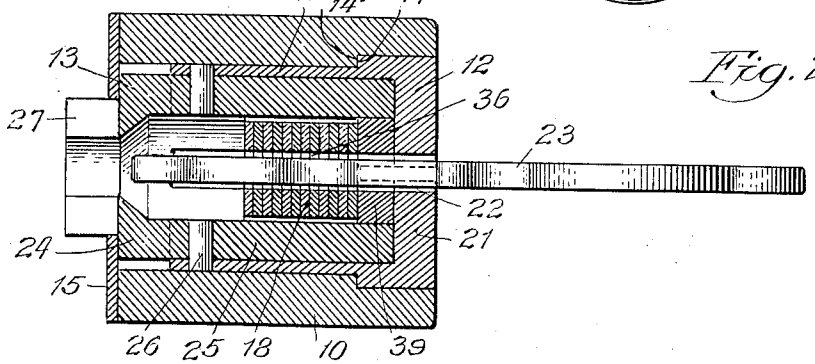



Fig. 2.

Fig. 3.

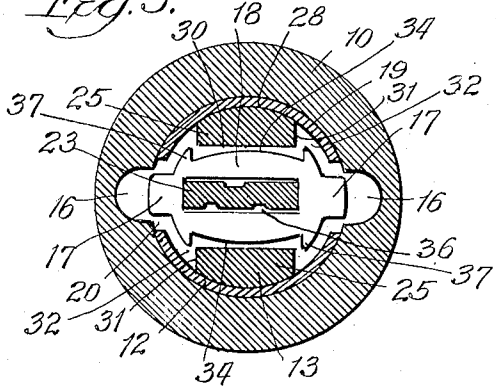



Fig. 4.

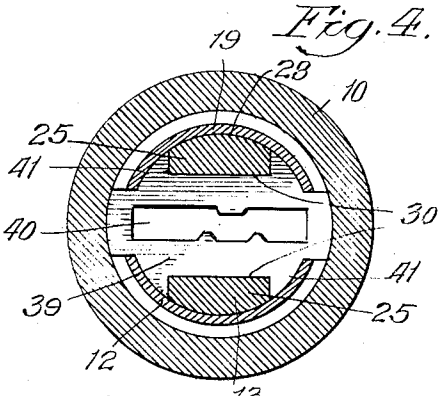



Fig. 5.

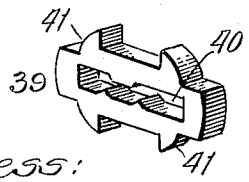
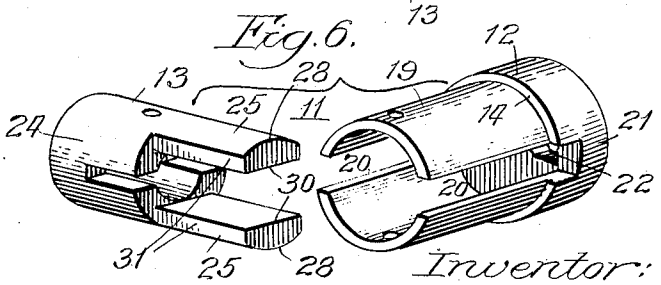



Fig. 6.




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# UNITED STATES PATENT OFFICE.

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## LOCK.

1,406,573. Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed February 26, 1921. Serial No. 447,932.

*To all whom it may concern:*

Be it known that I, AUGUST MANTANFEL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Locks, of which the following is a full, clear, and exact description.

The invention relates to locks. One object of the invention is to provide a lock provided with tumblers which will be locked to the plug and against longitudinal movement therein when attempt is made to pick the lock by rotating the plug to frictionally hold the tumblers and the insertion of a wire to shift them out of interlocking position. Another object of the invention is to provide an improved construction of lock in which the manufacture is facilitated by a reinforcing plate with a key-slot therein which is separately formed from the plug or tumbler-carrier and fixedly held therein so as to provide an elongated bearing for the key when it is inserted in the lock.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings: Fig. 1 is a longitudinal section of a lock embodying the invention. Fig. 2 is a section taken on line 2—2 of Fig. 1. Fig. 3 is a section taken on line 3—3 of Fig. 1. Fig. 4 is a section taken on line 4—4 of Fig. 1. Fig. 5 is a detail perspective of the reinforcing plate for the key-slot in the plug. Fig. 6 is a perspective of the sections of the plug separated.

The invention is exemplified in a lock comprising a barrel or cylinder 10 in which is rotatably mounted a plug 11 which is built up of an outer member 12 and an inner member 13. The outer member is cylindrical, fits in a cylindrical bearing surface in the cylinder 10, and is shouldered, as at 14, to engage a corresponding shoulder in the cylinder to hold the plug against backward longitudinal movement in the cylinder. A suitable back plate 15 is secured to the plug and engaging the inner end of the cylinder, secures the plug against longitudinal forward movement. The cylinder 10 is provided with grooves or recesses 16 which are disposed at diametrically opposite points to receive the ends 17 of a series of plate-tumblers 18 which are slidably held in the plug and which are adapted to be withdrawn from the recesses when all of the tumblers are properly positioned by the correct key. The outer member of the plug comprises a cylindrical wall 19 which is slotted longitudinally, as at 20, for the tumbler-ends 17 and an integral front wall 21 through which a slot 22, shaped to conform to the cross-section of the key 23, is formed. The inner member of the plug comprises a wall 24 adjacent the back of the cylinder and integral sides 25 which extend forwardly from the wall 24 to the front wall 21 of the outer member 12. The plug-members are fixedly secured together to form a unitary structure, by pins 26. The rear end of the plug is provided with a lug 27 or any other suitable means for operating the bolt to be controlled by the lock, as well understood in the art. The outer faces 28 of the sides 25 are curved to conform to the inner periphery of the cylindrical wall 19 of the outer plug-member and the inner faces 30 of said sides are straight to form a guideway for the tumblers 18. Said sides terminate in shoulders or edges 31 and so that spaces 32 will be formed between the sides and the cylindrical wall of the outer-member 12. The tumblers 18 are formed of plates and their sides 34 are curved and fit loosely between the faces 30 of the sides 25 so that there will be some play or looseness between the tumblers and the plug. The tumblers are provided with slots 36 through which the key 23 is adapted to pass and by which they will be shifted in their planes and positioned to bring both of their ends within the plug. The tumblers are also provided with hooks 37 which are normally disposed in the spaces 32 between the edges 31 of the sides 25 and the cylindrical wall of the plug. When any tumbler is shifted so that either of its ends will project from the plug, the hooks 37 at one end will enter the space between the faces 30 of the sides 25 while the hooks at its other end will be disposed in the spaces 32 adjacent the other end. The tumblers, being loose in the plug, may assume a position so that one of the hooks will overlap one of the edges 31 of one of the plug-sides 25. When, however, an attempt is made to pick the lock by manipulating the tumblers without a key, by turning the plug slightly to cause it to frictionally engage the tumblers, at least one of the hooks 37 of each tumbler will overlap one of the edges 31 of one of the sides 25 and thus lock the tumblers against longitudinal

movement sufficient in extent to bring it into releasing position by a wire or tool. When the proper key is inserted, its edges will engage the ends of the slots in the tumblers and position the tumblers centrally in the plug. The inner end of the key is tapered so as to cause the key to enter said slots, notwithstanding any disarrangement resulting from the looseness of the tumblers in the plug.

The invention thus exemplifies a cylinder-lock in which plate-tumblers are loosely mounted in the plug and in which an interlock is effected between the plug and the tumblers for preventing the tumblers from being shifted to releasing position. On the other hand, if the proper key is inserted, it will bring the ends of the tumblers within the periphery of the plug, as shown in Fig. 2, so as to permit the plug to be turned by the key. A characteristic of this construction is that any looseness of the tumblers in the plug will not prevent their operation into releasing position by the key, because the tumblers will be properly positioned by the key to bring their ends into the plug and any looseness of the tumblers in the plug or in interlock-engagement between the hooks 37 and the sides 25 will not interfere with the rotation of the plug and tumblers together.

A reinforcing plate 39 is provided with a slot 40 corresponding to the slot 22 in the front wall 21 of the plug and has its ends formed to fit in the slots 20 in the outer member 12 of the plug and one of the faces of the plate fits against the back face of the front wall 21. The back faces of the ends of this plate bear against the shoulder 14′ in the cylinder so that when the plug is assembled in the cylinder, the plate will be fixedly held in the plug. The sides 25 are also extended to lap the edges of the reinforcing plate. Said plate is also provided with shoulders 41 engaging the inner periphery of the cylindrical wall of the outer section 12 of the plug so as to confine the reinforcing plate against transverse movement in the plug. This plate provides an additional bearing surface for the key which is desirable to accurately guide the key through the tumblers. By forming the reinforcing plate separately from the front wall, the machining of the parts in manufacture is facilitated.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a cylinder lock, the combination of a casing, a plug rotatably mounted in the casing, key-operable plate tumblers transversely movable and loosely mounted in the plug, and devices between the plug and the tumblers adapted to overlap when the plug is shifted relatively to the tumblers to prevent transverse movement of the tumblers in the plug.

2. In a cylinder lock, the combination of a casing, a plug rotatably mounted in the casing, key-operable plate-tumblers transversely movable and loosely mounted in the plug and devices between the plug and both ends of the tumblers adapted to overlap when the plug is shifted relatively to the tumblers to prevent transverse movement of the tumblers in the plug.

3. In a cylinder lock, the combination of a casing, a plug rotatably mounted in the casing and provided with sides, key-operable plate-tumblers transversely movable and loose in the plug and means between said sides and the tumblers adapted to overlap when the plug is shifted relatively to the tumblers to lock the tumblers against transverse movement in the plug.

4. In a cylinder lock, the combination of a casing, a plug rotatably mounted in the casing and comprising an outer cylindrical member and an inner member provided with sides, key-operable plate-tumblers, transversely movable and loose in the plug, and means between the inner member of the plug and both ends of the tumblers adapted to overlap when the plug is shifted relatively to the tumblers to lock the tumblers against transverse movement in the plug.

5. In a cylinder-lock, the combination of a casing, a plug rotatably mounted in the casing and comprising a cylindrical wall having tumbler-slots therein, and a front wall having a key-slot therein, key-operable plate-tumblers transversely movable in the plug, a reinforcing plate provided with a key-slot, separately formed from said front wall and held at the ends of said tumbler-slots and against said front wall in fixed relation to the plug so as to rotate therewith, and means on the casing to hold the reinforcing plate against said front wall.

6. In a cylinder-lock, the combination of a casing, a plug rotatable in the casing and comprising an outer member having an integral front wall and an inner member comprising a back-wall and sides fitting in said cylindrical wall, a reinforcing plate separately formed from the plug and held therein against the inner face of the front wall, the sides of the inner member being extended to overlap said plate, and lugs on said plate for engaging said cylindrical wall to hold the plate against transverse movement in the plug, the reinforcing plate and said front wall being provided with corresponding key-slots.

AUGUST MANTANFEL.