Dec. 5, 1933. H. MACHINIST 1,937,523

LOCK

Filed April 29, 1932 3 Sheets-Sheet 1

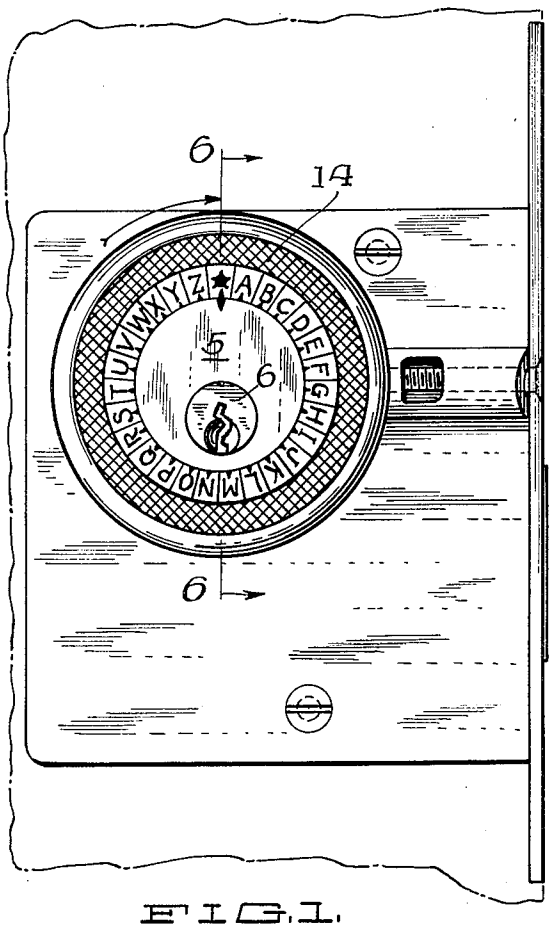


FIG. 1.

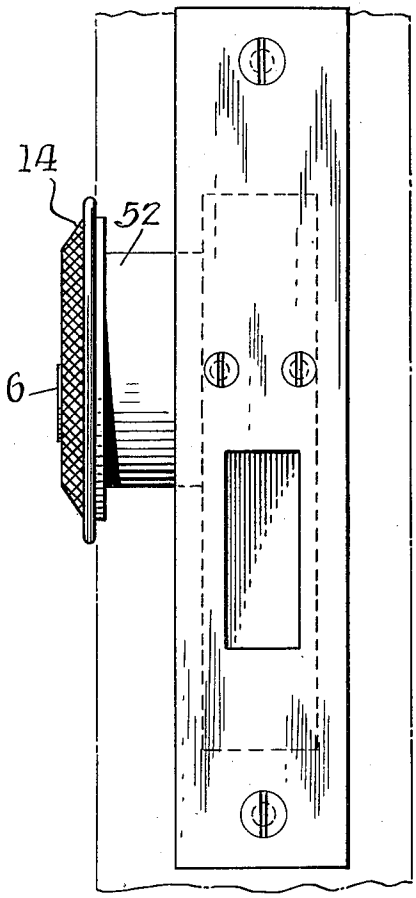


FIG. 2.

FIG. 3.

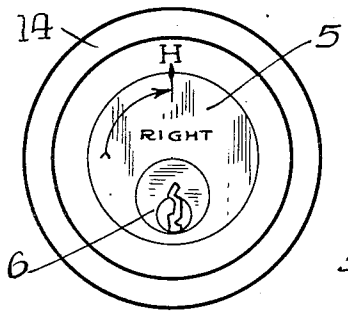


FIG. 4.

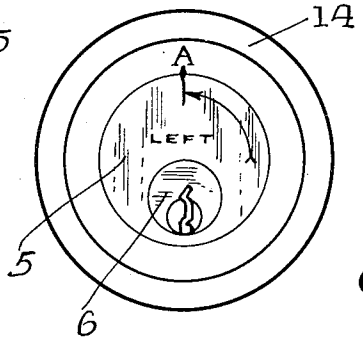
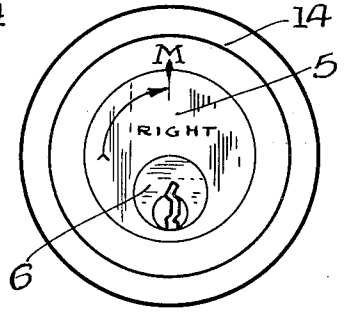


FIG. 5.



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FIG. 6.

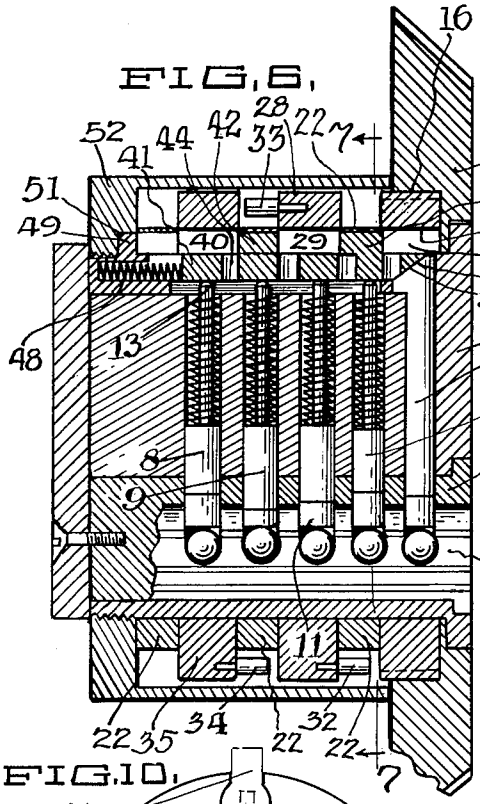


FIG. 12.

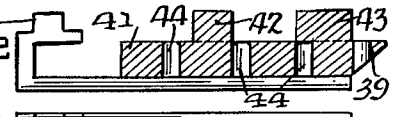
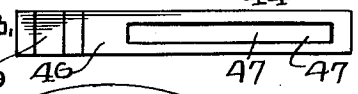


FIG. 13.



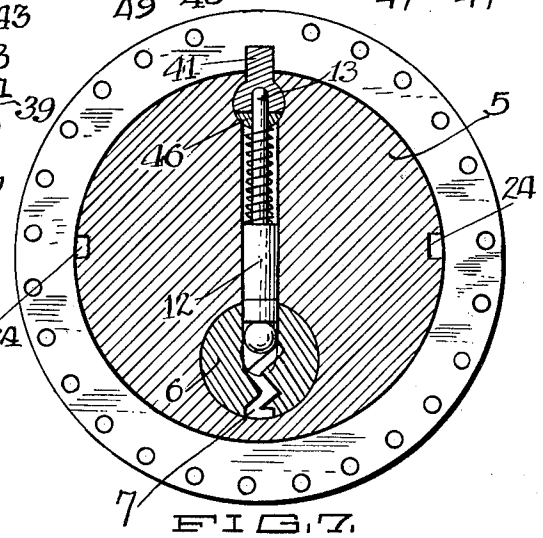


FIG. 7.

FIG. 10.

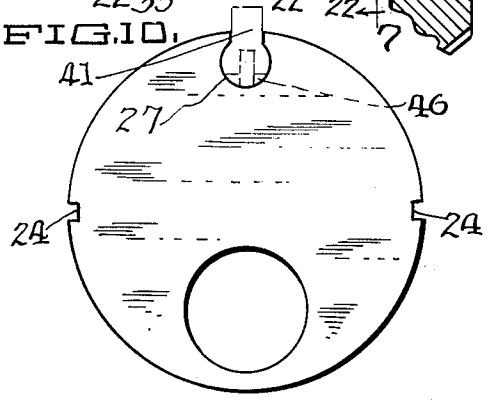




FIG. 8.

FIG. 9.

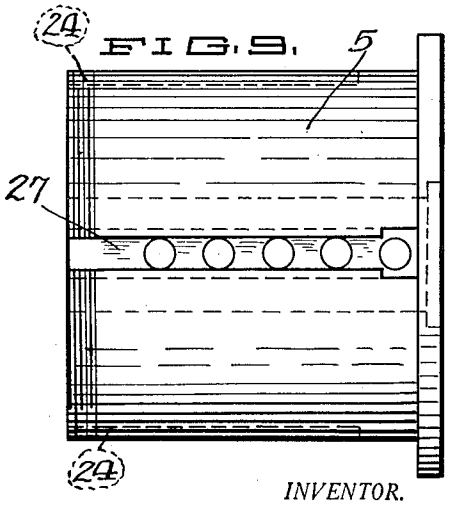
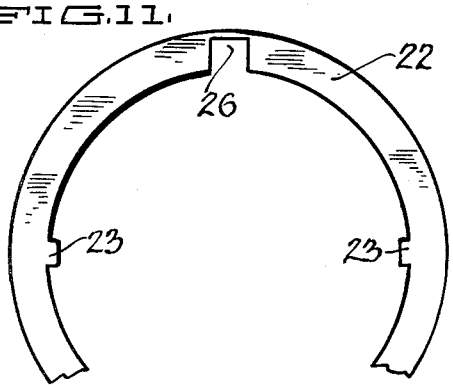


FIG. 11.



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FIG. 14.

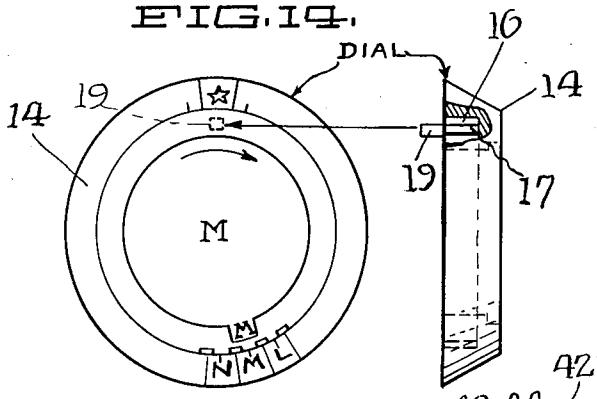


FIG. 17.

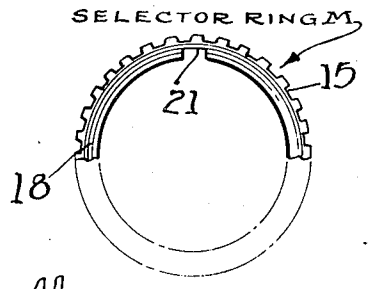
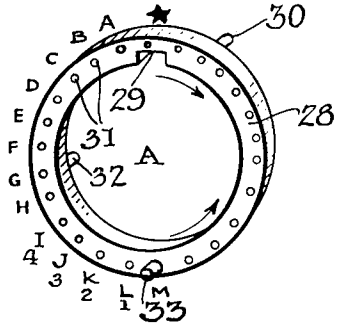


FIG. 15.



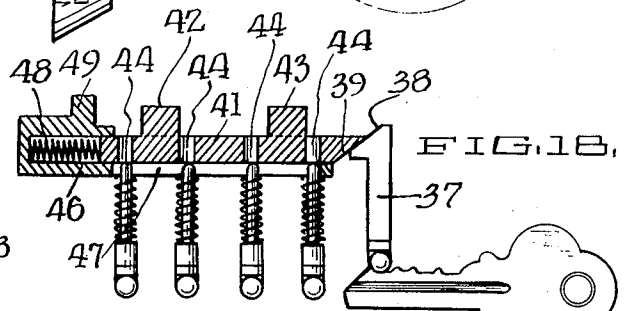


FIG. 18.

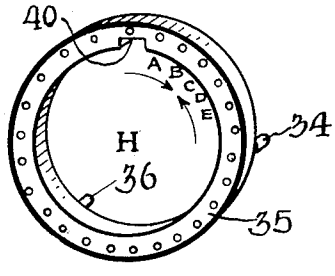


FIG. 16.

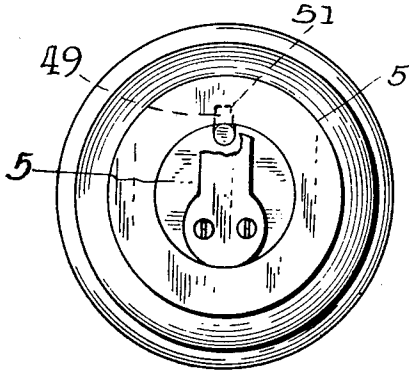


FIG. 19.

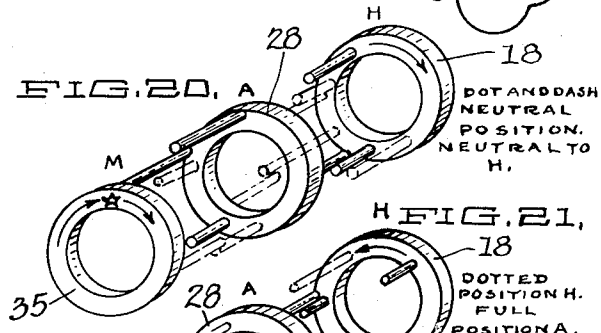


FIG. 20.

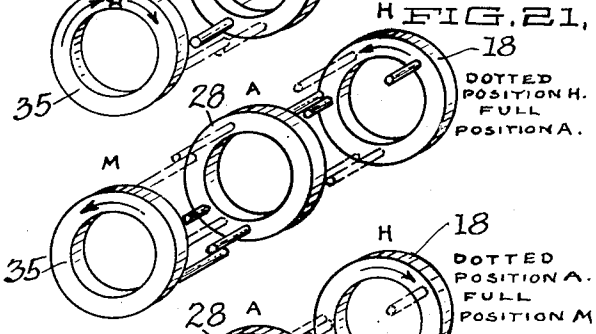


FIG. 21.

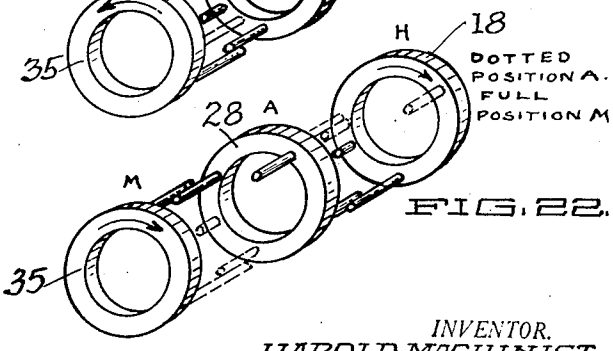


FIG. 22.

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Patented Dec. 5, 1933 1,937,523

UNITED STATES PATENT OFFICE

1,937,523

LOCK

Harold Machinist, San Quentin, Calif., assignor of one-tenth to Margaret Slater, Berkeley, Calif.

Application April 29, 1932. Serial No. 608,305

5 Claims. (Cl. 70—53)

This invention relates to improvements in locks and has particular reference to a permutation lock combined with a key actuated lock of the cylinder type.

The principal object of this invention is to produce a lock wherein the mechanism must be actuated by a key to produce the unlocking action of the lock and wherein the key cannot be inserted until a certain combination has been worked out on a rotating dial thus eliminating the possibility of a person picking the lock or inserting a dummy key thereinto.

An additional object of the invention is to produce a lock equipped with means to eliminate the opening of the parts from the rear of the lock except by an authorized person.

A further object is to produce a device which is simple to construct, easy to install and simple to operate.

A still further object is to produce a lock wherein various combinations may be easily changed even by an unskilled person, thus enabling the combination to be changed from time to time, if desired.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a side elevation of a lock casing having my lock arrangement attached thereto,

Fig. 2 is an end elevation of Fig. 1,

Figs. 3, 4 and 5 designate the various directions of rotation of the dial in order to spell out a particular combination which will permit the insertion of a key within the lock,

Fig. 6 is a transverse vertical cross section taken on the line 6—6 of Fig. 1,

Fig. 7 is a cross sectional view taken on the line 7—7 of Fig. 6,

Fig. 8 is a top plan view of one of the selector rings,

Fig. 9 is a top plan view of the barrel,

Fig. 10 is a rear elevation of the barrel of Fig. 9,

Fig. 11 is a fragmentary view of one of the spacer rings,

Fig. 12 is a side elevation partly in cross section of the sliding lock block, and holder,

Fig. 13 is a top plan view of the sliding lock block holder,

Fig. 14 is a front and side elevation of the dial,

Figs. 15 and 16 are perspective views of two of the selector rings,

Fig. 17 is a fragmentary view of the selector ring used in combination with the dial.

Fig. 18 is a diagrammatic view showing the manner in which the key actuates the sliding lock block,

Fig. 19 is a rear elevation partly broken away to show the means of locking the case, and

Figs. 20, 21 and 22 illustrate the various positions of the selector rings in operating the lock.

In my co-pending application, Serial No. 564,165, filed September 21st, 1931, I have disclosed a lock construction and the present application serves to simplify said construction and to define a unique and novel means to prevent access to the lock from the rear thereof even when the lock has been removed except by a person knowing the combination.

It is a well-known fact that it is possible to pick a cylinder type lock. It is also possible to work out the combination of a permutation lock. Applicant, however, has combined a cylinder type lock with a permutation lock and in such a manner that the key cannot be inserted in the lock until a proper combination has been worked and by providing a sliding lock block it is impossible to test for various combinations as the key cannot be inserted until the complete combination has been worked out. In other words were it not for this sliding lock block a person could work out one combination, insert the key a short distance, work out the next combination, insert the key further and thus progressively pick the lock.

In the accompanying drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 5 designates the cylinder of an ordinary cylinder type lock within which is positioned the ordinary key barrel 6 having a key-way 7. The customary tumblers and their operating parts are designated as a whole by the numerals 8, 9, 11 and 12. These tumblers are each provided with a pin 13, which pins when in depressed position have their upper extremities flush with the bottom of the sliding lock block, to be later described. It is understood that all of the tumblers are normally held in locking position by the usual springs. The construction thus far described would operate as an ordinary lock by employing the ordinary key, the only difference being that I have provided the pins 13 on each of the tumblers.

In order to prevent a lock, of the type thus far described, from being picked, I mount upon the cylinder 5, a dial 14 which is rotatable on

this cylinder. This dial has an annular groove 16 within which is a key 17 which is adapted to enter one of the recesses 15 formed on the periphery of the dial selector ring 18. This selector ring 18 has a pin 19 projecting from the rear side thereof and further this ring has a slot 21 formed upon its inner periphery, the purpose of which will be later seen.

In assembling the lock thus far described, the dial selector ring is inserted in the annular groove so that the slot 21 is directly behind a letter formed upon the dial face, which letter is to be used in working out the dial combination. In the present instance, as a matter of illustration, we have used the word "HAM" and as the dial selector ring operates the last letter of this word, that is, in assembling the lock the word must be spelled backwards as "MAH", the slot 21 will be placed directly behind the letter "M" of the dial. After being so placed the dial and selector ring are placed upon the cylinder 5. The next step is to place upon the cylinder, a spacer ring 22. This spacer ring has inwardly extending lugs 23 which slide in grooves 24 formed in the side of the barrel, which lugs prevent rotation of the spacer ring. This spacer ring has a slot 26 similar to the slot 21 and so arranged as to overlie a groove 27 formed in the top of the barrel at a point above the pins 13. The next step in assembling my lock is to place upon the cylinder and intermediate selector ring 28 which ring has a groove 29 similar to the grooves 21 and 26. This intermediate ring has indicia formed upon its outer surface which indicia is best illustrated in Fig. 8, where it will be noted that a star is placed directly above the slot 29 and the alphabet is spaced around the periphery. Openings 31 are formed through the selector ring for the reception of pins, two pins being placed on one side of the selector and one pin on the other. To illustrate using the word "HAM" the first pin 30 will be placed one space after the letter to be used, that is, as the middle letter of the word HAM is A, the pin will be placed in the hole in line with the letter B. Always consider the letters as extending around the periphery in the direction in which the ring is turning. For instance, A is on one side of the star and Z is on the opposite side of the star. If the ring is turning toward the right in Fig. 8, then the next space to the star is A. However, if the ring is being turned toward the left then the space marked Z must be considered as A. A second pin 32 is now placed in the ring and spaced one letter before the next letter to be dialed, as for example, if the last letter to be dialed is H then the second pin will be placed in G. The ring is now placed upon the cylinder in such a position that the slot 29 is over the slot 27 of the cylinder. A spacer ring is now placed upon the cylinder, which spacer ring is similar to that described as spacer ring 22. A carrier pin 33 is placed in the opposite side of the ring from the pins 30 and 32 and directly opposite the groove 29, which pin overlies the spacer ring so as to contact similar pins upon the final selector ring. The final selector ring 35 is now placed upon the cylinder and this selector ring carries two pins, one pin 34 is placed in the opening opposite the letter H, the first letter of the word "HAM". The second pin 36 is spaced from this first pin one more space than the number of the letter to be dialed. For instance as H is to be dialed and H is the eighth letter in the alphabet, then the second pin will be spaced nine spaces or in the Q opening of the ring. A final spacer ring is now placed on the cylinder.

This completes the permutation portion of the lock and in order that the same may function I slidably position in the barrel 5, a pin 37 having a cam head 38, which cam head abuts a cam surface 39 formed upon the sliding lock block 41. This sliding lock block has a pair of upstanding lugs 42 and 43 and openings 44 therethrough so that the pins 13 may be projected into the lock block when the lock block is in the position of Fig. 18. This lock block slides upon a block holder 46 which block holder has a slot 47 so that the pins 13 may be passed therethrough. A spring 48 is confined between the block 41 and the block holder 46. A lug 49 is formed upon the block holder 46 and adapted to enter a recess 51 formed in the casing 52.

The result of this last construction is that the sliding lock block and block holder will normally be in the position shown in Fig. 6, the holes 44 in the block will be out of alignment with the pins 13 and the selector rings will lie behind the projections 42 and 43. In this Fig. 6, however, the rings have been turned so that the slots 21, 29 and 40 are in position for the sliding block to move to unlocking position.

Now assuming that the lock is ready for the key and the key is inserted, the first act of the key will be to shove upwardly upon the pin 37 with the result that the cam surface 38 acting upon the cam surface 39 will push the lock block against the tension of the spring 48 into the position of Fig. 18. It will be here noted that as the key is inserted to its greatest extent, the pin 37 will move freely up and down over the succeeding ridges and valleys of the key, there being no ridges higher than the first ridge which caused the block 41 to move to a position, to align the holes 44 with their respective pins 13. This will permit the key to be further inserted in the barrel as the pins 13 may now move upwardly through the openings 44 and the lock may be actuated in the customary manner. As soon as the key is removed from the barrel and the dial is turned slightly the selector rings will lie behind the projections 42 and 43 of the lock block and therefore the key cannot again be inserted nor can the lock be picked as the tumblers are all held downwardly by the pins striking the undersurface of the lock block. The casing cannot be removed to find out the combination for the reason that the projection 49 is held in the recess 51 by the spring 48, and can only be removed when the combination has been worked out, which will permit the block holder being moved toward the front of the lock.

In Fig. 6 it will be noted that the nose of the pin 37 is in alignment with the end of the holder 46 and until the pin has raised to the position of Fig. 18, this holder cannot be moved and, therefore, the casing is locked until the combination has been worked out, after which the key can be inserted thus raising the pin 37 permitting the holder to be pushed toward the front of the lock through the use of a screw driver or similar instrument, after which the casing may be removed and threadedly disengaged from the cylinder.

From the above it will be evident that the sliding lock block and holder serve to prevent insertion of the key in the key slot and also serve to lock the casing onto the barrel. Also the sliding lock block and holder cannot be actu-

ated until the selector rings have all been rotated so as to bring their slots 21, 29 and 40 into alignment, thus permitting the lock block to slide so as to bring the openings 44 into alignment with the pins 13, after which the key may be inserted to move the lock block and while the key is inserted, the casing may be removed by pressing upon the holder forcing it against the tension of the spring 48, thus permitting a person to remove the casing and the selector rings, for the purpose of changing the pins to different holes in the rings to effect a new combination.

It will thus be seen that I have perfected a lock which will accomplish all of the objects above set forth.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In a lock, the combination with a lock cylinder and a barrel, of a key actuated mechanism positioned therein, said mechanism including a plurality of tumblers having pins attached thereto, a recess formed in said barrel, a lock block slidable in said recess, said block having openings therein and adapted to receive the ends of said pins when said pins are actuated by a key, said lock block having projections formed thereon, and a plurality of rings rotatable on said barrel, each of said rings having a slot formed therein whereby the projections on said block may be moved into said slots.

2. In a lock, the combination with a lock cylinder, a key actuated mechanism positioned in said cylinder and including a plurality of key actuated tumblers, each of said tumblers having a pin secured thereto, a sliding lock block positioned on said cylinder and having a cam formed on one end thereof, said block having openings therein for the reception of the ends of said pins when said tumblers are moved to unlocking position, a sliding pin positioned in said cylinder and having a cam capable of engaging the cam of said block when said pin is actuated by a key whereby said lock block is moved to align said openings with said tumbler pins.

3. In a lock, the combination with a lock cylinder, a key actuated mechanism positioned in said cylinder and including a plurality of key actuated tumblers, each of said tumblers having a pin secured thereto, a sliding lock block positioned on said cylinder and having a cam formed on one end thereof, said block having openings therein for the reception of the ends of said pins when said tumblers are moved to unlocking position, a sliding pin positioned in said cylinder and having a cam capable of engaging the cam of said block when said pin is actuated by a key whereby said lock block is moved to align said openings with said tumbler pins, a dial rotatably positioned on said barrel, and a plurality of selector rings rotatable on said barrel, said selector rings preventing movement of said lock block through the actuation of said key until said rings have been moved to a pre-determined position.

4. In a lock, the combination with a lock cylinder, a key actuated mechanism positioned in said cylinder and including a plurality of key actuated tumblers, each of said tumblers having a pin secured thereto, a sliding lock block positioned on said cylinder and having a cam formed on one end thereof, said block having openings therein for the reception of the ends of said pins when said tumblers are moved to unlocking position, a sliding pin positioned in said cylinder and having a cam capable of engaging the cam of said block when said pin is actuated by a key whereby said lock block is moved to align said openings with said tumbler pins, a dial rotatably positioned on said barrel, a plurality of selector rings rotatable on said barrel, said selector rings preventing movement of the lock block through the actuation of said key until said rings have been moved to a pre-determined position, a holder for said lock block, said holder having a projection formed thereon, a casing enclosing said cylinder and said rings, said casing having a recess formed therein and adapted to receive said projection on said holder.

5. In a lock, the combination with a lock cylinder, a key actuated mechanism positioned in said cylinder and including a plurality of key actuated tumblers, each of said tumblers having a pin secured thereto, a sliding lock block positioned on said cylinder and having a cam formed on one end thereof, said block having openings therein for the reception of the ends of said pins when said tumblers are moved to unlocking position, a sliding pin positioned in said cylinder and having a cam capable of engaging the cam of said block when said pin is actuated by a key whereby said lock block is moved to align said openings with said tumbler pins, a dial rotatably positioned on said barrel, a plurality of selector rings rotatable on said barrel, said selector rings preventing movement of the lock block through the actuation of said key until said rings have been moved to a pre-determined position, a holder for said lock block, said holder having a projection formed thereon, a casing enclosing said cylinder and said rings, said casing having a recess formed therein and adapted to receive said projection on said holder, and means interposed between said lock block and said holder for normally holding said block and said holder in locked position.

HAROLD MACHINIST.