July 5, 1938. S. A. LISS 2,122,478

LOCK

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Fig. 1

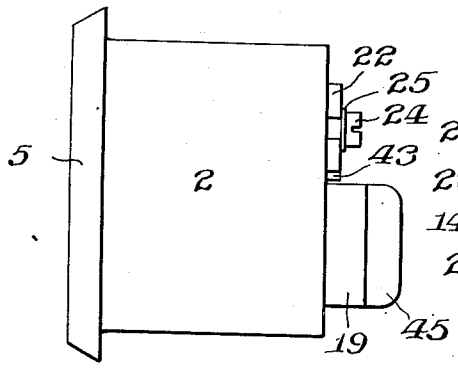


Fig. 2.

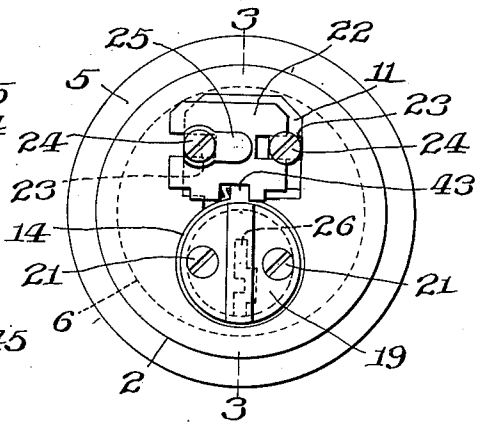


Fig. 3.

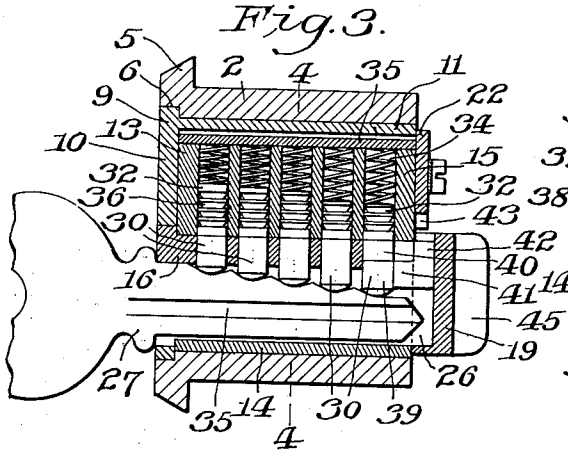


Fig. 4.

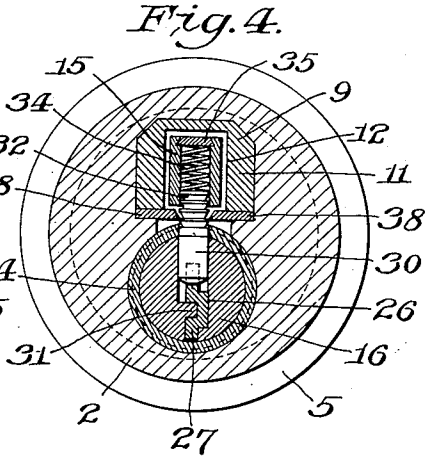


Fig. 5.

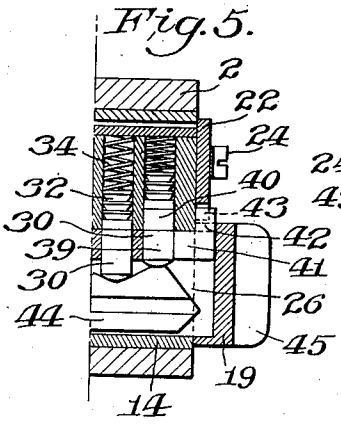


Fig. 6.

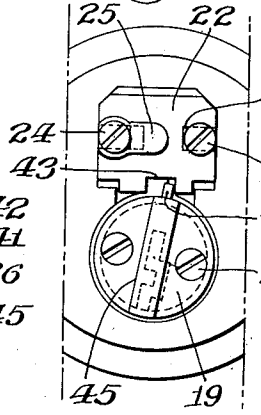


Fig. 7.

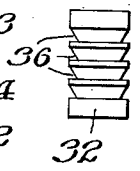
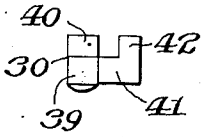


Fig. 8.



INVENTOR:
Samuel A. Liss,
BY
A. V. Groupe
ATTORNEY.

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Fig. 9.

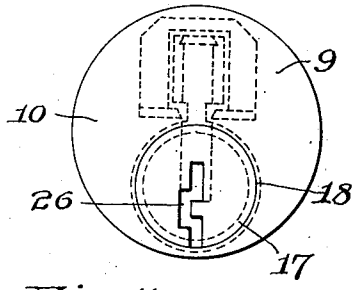


Fig. 10.

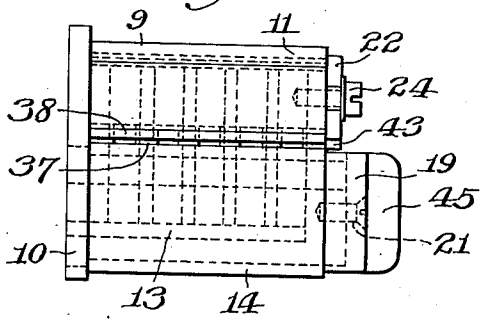


Fig. 11.

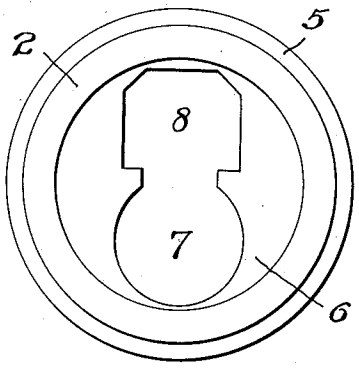


Fig. 12.

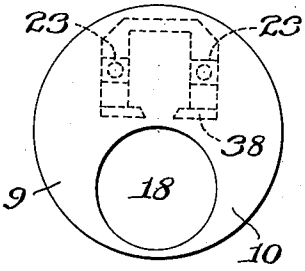


Fig. 13.

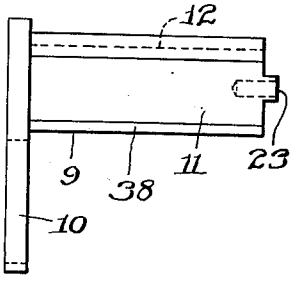


Fig. 14.

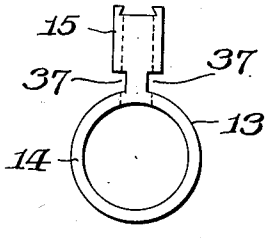


Fig. 15.

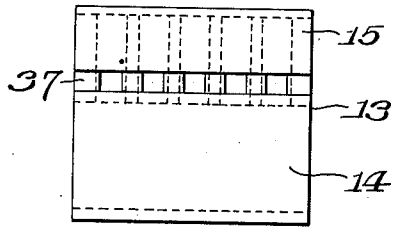


Fig. 16.

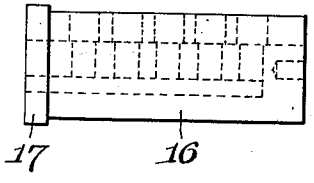
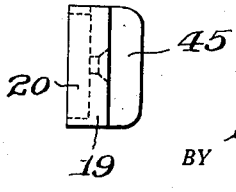


Fig. 17.



INVENTOR:
Samuel A. Liss,
BY
A. V. Grouse
ATTORNEY.

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UNITED STATES PATENT OFFICE

2,122,478

LOCK

Samuel A. Liss, Philadelphia, Pa., assignor of one-half to Helen B. Hamill, Haddonfield, N. J.

Application September 9, 1935, Serial No. 39,768

12 Claims. (Cl. 70—419)

This invention relates to improvements in locks of the cylinder type employing spring and key actuated tumblers in the locking mechanism thereof.

An object of the invention is to construct and relate the parts of the lock in a novel and advantageous manner for the prevention of the picking of the lock by the methods usually employed for that purpose.

Another object of the invention is to provide a novel construction and relation of parts whereby the locking mechanism and the associated supporting parts thereof may be removed from the lock casing which is permanently mounted in its support for repairing and other purposes.

Another object is to so construct and relate the parts of the locking mechanism and the associated supporting parts thereof that the same may be easily and quickly assembled and disassembled when removed from the casing.

Another object is to provide a novel and advantageous means or supplemental locking device for locking and unlocking the aforesaid locking mechanism and associated parts within the permanent casing by the aid of a supplemental key, such means or device being unoperable by the key provided for the regular operation of the main locking mechanism.

The invention resides in the elements and the combinations of them hereinafter described and claimed.

In the accompanying drawings, illustrating the invention,

Figure 1 is a side view of a lock constructed in accordance with the invention.

Figure 2 is a view of the rearward or inner end of the lock.

Figure 3 is a longitudinal section of the lock, on line 3—3 of Fig. 2, showing the regular operating key therefor inserted into the lock cylinder.

Figure 4 is a transverse section of the lock, on line 4—4 of Fig. 3.

Figure 5 is a sectional view of the parts shown at the right hand end of Fig. 3, showing the supplemental key substituted for the regular operating key.

Figure 6 is a view of a part of the rearward end of the lock, showing the supplemental locking device in the unlocked position.

Figure 7 is a side view of one of the secondary tumblers.

Figure 8 is a side view of one of the tumblers which operates within the cylinder.

Figure 9 is a front view of the locking mechanism and the associated supporting parts removed from the permanent casing.

Figure 10 is a side view of the parts shown in Fig. 9.

Figure 11 is a front view of the permanent casing alone.

Figure 12 is a front view of the removable casing member.

Figure 13 is a side view of the member shown in Fig. 12.

Figure 14 is an end view of the part which contains the secondary tumblers.

Figure 15 is a side view of the part shown in Fig. 14.

Figure 16 is a side view of the lock cylinder with removable head thereof removed therefrom.

Figure 17 is a side view of the removable head of the cylinder.

Referring to the drawings, 2 designates the casing of the lock which is constructed to be permanently secured to or within any suitable support with which the lock is to be used.

The construction of the casing 2 is clearly illustrated in Figs. 1, 2, 3, 4 and 11. The exterior of the casing may be of any desired configuration, and, as herein shown, it is of cylindrical form having an annular flange 5 on its forward end. The forward wall of the casing has a round depression 6 formed therein, as best shown in Figs. 3 and 11, and the casing has a bore 7 which extends completely through the lower portion thereof longitudinally of the same. The casing is also provided with a channel 8 which extends completely through the upper portion thereof parallel to the bore 7 and which is angular in cross section and which opens into the bore 7, as shown in the drawings.

The casing 2 carries a removable casing member 9 as shown in Figs. 12 and 13, comprising a round disc or head 10 fitted within the casing depression 6 and a bar 11 which is formed on or secured thereto and which extends rearwardly therefrom through the casing channel 8. The top and side walls of the bar 11 are fitted to the top and side walls of the channel 8, and the bar 11 is provided with a channel 12 having an open bottom and extending longitudinally therethrough from end to end thereof.

Located within the bore 7 of the casing 2 and within the channel 12 of the casing member 11 is a part or fitting 13, as shown in Figs. 14 and 15, comprising a sleeve 14 and a block 15 extending upwardly therefrom. The sleeve 14 is fitted to the casing bore 7 and the block 15 extends into

the channel 12 of the bar 11 of the casing member 9.

The lock cylinder 16 extends through the sleeve 14 and it is fitted to be rotated therein. The forward end of the cylinder 16 is provided with a round head 17 which is fitted to turn in a round hole or opening 18 in the disc or head 10 of the casing member 9, and the rearward end of the cylinder 16 is provided with a removable head 19 which receives the end portion of the cylinder within a surrounding collar or flange 20 and which is detachably secured to the cylinder by means of screws 21 which pass through the head 19 and are screwed into the cylinder.

The space between the cylinder heads 17 and 19 is equal to the length of the sleeve 14 of the part or fitting 13, and the heads 17 and 19 are arranged to engage the ends of the fitting 13 to prevent longitudinal displacement of the cylinder within the lock.

The fitting 13 is of equal length with the bar 11 of the removable casing member 9, and the block 15 of the fitting is retained within the channel 12 of the bar 11 by a laterally movable locking plate 22 carried by the rearward end of the bar. This locking plate 22 has slotted sides which embrace rearwardly extending blocks or projections 23 formed on the ends of the side walls of the bar 11. These blocks or projections 23 guide the plate 22 during the lateral movement thereof and serve as stops to limit such movement when the plate is moved from the position shown in Fig. 2 to the position shown in Fig. 6 and back again. The plate 22 is retained in slidable contact with the end of the bar 11 by the heads of screws 24 which are screwed into the blocks 23, and a friction spring 25 having a free end bearing against the plate 22 and another end held in place between one of the blocks 23 and the head of one of the screws 24 serves to prevent accidental displacement of the plate from either of the positions to which it is moved.

When the locking plate 22 is in the position shown in Fig. 2, the left hand side thereof is projected over a portion of the rearward end of the permanent casing 2 and by its engagement therewith retains the disc or head 10 of the removable casing member 9 within the depression 6 in the forward end of the casing and thereby locks the member 9 within the permanent casing 2.

When the locking plate 22 is moved to the position shown in Fig. 6, the various parts of the lock may be removed from the permanent casing and disassembled, as will be hereinafter described.

The width of the channel 12 in the bar 11 is greater than the width of the block 15 of the fitting 13 to permit limited lateral movement of the block and to permit limited turning movement of the sleeve 14 when the block 15 is moved laterally by turning the entire fitting on the axis of the sleeve 14 and cylinder 16, for a purpose hereinafter described, and, when the casing member 9 is locked within the casing 2 by the plate 22, the head 10 and plate 22 prevent longitudinal displacement of the fitting and permit it to be turned slightly on the axis of its sleeve 14 within the casing bore 7 while the heads on the respective ends of the cylinder 16 engage the respective ends of the fitting sleeve 14 and prevent longitudinal displacement of the cylinder 16 and permit it to be turned on its axis within the sleeve.

The cylinder 16 has a key-way 26 formed therein and extending longitudinally thereof and having an open outer end for the reception of a key 27, shown in Fig. 3, for the regular operation of the lock, and the cylinder 16 is provided with a longitudinally extending row of transversely extending parallel bores 29 within which a set of pins 30 constituting the primary tumblers of the lock are slidably fitted.

The block 15 of the fitting 13 is provided with a longitudinally extending row of parallel bores 31 within which a set of pins 32 constituting the secondary tumblers of the lock are slidably fitted in axial alinement with the primary tumblers 30.

The primary and secondary tumblers 30 and 32, respectively, are of equal diameter so that they may slide freely within the respective bores of the cylinder 16 and fitting 13 and cross the line of division between them.

The cylinder bores for the primary tumblers 30 open into the key-way 26 and when the key 27 is absent from the key-way 26, the downward or inward movement of the tumblers 30 is limited by the top wall of a rib 31 which is received within a groove 33 in the key 27 when the key is inserted into the cylinder.

The tumblers are urged yieldingly toward the rib 31 of the key-way by springs 34 located within the upper or outer bores for the secondary tumblers 32 and exerting pressure between the secondary tumblers and a longitudinally extending plate 35 carried by the block 15. This plate 35 is fitted to slide longitudinally within a groove formed in the upper portion of the block 15 and having under-cut side walls fitted to corresponding side walls of the plate. The plate 35 is removable from the block 15 when the fitting 13 is removed from the member 9 for a purpose hereinafter appearing.

When the key 27 for the regular operation of the lock is inserted into the key-way 26, the key engages the primary tumblers 30 and moves them and the secondary tumblers 32 against the pressure of the springs 34 to bring the opposing ends of the primary and secondary tumblers into registry with the outer surface of the cylinder 16 and inner surface of the sleeve 14 to unlock the cylinder and permit it to be turned; and, when the key 27 is withdrawn from the key-way 26, the springs 34 move the primary tumblers into engagement with the rib 31, and, at the same time, move the secondary tumblers 32 across the line of division between the sleeve 14 and the cylinder 16 and into the tumbler bores of the cylinder and thereby lock it against rotation.

Each of the secondary tumblers 32 is provided with a series of annular grooves 36, each groove of which has a downwardly and inwardly beveled wall leading to an abrupt shoulder formed by the bottom of the groove, as clearly shown in the drawing; and the block 15 of the fitting 13 is provided with longitudinally extending grooves 37 in the opposite sides thereof in the region of the union of the block 15 with the sleeve 14 and into which opposite sides of the grooved secondary tumblers 32 extend.

The bottom of the side walls of the bar 11 of the casing member 9 has longitudinally extending, parallel plates 38 suitably secured thereto and extending inwardly therefrom into the grooves 37 of the block 15. The inner edges of the plates 38 are beveled downwardly and inwardly in correspondence with the beveled walls of the tumbler grooves 36, and the space between such inner edges is equal to or slightly in excess of the diameter of the secondary tumblers 32 to permit free movement of the tumblers between the plates during the operation of the lock by the keys provided for that purpose.

The purpose of providing the rockable fitting 13 and the plates 38 and the grooves 36 in the secondary tumblers 32 is to prevent the lock from being picked by the methods usually employed which involve the use of side pressure against some or all of the primary tumblers either in locating the unlocking positions of the tumblers or in holding them in such unlocking positions after they have been moved thereto or both. Should such side pressure be exerted against any of the primary tumblers 30, during an attempt to pick the lock, such pressure will rock the fitting 13 on the axis of the cylinder 16 and sleeve 14 and thus move the fitting block 15 laterally and cause the beveled inner edge of one of the plates 38 to enter some of the grooves 36 of the secondary tumblers and prevent the tumblers from being moved to the unlocking position.

The pin which constitutes the innermost primary tumbler 30 is made in two separable parts 39 and 40. The lower part 39 is provided with a rearwardly extending blade 41 having an upwardly extending projection 42 on its rearward end. This blade 41 and its projection 42 are fitted to slide in a slot of equal width therewith in the rearward end of the cylinder 16 and extending through the collar or flange 20 of the head 19 on the rearward end of the cylinder.

The table 41 and its projection 42 are constructed to be moved from the position shown in Fig. 3 to the position shown in Fig. 5 when the primary tumbler 30 carrying them is so moved, and, when these parts are moved to the position shown in Fig. 5, the projection 42 is moved into a notch 43 in the bottom of the locking plate 22. The parts are moved to the position shown in Fig. 5 by a supplemental key 44 inserted into the key-way 26, as shown in Fig. 5. This supplemental key is like the key 27 which is provided for the regular operation of the lock, excepting that, in the supplemental key, the free or inner end of the key bit which sets the innermost primary tumbler 30 carrying the blade 41 is constructed and shaped to set these parts in the position shown in Fig. 5 in which the line of division between the two parts 39 and 40 of the innermost tumbler 30 is in registry with the line of division between the sleeve 14 and the cylinder 16, so that when the key 44 is inserted into the cylinder the projection 42 will be moved into the notch 43 and the cylinder 16 may be turned by the inserted key.

It will now be understood that when the supplemental key 44 is inserted into the cylinder 16 the latter will be unlocked and may be turned in either direction to cause the projection 42 to engage either end of the notch 43 and move the locking plate 22 from either to the other of the positions shown in Figs. 2 and 5.

Normally the locking plate 22 rests in the position shown in Fig. 2 and thereby locks or retains the locking mechanism and the associated supporting parts thereof within the permanent casing 2 for the regular operation of the lock by the key 27.

When, however, it is desired to disassemble the parts of the lock for repairing or other purposes, the key 44 is inserted into the cylinder 16 and the cylinder is turned to cause the projection 42 to move the locking plate 22 from the position shown in Fig. 2 to the position shown in Fig. 6. This done, the casing member 9, the fitting 13, the locking cylinder 16 and the parts carried thereby, as shown in Figs. 9 and 10, may be bodily removed as a unit from the permanent casing 2 through the forward end thereof. After these parts have been thus removed from the casing 2, the supplemental key 44 may be withdrawn from the cylinder 16 and the screws 24 and locking plate 22 may be removed from the casing member 9, shown in Figs. 12 and 13, to permit the fitting 13 and cylinder 16 therein to be removed rearwardly from the member 9. This done, the plate 35 may be removed from the block 15 of the fitting 13 shown in Figs. 14 and 15, and thereafter the spring 34, secondary tumblers 32 and all the primary tumblers 30 excepting the innermost one may be removed from the fitting 13 and cylinder 16 through the upper ends of the tumbler guiding bores in the fitting; and, after the screws 21 have been removed from the cylinder head 19, the head 19 may be removed from the cylinder and the cylinder removed from the sleeve 14 and thereafter the primary tumbler 30 carrying the blade 41 may be removed from the cylinder.

The parts of the lock may be reassembled by a reversal of the disassembling operation just described, and after the parts have been reassembled the supplemental key 44 may be inserted into the cylinder 16 and the cylinder turned to move the locking plate 22 from the position shown in Fig. 5 to the position shown in Fig. 2 to lock the parts within the permanent casing 2, whereupon the supplemental key 44 is withdrawn from the cylinder 16 and the lock is in normal condition for regular operation by the key 27.

The rearward cylinder head 19 is provided with a projecting flange 45 as a suitable means to engage and move the part to be operated by the locking cylinder 16.

I claim:

1. In a lock, a casing, a key operated rotatable cylinder, a primary tumbler movable within the cylinder, a secondary tumbler cooperating with the primary tumbler for locking and unlocking the cylinder, laterally movable guiding means for the secondary tumbler, and means rendered operable to prevent the unlocking functioning of the secondary tumbler upon lateral movement of the latter and its guiding means.

2. In a lock, a casing, a key operated rotatable cylinder, a primary tumbler movable within the cylinder, a secondary tumbler cooperating with the primary tumbler for locking and unlocking the cylinder, and laterally movable guiding means for the secondary tumbler, said secondary tumbler having a shoulder, and said casing having a part constructed to be engaged by said shoulder to prevent the unlocking functioning of the secondary tumbler when it and its guiding means are moved laterally.

3. In a lock, a casing, a key operated rotatable cylinder, a primary tumbler movable within the cylinder, a secondary tumbler cooperating with the primary tumbler for locking and unlocking the cylinder, and a part movable laterally on the axis of the cylinder and providing guiding means for the secondary tumbler and having a bore in which the cylinder is mounted, said secondary tumbler having a shoulder, and said casing having a part constructed to be engaged by said shoulder to prevent the unlocking functioning of the secondary tumbler when it and its guiding means are moved laterally.

4. In a lock, a casing having a bore therein, a laterally movable part having a sleeve portion fitted to turn within the bore in the casing, a key operated cylinder rotatably mounted with-

in said sleeve portion, a primary tumbler movable within the cylinder, a secondary tumbler guided within said part and cooperating with the primary tumbler for locking and unlocking the cylinder, and means rendered operable to prevent the unlocking functioning of the secondary tumbler upon lateral movement of the latter and said part.

5. In a lock, a casing having a bore therein, a laterally movable part having a sleeve portion fitted to turn within the bore in the casing, a key operated cylinder rotatably mounted within said sleeve portion, a primary tumbler movable within the cylinder, a secondary tumbler guided within said part and cooperating with the primary tumbler for locking and unlocking the cylinder, said secondary tumbler having a shoulder, and said casing having a part constructed to be engaged by said shoulder to prevent the unlocking functioning of the secondary tumbler when it and said laterally movable part are moved laterally.

6. In a lock, a casing, a key operated rotatable cylinder, a primary tumbler movable within the cylinder, a secondary tumbler cooperating with the primary tumbler for locking and unlocking the cylinder, and laterally movable guiding means for the secondary tumbler, said secondary tumbler having a plurality of annular grooves providing a plurality of shoulders, and said casing having a part constructed to be engaged by any one of said shoulders to prevent the unlocking functioning of the secondary tumbler when it and its guiding means are moved laterally.

7. In a lock, a casing having a bore therein, a laterally movable part having a sleeve portion fitted to turn within the bore in the casing, a key operated cylinder rotatably mounted within said sleeve portion, a primary tumbler movable within the cylinder, a secondary tumbler guided within said part and cooperating with the primary tumbler for locking and unlocking the cylinder, means rendered operable to prevent the unlocking functioning of the secondary tumbler upon lateral movement of the latter and said part, and key operated means for releasably maintaining said part within the casing.

8. In a lock, a casing, a casing member within and removable from the casing, a part having a sleeve portion, a key operated cylinder rotatably mounted within said sleeve portion and having heads on the respective ends thereof for engagement with the ends of said part, one of said heads being removable from the cylinder to permit the removal of the cylinder from the sleeve, said member, said part and said cylinder being removable as a unit from the casing, a primary tumbler movable within the cylinder, a secondary tumbler movable within said part and cooperating with the primary tumbler for locking and unlocking the cylinder, and key controlled means operated by a turning movement of the cylinder for releasably maintaining said member within the casing.

9. In a lock, a casing, a casing member within and removable from the casing, a part carried by and removable from said member, a key operated cylinder rotatably mounted in said part, a primary tumbler movable within the cylinder, a secondary tumbler movable within said part and cooperating with the primary tumbler for locking and unlocking the cylinder, and key controlled means operated by a turning movement of the cylinder for releasably maintaining said member within the casing.

10. In a lock, a casing, a casing member within and removable from the casing and having a head on its outer end constructed to engage the outer end of the casing, locking mechanism carried by the member and removable therewith from the casing, a locking plate carried by the inner end of the member, and key operated means for moving said plate into and from a position in which its engagement with the casing prevents the removal of the member therefrom.

11. In a lock, a casing, a casing member within and removable from the casing, a locking device for locking said member within the casing, and locking mechanism carried by said member and including a locking cylinder having a key operated tumbler movable to two positions by different keys inserted into the cylinder, said tumbler having means associated therewith to effect the locking of the cylinder when the tumbler is away from either of said positions and to effect the unlocking of the cylinder when the tumbler is in either of said positions, and said tumbler having means constructed to operate said locking device only when the tumbler is in one of said positions.

12. A lock fitting comprising a body having a cylinder receiving sleeve portion and a block extending outwardly therefrom and having a row of tumbler receiving bores opening into the sleeve and having grooves in the opposite sides thereof which open into the bores.

SAMUEL A. LISS.