H. H. SMITH.

COMBINATION LOCK.

APPLICATION FILED MAR. 3, 1922.

1,430,332. Patented Sept. 26, 1922.

Fig. 1.

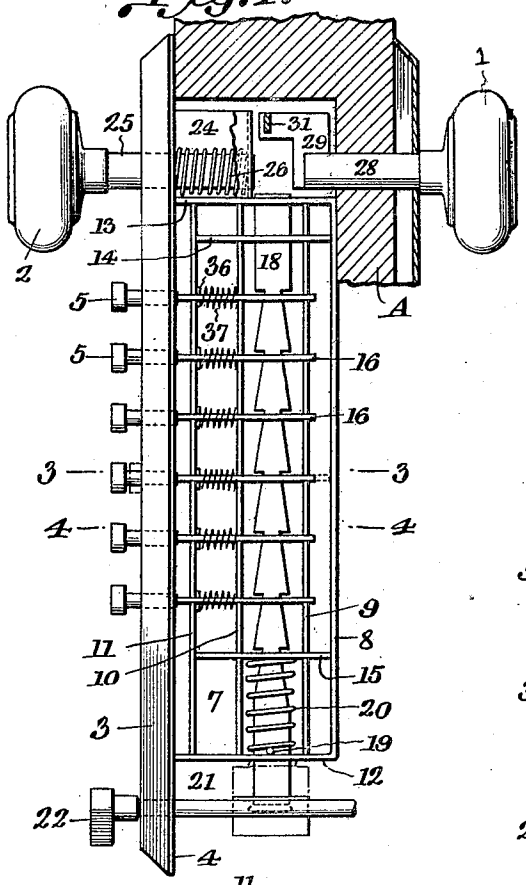
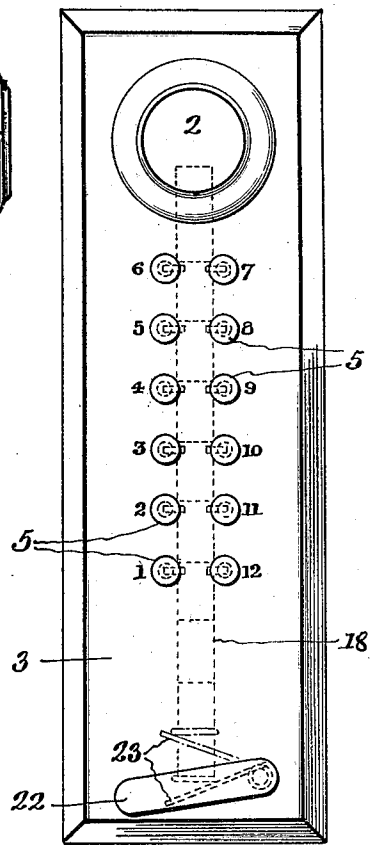


Fig. 2.



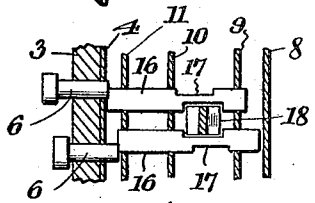


Fig. 3.

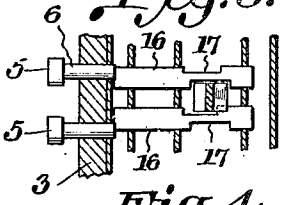


Fig. 4.

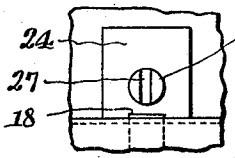


Fig. 5.

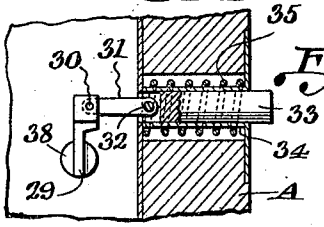


Fig. 6.

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UNITED STATES PATENT OFFICE.

HURLEY H. SMITH, OF ELKHART, INDIANA.

COMBINATION LOCK.

Application filed March 3, 1922. Serial No. 540,704.

To all whom it may concern:

Be it known that I, HURLEY H. SMITH, a citizen of the United States, and resident of Elkhart, in the county of Elkhart and State of Indiana, have invented certain new and useful Improvements in Combination Locks, of which the following is a full, clear, and exact description.

My invention relates to combination locks of the push button type and is intended as an improvement on the structure shown in Patent 596,185, to adapt the same to a door lock and improve said device in many features.

An object of my invention is to provide a combination lock of the type specified that shall be capable of a large number of combinations which can be changed when desired, and shall be simple in construction and efficient in its operation.

Another object is to provide a lock that can be readily set, and which it will be practically impossible for any one to unlock without a knowledge of the combination.

Other objects will be apparent from the following detailed description and the appended claims.

Figure 1 is a side elevation of the device in position in a door, with a portion of the door in section.

Figure 2 is a view of the device as it appears from the outside of the door.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1.

Figure 5 is an end view of the spindle of the outer knob and associated parts.

Figure 6 is a view partly in section showing the end of the spindle of the inner knob and the connections therefrom to the locking bolt of the door.

An inner knob 1 is carried by the frame A of the door and the outer knob 2 is mounted in a plate 3 of suitable material to which is preferably attached on the inside another plate 4. Keys 5 are mounted on the ends of stems 6 which slide in the plates 3 and 4 as shown. In a cut out portion of the door and inside of the plate 3 is located a frame 7 which has longitudinal plates 8, 9, 10 and 11, and cross plates 12, 13, 14 and 15, the cross plates 12 and 13 being preferably integral with the longitudinal plate 8, though not necessarily so. Sliding plates or bolts 16, corresponding in number to the keys 5 and stems 6 are mounted to slide through the longitudinal plates 9, 10, and 11 in bearings therein. Each plate has on opposite sides cut out portions 17, clearly represented in Figures 3 and 4. The cut out portions on opposite sides do not register.

A longitudinal bolt 18, generally rectangular in cross section, lies between the plates 9 and 10 and is guided in openings in the plates 12 and 13. This bolt has portions cut out of two sides to form shoulders as shown in the drawings, each pair of shoulders being adjacent the plates or bolts 16 and lying just above the same when the bolt 18 is in locking position.

The cut out portions 17 are of a width just sufficient to clear the locking bolt 18 when the plates 16 are set in inoperative position. The lower plate 16 in Figure 4 is shown as in locking position, and it is evident that a portion of this plate lies under one shoulder of the bolt 18. If this plate 16 is moved inward by its key 5, as shown in Figure 3, the cut out 17 will be brought to register with the bolt which can be then moved without any interference with this stem.

Near the lower end the locking bolt 18 has a pin 19 and between the pin 19 and the plate 15 is a spring 20 which tends to throw the locking bolt 18 downward until the pin contacts with the plate 12, when the bolt is in unlocked position.

In the lower part of the casing 3 is mounted a stem 21 provided with a handle 22 on its outer end, and a flat extension 23 on its side near its inner end which underlies the lower end of the bolt 18. By turning the handle 22 the extension 23 can be moved from the lower dotted line position of Figure 2 to the upper dot and dash position which movement results in moving the bolt 18 upward to locking position and compressing the spring 20.

Near the upper end of the casing 3, on the inside thereof is a frame 24 through which the spindle 25 of the knob 2 can slide. Within this frame is a spring 26 surrounding the spindle 25 and normally holding it and the knob 2 in outer position. The inner end of the spindle 25 has a rectangular groove 27 as shown in Figure 5.

The spindle 28 of the inner door knob 1 has a projecting member 29 which matches the groove 27, and this member is pivoted at its upper end to a short link 31 which

is in turn pivoted at 32 to the door bolt 33. This is mounted to slide in a casing 34 and a spring 35 normally tends to hold it closed.

Each of the sliding plates or bolts 16 has a pin 36 therein and a spring 37 surrounds said plate between the pin 36 and the plate 10, said spring thus tending to hold the sliding plate in outer position, these pins and springs have been omitted from Figures 3 and 4 for the sake of clearness.

The number of the sliding plates 16 may be as desired. Each is numbered on the outside, as shown in Figure 2.

The operation of the device is believed to be clear from the above description, but may be briefly set forth as follows.

Whenever the bolt 18 is in its lower or unlocked position, the door can be opened from the outside by pressing in on the knob 2 until the groove 27 engages the member 29 and then turning the knob to withdraw the door bolt 33.

When it is desired to use the combination lock, certain of the plates 16 are set in the position of the lower plate in Figure 3 so that a portion thereof will underlie the shoulder on the bolt 18 when it is pushed up. The handle 22 is turned, moving up the bolt 18 by means of the extension 23, and the sliding plates 16 that are set will be cammed aside until the shoulders on the bolt 18 pass above the same. The plates that have been thus set will then prevent the return of the bolt 18. When the bolt 18 is in its upper position it fills the space between the end of the spindle 25 and the member 29. The outer knob 2 cannot then be pushed in, and the door cannot be opened from the outside, although the inside knob will move the door bolt 33 as usual.

To unlock, it is simply necessary to press the buttons 5 of those sliding plates or bolts that have been set in locking position. This will remove those plates from beneath the shoulders on the bolt 18 and the spring 20 will move it downward to a position where it will not interfere with the inward movement of the spindle 25 of the outer knob.

It is to be noted that the proper buttons 5 must all be pressed simultaneously, and that no other buttons can be pressed without locking the bolt 18. This results from the fact that the sliding plates or bolts 16 which are normally free of the shoulders on the bolt 18 will come into the path of said shoulders if pressed. For example, if the upper button in Figure 4 is pressed the plate 16 corresponding thereto will come into the path of the adjacent shoulder on the bolt 18.

To change the combination, the inside plate is removed, and any desired plate 16 can be removed and turned over. This will bring the cut out portion 17 on the opposite side into working position, and it is to be noted, as shown in Figures 3 and 4, that the cut out portions on opposite sides of each plate are differently placed, one being normally in unlocking position and the other normally in locking position with relation to the bolt 18.

This lock is simple to set, easy to unlock if the combination is known and practically impossible to unlock if the combination is not known. An enormous number of different combinations may be used as desired.

The number of sliding plates or bolts 16 may be varied and details of form and arrangement may be changed as desired. The device is not limited to a door for its utility, but will be generally used in a closure of similar type.

I claim as my invention.

1. A combination lock comprising a frame, a locking bolt mounted to slide longitudinally in said frame and provided with shoulders at points intermediate its length, plates mounted to slide transversely in said frame and having cut-out portions adjacent said shoulders, certain of said cut-out portions registering with the locking bolt and others being out of register and having a portion of the plate underlying the shoulder to prevent movement of the bolt to unlocked position, a spring for normally holding the bolt in inoperative position, springs holding the plates in normal position, and finger keys for moving the operative plates to inoperative position.

2. A combination lock comprising a frame, a locking bolt mounted to slide longitudinally in said frame and provided with shoulders at points intermediate its length, sliding plates arranged in pairs, one on each side of the bolt and having cut-out portions adjacent the shoulders, certain of said cut-out portions registering with the locking bolt and others being out of register whereby a portion of the plate underlies a shoulder and prevents movement of the bolt to unlocked position, spring means for holding said bolt in unlocked position, means for moving it to locking position in which it is held by certain of said plates, and means for sliding the holding plates transversely to release the locking bolt.

3. Locking mechanism for doors comprising an inner knob, means connected to the spindle thereof to operate the door bolt, an outer knob normally disconnected from said means but movable inwardly into engagement therewith, a locking bolt slidable into position to prevent said engagement, means for retaining the locking bolt in operative position, said means operative by certain predetermined keys to release the locking bolt.

4. Locking mechanism for doors comprising an inner knob, means connected thereto

to operate a door bolt, an outer knob normally spring pressed out of engagement with said means but movable inwardly into engagement therewith, a locking bolt slidable into position to prevent said engagement, sliding plates having means for retaining said bolt in locking position, and means for operating said plates to release the locking bolt.

5. Locking mechanism for doors comprising an inner knob, means connected thereto to operate a door bolt, an outer knob normally spring pressed out of engagement with said means but movable into engagement therewith, a locking bolt slidable into position to prevent said engagement, shoulders on said bolt, sliding plates having portions that may be set to engage said shoulders and hold the bolt in locking position, means for operating said plates to release the bolt, and means for then moving the bolt to inoperative position.

6. A combination lock comprising a frame, a longitudinally sliding bolt therein, pairs of transversely sliding plates, the plates of each pair lying on opposite sides of said bolt, each plate having cut out portions in both edges, the cut out portion on one edge being in position to register with the locking bolt, and the cut out portion on the other edge being in a position wherein it does not register with said bolt, each plate being reversible whereby the combination may be changed.

In testimony whereof, I have hereunto subscribed my name.

HURLEY H. SMITH.