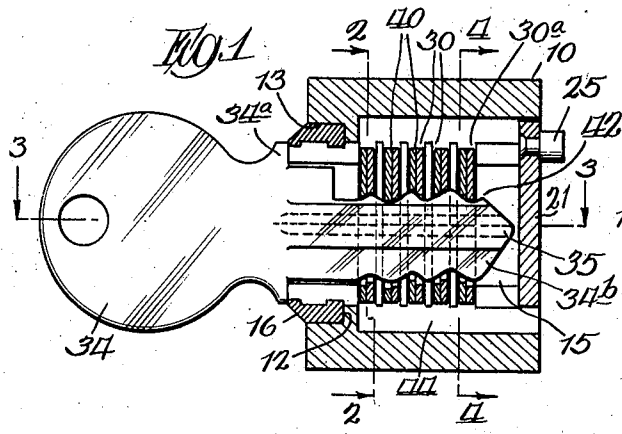
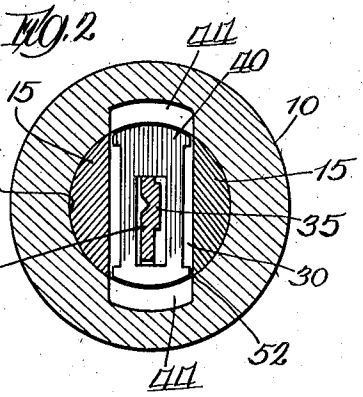
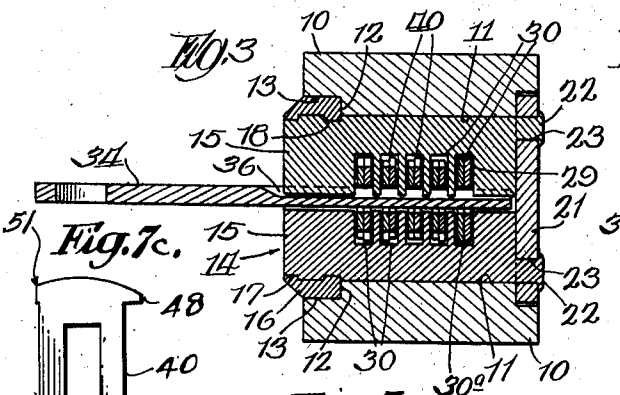
Aug. 20, 1929. E. P. BAIRD 1,725,557

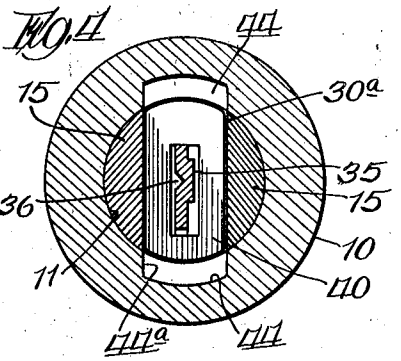
LOCK

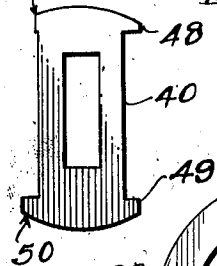
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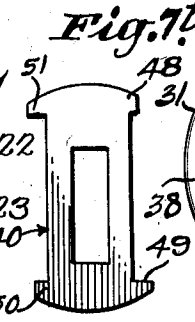


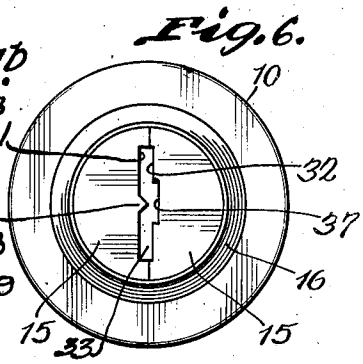


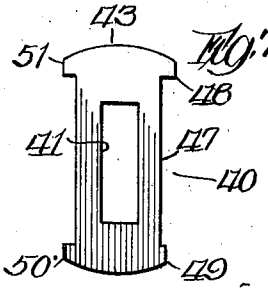












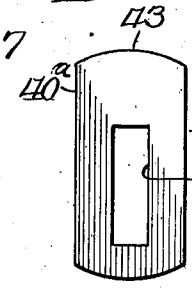


Fig. 8.

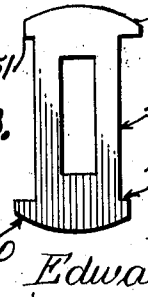


Fig. 7a.

Inventor:
Edward P. Baird
by Rector, Hibben, Davis & Macauley
Atty's.

Patented Aug. 20, 1929. 1,725,557

UNITED STATES PATENT OFFICE.

EDWARD P. BAIRD, OF EVANSTON, ILLINOIS, ASSIGNOR TO BAIRD LOCK CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

LOCK.

Application filed August 31, 1923. Serial No. 660,308.

This invention relates to improvements in locks, and its purpose is to provide a device comprising improved means for preventing the operation of the locking mechanism by unauthorized persons. One object of the invention is to provide a lock of the tumbler type comprising improved tumblers adapted to prevent the alignment thereof without the use of a properly designed key. A further object is to provide a lock comprising tumblers of irregular shapes and dimensions designed to increase the difficulty of aligning them without the use of a key. Other objects relate to various features of construction and arrangement such as will appear more clearly hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

Fig. 1 shows a longitudinal vertical section through a lock of the cylinder type embodying features of the present invention;

Fig. 2 shows a transverse section on the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 shows a longitudinal horizontal section taken on the line 3—3 of Fig. 1 looking in the direction of the arrows;

Fig. 4 shows a section taken on the line 4—4 of Fig. 1 looking in the direction of the arrows;

Fig. 5 shows an end elevation of the inner end of the lock, looking toward the left as viewed in Fig. 1;

Fig. 6 shows an end elevation of the front end of the lock with the key removed, looking toward the right as viewed in Fig. 1;

Figs. 7, 7^a, 7^b and 7^c are elevated views of some of the irregular lock tumblers having lateral projections all of different lengths; and

Fig. 8 shows an elevation of one of the straight side lock tumblers employed in the inner end of the lock.

As illustrated in the drawings, the invention comprises a barrel 10 which is substantially cylindrical in shape and adapted to be rigidly secured in the door or other device to be locked by any means suitable for the purpose. This barrel is provided with a cylindrical bore 11 terminating at its forward end at the shoulder 12 which is formed at the inner end of the enlarged bore 13. The barrel 10 is adapted to be engaged by the movable lock cylinder 14 which, in the embodiment illustrated, comprises two complementary parts 15 of substantially semi-cylindrical cross section having their flat sides in contact to form a complete cylinder. These complementary members 15 are secured in assembled relation at their forward ends by means of a cap or collar 16 having rotatable engagement with the bore 13 of the barrel and coacting at its inner end with the annular flange 12. The cap 16 is provided with an annular flange 17 which engages the annular recess at the forward end of the cylinder 14 and the cylinder is provided with an annular groove 18 into which the metal at the inner end of the cap is swaged, so that the parts 15 of the cylinder are securely held by the cap. At their inner ends, the complementary members 15 of the lock cylinder are secured to a substantially circular plate 21 by means of lugs 22 formed integrally with the members 15 and engaged holes 23 in the plate, the ends of the lugs being riveted to hold the parts securely in assembled relation. A pin 25 is mounted eccentrically on the plate 21 and is adapted to operate the locking bolt, or the like, when the cylinder is turned in the barrel. The plate 21 also has an arcuate notch 27 formed in the outer edge thereof to receive a radial projection 28 which extends inwardly from the inner end of the bore 11 of the barrel 10. The projection 28 is adapted to engage the shoulder at the ends of the notch 27 to limit the angular movement in either direction of the cylinder 14.

The complementary members 15 of the lock cylinder have grooves 29 formed therein on their flat sides to form, when the parts of the cylinder are assembled, a series of tumbler slots 30 of rectangular cross section extending transversely through the lock cylinder. The members 15 are further provided on their contacting sides with oppositely disposed grooves 31 and 32 forming together a key slot 33 adapted to receive a key 34. This key has shoulders 34^a adapted to engage the end of the cylinder when the key is fully inserted, as shown in Fig. 1, and the blade 34^b of the key is provided on one side with a rib 35 and on the other side with a groove 36, adapted to engage a groove 37 and the projecting V-shaped rib 38, respectively, which are formed on the lateral walls of the key slot 33, as shown particularly in Fig. 6. The tumbler slots 30

are occupied by a plurality of tumblers 40, two tumblers being located in each slot 30 in the embodiment illustrated. These tumblers are provided with rectangular apertures 41 adapted to be engaged by the blade 34^b of the key and the key is provided along its edges with projections 42 which are adapted to co-act with the walls of the slot 41, in the manner illustrated in Fig. 1, to align the curved edges 43 of the tumblers with the outer cylindrical surface of the cylinder 14, thus withdrawing the tumblers from the longitudinal grooves 44 which are formed in the barrel 10 and permitting the cylinder to be rotated in the barrel to operate the locking bolt through the movement of the pin 25.

To increase the difficulty of operating the lock cylinder without the use of a properly designed key, tumblers 40 are employed having outer edges of various different contours. In the innermost key slot 30^a the tumblers preferably have the form illustrated in Fig. 8 where the tumbler 40^a is shown as having parallel lateral edges 45 extending between the curved end surfaces 43. These straight side tumblers are adapted to fit closely the lateral walls 44^a of the grooves 44 in the barrel so that when these tumblers are in engagement with these grooves the vibration of the lock cylinder about its axis of rotation is prevented, thus making it impossible to effect the alignment of the other tumblers by vibratory movements of the cylinder. Since the straight side tumblers 40^a are located in the innermost tumbler slot, they are the most difficult to reach by persons seeking to pick the lock and therefore cannot be easily aligned.

The tumblers occupying the remaining tumbler slots 30 are of the general form illustrated in Figs. 7, 7^a, 7^b and 7^c. The lateral sides 47 are spaced apart distances less than the width of the tumbler slots and they are provided at their corners with projections 48, 49, 50 and 51, all of which differ in length measured from the longitudinal axis of the key slots 41 formed in the tumblers. The ends of the projections are adapted to co-act with the walls of the tumbler slots and with the shoulders 44^a of the grooves formed in the barrel. The different lengths of these projections serve normally to maintain the tumblers out of alignment with each other and increase the difficulty of aligning them due to the engagement of the projections with the edges 52 of the side walls of the tumbler slots. If the tumbler slots are slightly out of alignment with the grooves 44 in the barrel, the projections on the corners of the tumblers hook over the edges 52 of the tumbler slot walls and prevent the alignment of the tumblers in the tumbler slots except by the use of a proper key. The different lengths of these projections render it impossible to disengage all of these projections from the corners of the slot walls at one time, thus further insuring against the picking of the lock by unauthorized persons.

The key 34 is adapted to fit closely the key slot 33 formed in the cylinder 14, both laterally and vertically and until the key has been inserted to its full length, thereby releasing the inner tumblers 40^a from the tumbler slot 30^a, it is impossible to impart any movement to the cylinder. The cylinder can then be turned only in case the key is fully inserted to release all of the remaining tumblers from the grooves 44 in the barrel.

Although I have shown and described a single embodiment of the invention for purposes of illustration, it will be understood that it may be constructed in various other forms without departing from the scope of the appended claims.

I claim:

1. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, each projection on each tumbler being of different length than the other projections on that tumbler rendering the same laterally tiltable in the slots, the remainder of said tumblers having straight sides snugly fitting the slots.

2. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, each projection on each tumbler being of a length different than the other projections on that tumbler rendering the same tiltable relative to the slots, the remainder of said tumblers having straight sides closely positioned adjacent the slots, said barrel having grooves adapted to be engaged by said tumblers.

3. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, each projection on each tumbler being of a length different than the other projections on that tumbler, a clearance between the adjacent wall of the slot and the edge of each of said tumblers for permitting the latter to be moved laterally, the remainder of said tumblers having straight sides snugly fitting the slots, said barrel having grooves adapted to be engaged by said tumblers, said grooves being adapted to be closely fitted by said tumblers having said straight sides.

4. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots therethrough, and a plurality of tumblers mounted in said slots, said barrel having longitudinal grooves adapted to be engaged by said tumblers, some

of said tumblers being adapted to fit closely the lateral walls of said grooves, the remainder of said tumblers having projections on their lateral sides, each of said projections on each tumbler being of a length different from the other projections on that tumbler to render said tumblers tiltable to engage the edges of the walls of said slots when improperly aligned in said cylinder.

5. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a longitudinal key slot therein, said cylinder having a plurality of transverse tumbler slots intersecting said key slot, a plurality of tumblers mounted in said tumbler slots and adapted to be aligned by a key inserted in said key slot, said tumblers being tiltable laterally relative to the slots, said barrel having grooves adapted to be engaged by said tumblers, and projections formed on the outer edges of said tumblers to hook over the edges of the tumbler slots when the tumblers are not aligned, said projections on each tumbler being of a length different than the other projections on that tumbler.

6. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, each said projection on all said lattermentioned tumblers being of a different length rendering said tumblers tiltable relative to said slots and to each other.

7. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, the correspondingly positioned projections on adjacent tumblers being of different lengths.

8. The combination in a lock, of a barrel, a cylinder mounted in said barrel and having a plurality of tumbler slots, and a plurality of tumblers mounted in said slots, some of said tumblers having projections on their lateral sides, the correspondingly positioned projections on adjacent tumblers being of different lengths, the remainder of said tumblers having straight sides snugly fitting said slots.

EDWARD P. BAIRD.