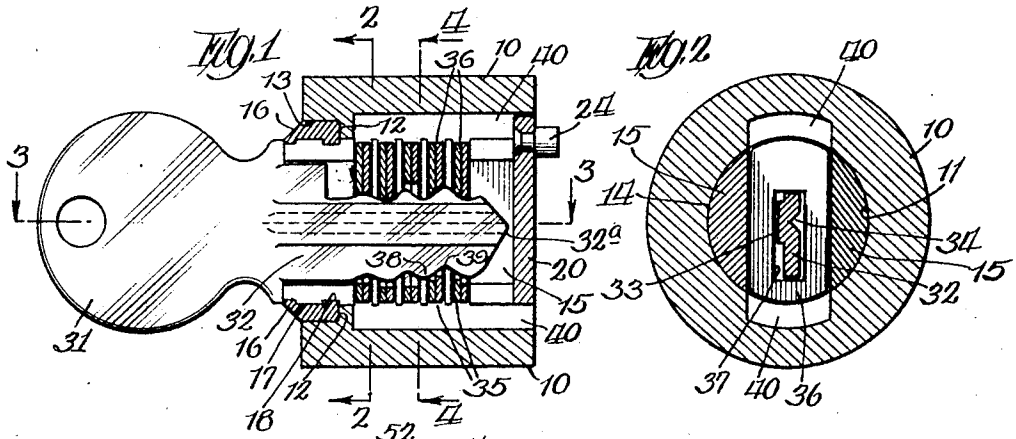
Feb. 19, 1929. 1,702,488

E. P. BAIRD

LOCK

Filed Aug. 31, 1923



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

Patented Feb. 19, 1929. 1,702,488

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. 660,309.

This invention relates to improvements in locks and its purpose is to provide an improved device which cannot be readily picked or released by unauthorized persons. The invention relates particularly to a lock comprising a plurality of tumblers which are adapted to be aligned with each other by a key to release the movable part of the lock and which automatically assume positions, when the key is withdrawn, whereby the unauthorized picking or releasing of the movable part of the lock in effectively prevented. A further object of the invention is to provide a lock comprising two sets of tumblers, those in one set being adapted to move in one direction when the key is withdrawn while those in the other set move in another direction. A further feature is the provision of a plurality of series of tumblers adapted to move in different directions and capable of being aligned by a single key to release the movable part of the lock. A further feature of the invention is the provision of a lock of the barrel and cylinder type comprising tumblers which are moved into engagement with notches in the barrel by means of springs when the key is withdrawn. Other objects relate to various features of construction and arrangement of the locking device which 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 embodying the invention, a key being shown in position to release the tumblers; Fig. 2 shows a transverse vertical section on the line 2—2 of Fig. 1; Fig. 3 shows a longitudinal section on the line 3—3 of Fig. 1; Fig. 4 shows a transverse vertical section on the line 4—4 of Fig. 1; Fig. 5 shows a sectional view similar to Fig. 4 with the key withdrawn; Fig. 6 shows a rear end elevation of the locking device; and Fig. 7 shows a front end elevation of the barrel and cylinder.

As illustrated in the drawings the invention comprises a cylindrical barrel 10 which is adapted to be rigidly secured against longitudinal or transverse movement in the frame of the lock or in the casing to which the lock is attached. This barrel is provided with an internal cylindrical bore 11 terminating at its forward end at the internal annular shoulder 12 which is formed at the end of the enlarged bore 13. This barrel forms a support for the movable lock cylinder 14 comprising two complementary members 15, each of which is semi-circular in cross-section as shown particularly in Fig. 7, these members being placed together with their flat sides in contact and being united by a cap or collar 16. The members 15 are provided with semi-circular shoulders 17 adjacent their ends, forming together a complete annular shoulder or projection over a portion of which the cap 16 is adapted to pass. The cap has an annular flange 16^a at its outer end which engages the outer edge of the shoulder 17 and at its other end the collar is swaged or inturned into an annular groove 18 which is formed adjacent the shoulders 17. The cap 16 is adapted to fit and revolve in the bore 13 while the members 15 of the cylinder are adapted to revolve in the bore 11. At their inner ends, the complementary members 15 of the barrel are united by an end plate 20 which is of a diameter adapted to fit the enlarged counter bore 21 of the barrel 10. The plate 20 is provided with apertures 22 which are engaged by two longitudinally extending lugs 23 formed integrally with the members 15 and the ends of these lugs are riveted to secure the plate in place on the cylinder. A pin 24 is eccentrically mounted on the plate 20 and is adapted to engage and operate the locking bolt, or the like, when the cylinder 14 is rotated, the angular movement of the cylinder being limited by the lug 25 on the barrel engaging the end walls of the notch 26 in the plate 20.

Before being assembled in the manner above described, the complementary members 15 of the cylinder are provided on their flat sides with registering grooves which together form the key slot 28 extending longitudinally completely through the cylinder. This key slot is substantially rectangular in cross-section but is provided on one side with a groove 29 of rectangular cross-section extending laterally from the slot throughout its length, and on the other side a V-shaped projection 30 extends laterally into the key slot throughout its length. The key 31 is provided with a flat blade 32 adapted to fit closely the slot 28 and is provided on one side with a rib 33 adapted to fit the groove 23 and on the other side with a V-shaped groove 34 adapted to receive the V-shaped projection 30. In addition to these features, the complementary

members 15 of the cylinder are provided with a series of transverse grooves, extending vertically, as shown in Fig. 1, and forming rectangular tumbler slots 35 as illustrated particularly in Fig. 3. These slots extend completely through the cylinder 14 and are adapted to be occupied by movable tumblers which are capable of being aligned with each other by the key 31. In the embodiment illustrated, there are five tumbler slots and each of these, except the middle one, is occupied by a pair of tumblers 36 having the form illustrated particularly in Figs. 1 and 2. These tumblers have curved extremities which are adapted to form continuations of the peripheral surface of the cylinder when they are aligned with each other by the key, and they are provided with rectangular slots or openings 37 adapted to receive the key. These slots or openings 37 are of different dimensions in the different tumblers, as shown particularly in Fig. 1 and are adapted to be engaged by the various projections 38 and depressions 39 which are formed in the upper and lower edges of the key so that when the key is placed in the key slot 28 the tumblers align with each other as shown in Fig. 1 and permit the rotation of the cylinder 14 in the barrel 10. When the key is withdrawn these tumblers 36 are adapted to pass by gravity into one of the longitudinal grooves 40 which are formed in the inner wall of the barrel 10 on the upper and lower sides of the cylinder. When the tumblers thus engage these grooves, the rotation of the cylinder is prevented by the engagement of the extremities of the tumblers with the lateral sides of the grooves.

For the purpose of more effectually overcoming the possibility of aligning the tumblers in the cylinder without the use of a key of the proper configuration, an additional pair of tumblers or latch members 45 are mounted in the middle tumbler slot 35. These intermediate tumblers 45 have the form shown particularly in Figs. 3, 4 and 5, where it will be seen that each tumbler comprises a body portion 46 having formed therein a substantially rectangular key slot 47 adapted to be closely fitted transversely by the key blade 32. Each key slot 47 is provided on one side with a V-shaped notch 48 and on the other side with a curved notch 49 for a purpose to be hereinafter described. Each tumbler is further provided on one side with a projecting arm 50 and on the other side with a projecting arm 51, the arm 51 on one tumbler 45 being arranged on the same side of the key slot as the arm 50 of the other tumbler 45. These projecting arms 50 and 51 are adapted to extend into apertures 52 which extend laterally from the intermediate tumbler slot through the walls of the complementary cylinder members 15. The apertures 52 are counterbored as shown at 52ª to receive coiled springs 54 which extend between the shoulders at the ends of the counterbores and the shoulders 55, which are formed on the arms 51, so that one spring 54 tends to force one of the intermediate tumblers 45 laterally in one direction while the other spring 54 tends to force the other tumbler 45 laterally in the other direction. When thus forced apart by the springs, the arms 50 which are moved in opposite directions are adapted to engage notches 57 in the inner wall of the barrel 10, thus preventing rotation of the cylinder within the barrel and supplementing the action of the tumblers 36.

The blade 32 of the key is provided with an angular extremity 32ª and when the key is inserted into the cylinder this V-shaped extremity is adapted to engage the small opening 58 which is formed by the registering portions of the key slots 47 in the tumblers 45, as shown in Fig. 5. As the key is forced inwardly, the rib 33 on one side of the key will engage the V-shaped notch 48 in one of the tumblers 45 and force that tumbler laterally in one direction against the action of its spring 54 while the flat side of the key, opposite the rib 33, will engage the curved notch 49 in the other tumbler 45 and force that tumbler laterally in the other direction against its spring 54, until the two tumblers 45 occupy positions wherein the key slots 47 register with each other and wherein the arms 50 will have been withdrawn entirely from the notches 57. The blade 32 of the key can then be completely inserted to effect the proper alignment of the tumblers 36 so that the cylinder 14 can be turned in the barrel 10 to operate the locking bolt.

From the foregoing description it will be apparent that in order to effect the proper registry of the tumblers 45 a key must be employed which exactly fits the key-slots 47 in a lateral direction and which also has the proper lateral surfaces to operate the tumblers by engagement with the notches 48 and 49. Inasmuch as these tumblers are operated by springs 54 which positively press them laterally so that the arms 50 project into the notches 57, it will be seen that these tumblers cannot be released by any slight vibratory movement of the cylinder. The spring actuated tumblers have the further advantage that they positively engage the recesses 57 when the key is withdrawn. The tumblers 45 move in a direction at right angles to the movement of the main tumblers 36 which further increases the difficulty of effecting a proper alignment of all of the tumblers at one time without the use of a properly formed key. The transversely moving tumblers 45 may be used alone in any desired number or in combination with any desired forms of tumblers located in the other tumbler slots. One or more tumblers may be used in each tumbler slot and the transversely moving

tumblers may be located in any selected slot or slots.

Although one form of the invention has been shown and described 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 member having a key slot and tumbler slots, and a pair of laterally movable and oppositely slidable spring actuated means located in one of said tumbler slots and adapted to be released by the insertion of a key in said key slot, for normally preventing the operation of said lock.

2. The combination in a lock of a member having a key slot and other slots, a vertically movable latching member in some of said other slots extending transversely to said key slot and operating normally to prevent the movement of said first-named member, and a pair of laterally movable and oppositely slidable latching members in another of said other slots extending transversely to said key slot and transversely to said first-named latching member for normally preventing the movement of said first-named member.

3. A lock of the class described having in combination, an actuating member provided with diametrically opposed slots, tumblers mounted in one of said slots and having outwardly projecting arms mounted in diametrically opposed slots, springs in said latter slots engaging the tumblers for moving and holding the same laterally in opposite directions, and a stationary member having a recess adapted to be engaged by said tumblers.

4. The combination in a lock of a gravity actuated tumbler in a tumbler slot, laterally movable and oppositely slidable spring actuated tumblers in another tumbler slot movable at right angles to the direction of movement of said gravity actuated tumbler, and a key for operating all said tumblers independently of each other.

5. The combination in a lock of a rotatable member having a key slot, a set of tumblers mounted in said member and having slots adapted to register with said key slot, a stationary member having a recess adapted to be engaged by said tumblers when the key is withdrawn from the slot, a second set of tumblers movable transversely to said first named tumblers and having slots to be engaged by said key, said stationary member having notches to be engaged by said last mentioned tumblers, and means for moving said second set of tumblers laterally in opposite directions when said key is removed.

6. The combination in a lock of a rotatable cylinder having a key slot and a plurality of tumbler slots intersecting said key slot, a set of tumblers mounted in some of said tumbler slots and having parts adapted to be engaged by a key inserted in said key slot, a barrel having recesses adapted to be engaged by said tumblers when said key is withdrawn, a second set of tumblers independently mounted in another of said tumbler slots and having parts adapted to be engaged by said key, said barrel having notches adapted to be engaged by said last named tumblers when said key is withdrawn, and springs mounted in the slots and engaging said second set of tumblers for moving the latter laterally in opposite directions when said key is removed.

7. The combination in a lock of a rotatable cylinder having a key slot and a plurality of tumbler slots intersecting said key slot, a set of tumblers mounted in some of said tumbler slots and having parts adapted to be engaged by a key inserted in said key slot, a barrel having a recess adapted to be engaged by said tumblers when said key is withdrawn, and a second set of tumblers separately mounted in another of said tumbler slots and having parts adapted to be engaged by said key, said cylinder having apertures communicating with the other of said tumbler slots occupied by said second-named tumblers, said second-named tumblers having arms extending into said apertures, springs encircling said arms for moving the second named tumblers laterally in opposite directions with respect to each other, said barrel having notches adapted to be engaged by the extremities of said arms when said key is withdrawn from said slot.

8. The combination in a lock of a rotatable cylinder having a key slot and a plurality of tumbler slots intersecting said key slot, a set of tumblers mounted in some of said tumbler slots and having parts adapted to be engaged by a key inserted in said key slot, a barrel having a recess adapted to be engaged by said tumblers when said key is withdrawn, a second set of tumblers mounted in a slot intermediate said first-named tumbler slots and having parts adapted to be engaged by said key, said cylinder having apertures communicating with the other of said tumbler slots occupied by said second-named tumblers, said second-named tumblers having arms extending into said apertures, said barrel having notches adapted to be engaged by the extremities of said arms when said key is withdrawn from said slot, and springs for moving laterally and in opposite directions said second-named tumblers on withdrawal of said key.

9. The combination in a lock of a rotatable cylinder having a key slot and a plurality of tumbler slots intersecting said key slot, a set of tumblers mounted in some of said tumbler slots and having parts adapted to be engaged by the edge of a key inserted in said key slot, a barrel having a recess adapted to be engaged

by said tumblers when said key is withdrawn, a second set of tumblers mounted in the other of said tumbler slots and having parts adapted to be engaged by the flat sides of said key, said cylinder having apertures communicating with other of said tumbler slots occupied by said second-named tumblers, said second-named tumblers having arms extending into said apertures, said barrel having notches adapted to be engaged by the extremities of said arms when said key is withdrawn from said key slot, and springs tending normally to move said second-named tumblers laterally and in opposite directions so as to force said arms into said notches.

10. The combination in a lock of a barrel, a cylinder mounted to rotate in said barrel, said cylinder being provided with a plurality of tumbler slots and a key slot intersecting said tumbler slots, a set of tumblers mounted in some of said tumbler slots and having apertures therethrough adapted to register with said key slot, a key having edges adapted to operate said tumblers by engagement with the walls of said apertures, said barrel having notches adapted to be engaged by said tumblers when said key is withdrawn, a second set of laterally movable and oppositely slidable tumblers mounted in other of said tumbler slots and having apertures adapted to register with said key slot and to be closely fitted transversely by said key, and means tending to move said second named tumblers transversely to the direction of the movement of said first named tumblers, said barrel having notches adapted to be engaged by parts of said second-named tumblers when said key is withdrawn from said key slot.

11. The combination in a lock of a rotatable member having a tumbler slot and a key slot intersecting said tumbler slot, a pair of tumblers mounted in said tumbler slot having apertures adapted to register with said key slot, means tending to move said tumblers laterally and in opposite directions, and a key having parts adapted to engage said tumblers to effect the registry of said apertures with said key slot.

12. The combination in a lock of a movable member having a tumbler slot and a key slot intersecting said tumbler slot, a pair of tumblers mounted in said tumbler slot and having apertures therethrough adapted to register with said key slot, the opposite side walls of said apertures being provided with notches of different configuration, means tending to move said tumblers in opposite directions, and a key having parts adapted to engage said notches to effect a reverse movement of said tumblers and the registry of said apertures with said key slot.

13. The combination in a lock of a rotatable member having a tumbler slot and a key slot intersecting said tumbler slot, said member being further provided with apertures extending laterally from said tumbler slot, a pair of laterally slidable tumblers mounted in said tumbler slot and having openings adapted to register with said key slot, arms projecting from said tumblers into said apertures in said member, yieldable means tending to move and hold said tumblers in opposite directions, a stationary member having notches adapted to be engaged by said arms, and a key having parts adapted to engage the openings in said tumblers to effect the alignment of said openings with said key slot and to move said arms from said notches.

14. The combination in a lock of a rotatable member having a tumbler slot and a key slot intersecting said tumbler slot, said member being further provided with openings extending laterally from said tumbler slot, a pair of laterally slidable tumblers mounted in said tumbler slot and having apertures adapted to register with said key slot, arms projecting from said tumblers into said openings in said member, yieldable means tending to move and hold said tumblers in opposite directions and said arms in engagement with said openings, a stationary member having notches adapted to be engaged by said arms, the lateral walls of said apertures through said tumblers being provided with notches, and a key adapted to fit said apertures in said tumblers closely in a direction transversely of said key slot and having parts adapted to effect the registry of said apertures with said key slot and to release said arms from said notches.

EDWARD P. BAIRD.