March 10, 1931. F. S. HARDY 1,796,098

LOCK

Filed Feb. 13, 1929 2 Sheets-Sheet 1

Fig. 1.

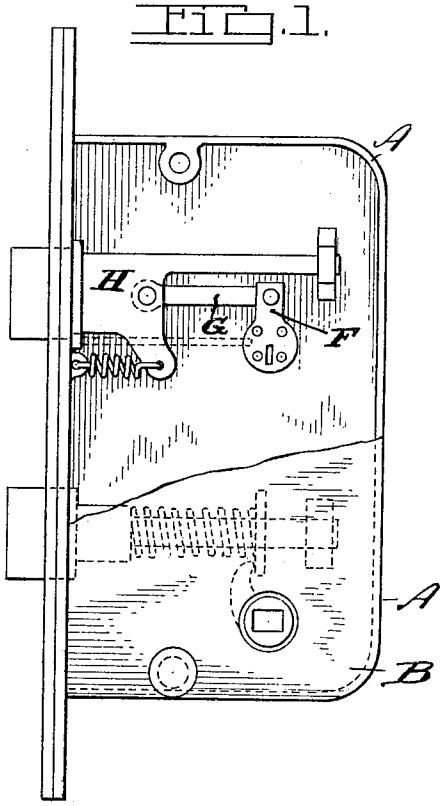
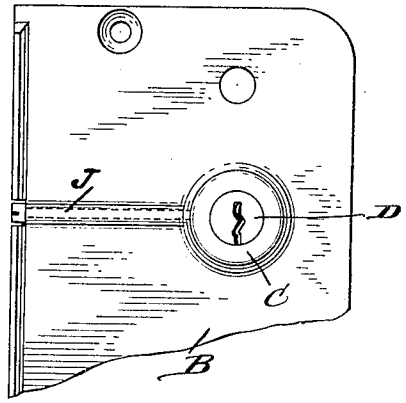


Fig. 2.



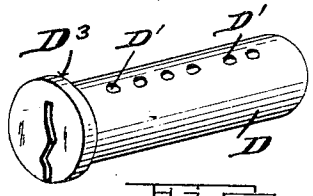


Fig. 4.

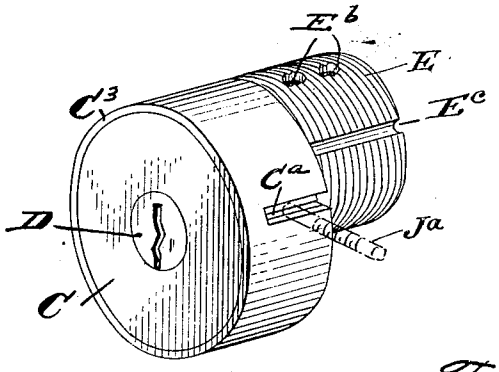


Fig. 3.

Frederick S. Hardy
INVENTOR

BY S. C. Thomas
ATTORNEY

March 10, 1931. F. S. HARDY 1,796,098

LOCK

Filed Feb. 13, 1929 2 Sheets-Sheet 2

Fig. 5.

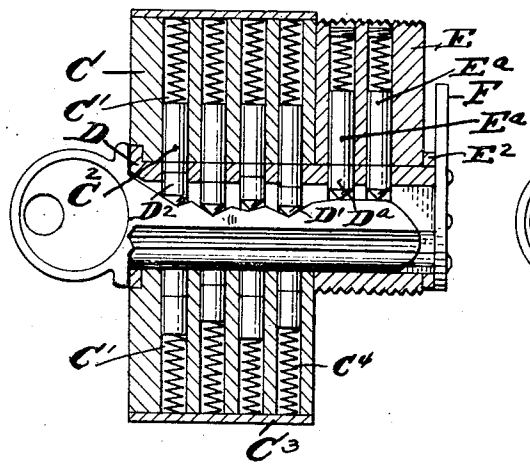


Fig. 6.

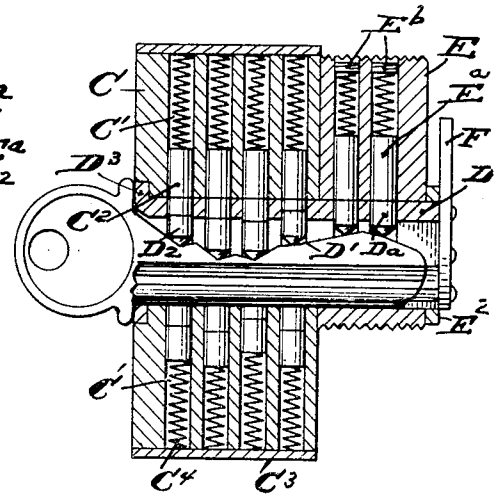


Fig. 7.

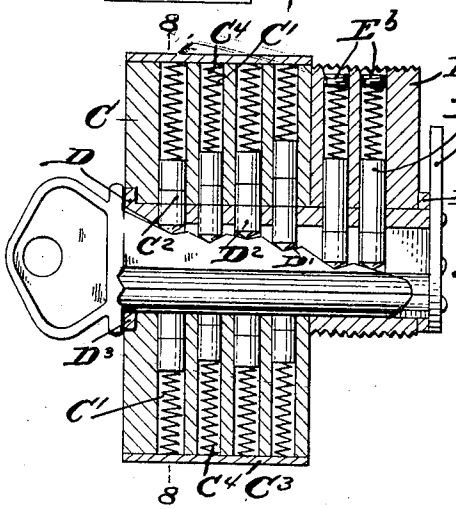
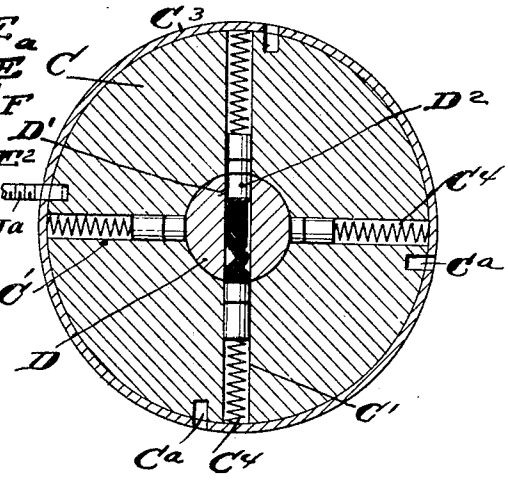


Fig. 8.



Frederick S. Hardy

INVENTOR

BY L. C. Thomas

ATTORNEY

Patented Mar. 10, 1931 1,796,098

UNITED STATES PATENT OFFICE

FREDERICK S. HARDY, OF DETROIT, MICHIGAN

LOCK

Application filed February 13, 1929. Serial No. 339,514.

My invention relates to an improvement in pin tumbler locks designed particularly for hotels, office buildings or other locations wherein it is frequently necessary or desirable to change the combination of the lock in order that former occupants of the room may not be in possession of a key adapted to unlock the door after giving up the premises.

The primary object of the invention is to provide means whereby the lock may be changed from one combination to another without removing the lock, or the key cylinder in which keys of different construction may be inserted to shift a plurality of sets of pin tumblers in a coordinating member that they may alternately cooperate with the pin tumblers carried by the key cylinder.

A further object of the invention is to provide a rotatable sleeve encircling the key cylinder, in which are lodged a plurality of groups of spring-actuated pin-tumblers which upon the insertion of a suitable combination changing key may be brought successively into cooperative alignment with the pin-tumblers of the key cylinder, thereby changing the combination so that a different key will be required to unlock the door from that previously employed,—without removing the lock, or the key-cylinder from the lock to effect the change.

A further object of the invention is to provide means whereby an employee of the hotel or building may change the combination of the lock from the outside of the door without gaining access to the premises.

With the foregoing and other objects in view which will appear as the description proceeds, the invention further resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes may be made in the precise embodiment of the invention shown without departing from the spirit of the same.

In the drawings accompanying this specification:

Figure 1 is a side elevation of a door lock showing one of the plates broken away to disclose the usual cam carried on the inner end of the key cylinder for actuating the bolt mechanism of the lock.

Figure 2 is a fragmentary side elevation of the cover plate for the lock, showing an adjustable set screw supported in the cover plate for normally securing a sleeve, bored eccentrically to receive one end of the key cylinder against rotatable displacement.

Figure 3 is a perspective view of a detail, showing the key cylinder concentrically lodged within an annular casing, housing a plurality of groups of longitudinally aligned spring actuated pin tumblers,—showing also a separate screw threaded casing through which the key cylinder extends, eccentrically to the axis of said screw threaded casing.

Figure 4 is a perspective view of the key cylinder.

Figure 5 is a longitudinal vertical sectional view through the key cylinder,—showing the annular casing surrounding the key cylinder, in which are lodged a plurality of groups of pin tumblers,—a separate screw threaded casing, through which the key cylinder also extends, and the pin-timbler chambers of the latter.

Figure 6 is a vertical longitudinal sectional view corresponding with that shown in the preceeding figure, showing the device adjusted to provide a new lock combination.

Figure 7 is a similar vertical longitudinal sectional view showing a combination changing key inserted in the key cylinder, the key cylinder being locked against rotation by pin tumblers housed in the separate screw-threaded casing, the pin tumblers in the annular casing being shifted by the key, whereby the casing may be rotated to present another group of pin-tumblers in alignment with the pin tumblers of the key cylinder.

Figure 8 is a cross-sectional view through the key cylinder and the annular encircling pin-tumbler sleeve, taken on or about line 8—8 of Figure 7.

Referring now to the letters or reference placed upon the drawings:

A denotes a lock casing, and B a cover plate secured to the casing in the usual manner.

C indicates an annular rotatable sleeve provided with a plurality of radially disposed pin tumbler chambers C^1 longitudinally aligned in spaced relation to each other. D is a rotatable key cylinder concentrically mounted in the bore of the sleeve, provided with a plurality of chambers D^1, fitted with pin tumblers D^2,—with which the chambers of the sleeve,—fitted with pin tumblers C^2—are respectively aligned when rotated and with which they coordinate.

C^3 is a collar pressed upon the annular sleeve and rotatably adjustable therewith. C^4 are springs lodged in the respective tumbler pockets, bearing at one end against the collar and at the other end upon the pin tumblers, to force the latter to the limit of their movement.

E denotes a fixed sleeve screwed into the wall of the lock casing, fitted with spring actuated pin tumblers E^a coordinating with the pin tumblers D^a in the key cylinder.

The sleeve E is bored eccentrically to receive one end of the key cylinder,—formed at its outer end with a flange D^3 projecting into a counterbore in the face of the rotatable sleeve C. A washer E^2 is fitted to the other end of the key cylinder overlapping the inner face of the fixed sleeve E. F is a cam member secured upon the end of the key cylinder, adjacent the washer, see Figures 1 and 5, thereby securing the several parts together as a unit. The cam member F, secured to the end of the rotatable key cylinder D, is connected by a link G with the locking bolt H,—see Figure 1—and is adapted to actuate the bolt H in either direction as required, upon rocking the key inserted in the cylinder.

E^b are plugs screwed into the chambers of the sleeve E—in which are lodged the spring actuated pin tumblers E^a,—to receive the thrust of the springs and to insure against accidental displacement of the parts.

J is a set screw supported in the cover plate of the lock with a head extending through the lock casing, adapted when adjusted to enter a groove E^c in the sleeve E to secure the latter against accidental release.

A similar set screw J^a is adapted to enter the aligned grooves C^a in the collar C^3 and in the rotatable member C to secure the same against accidental release when adjusted. The collar C^3 is a pressed fit upon the rotatable member C, both the collar and rotatable member turning together when adjusted to present a new combination of pin tumblers.

To effect the rotation of the member C and collar C^3, the combination changing key is first inserted in the key cylinder—see Figure 7—the set screw J^a, see Figure 8, is then withdrawn from the aligned grooves C^a, in the collar C^3 and the rotatable member C. The operator then presses his fingers against the face of the member C, rotating the member C upon the key cylinder D, until another set of the aligned grooves C^a, in the collar C^3 and member C are brought into alignment with the end of the screw J^a. The screw J^a is then adjusted that it may enter the aligned grooves in the respective members C and C^3 to secure the same against accidental rotation.

Having now indicated the several parts by reference letters the construction and operation of the device will be readily understood.

To change the combination of the lock from the one in use, a suitably constructed key,—see Figure 7—known as the combination changing key, is inserted in the key cylinder forcing the tumbler pins of the key cylinder outwardly and thereby pushing back the tumbler pins in the rotatable sleeve C against the action of the respective springs until the pins in the outer end of the key cylinder are flush with the perimeter of the key cylinder,—it being noted that the changing key is constructed so that the tumbler pins in the non-rotatable sleeve E are not forced out of locking engagement with the key cylinder by the tumbler pins of the latter;—the key cylinder is thus held against rotation.

The set screw securing the annular collar C^3 and the rotatable sleeve C is now released and the sleeve is manually rotated around the key cylinder as previously indicated until another group of pin tumblers are aligned with the pin tumblers of the key cylinder, the set screw is then adjusted to secure the sleeve C against further rotation. The combination changing key is then withdrawn, whereupon a key suitably notched to shift the pin tumblers of the annular rotatable sleeve C and the pin tumblers of the sleeve E into alignment with the perimeter of the key cylinder is then inserted in the key cylinder—see Figure 5—the key cylinder is then rotated by the key and through the rocking action of the cam member F secured to the end of the key cylinder, the bolt H may be withdrawn or locked as required.

It will be seen that a plurality of different combinations may be easily effected through the use of this device in a very short period of time, without either removing the key cylinder or its cooperating annular rotatable locking pin cylinder.

Having thus described my invention, what I claim is:

1. In a lock; a slidable bolt; a pin tumbler mechanism, including an annular rotatable sleeve having a central bore and a plurality of groups of pin tumbler chambers extending radially from the central bore, the chambers of each group being spaced apart in longitudinal alignment; a rotatable key cylinder fitted in the central bore of the sleeve, having a row of pin tumbler chambers spaced apart in longitudinal alignment, whereby upon the rotation of the sleeve, the chambers comprising the respective longitudinal groups of the

rotatable sleeve may be brought successively into registration with the longitudinal group of the key cylinder, a plurality of pin tumblers respectively lodged in the chambers of the key cylinder; a plurality of spring actuated pin tumblers lodged in the respective radial groups of the rotatable sleeve; and means for securing the annular sleeve against rotation, following the manual adjustment of the same upon the key cylinder, whereby the pin tumblers of one group in the annular sleeve are held in cooperative relation with the pin tumblers of the key cylinder until the combination is changed.

2. In a lock, a slidable bolt; a pin tumbler mechanism, including an annular rotatable sleeve having a central bore and a plurality of groups of pin tumbler chambers extending radially from the central bore, the chambers of each group being spaced apart in longitudinal alignment; a rotatable key cylinder, having a row of pin tumbler chambers, spaced apart and in longitudinal alignment, whereby upon the rotation of the sleeve, the chambers comprising the respective longitudinal groups of the rotatable sleeve may be brought successively into registration with the longitudinal group of the key cylinder; a plurality of pin tumblers respectively lodged in the chambers of the key cylinder, a plurality of spring actuated pin tumblers lodged in the respective radial groups of the rotatable sleeve, a fixed sleeve screwed into the wall of the lock, having a bore eccentric to the axis of said sleeve to receive the end of the rotatable key cylinder; spring actuated pin tumblers housed in the fixed sleeve, adapted when aligned with the pin tumblers of the key cylinder to cooperate with the latter in locking and releasing the key cylinder; means for securing the annular sleeve against rotation, following the manual adjustment of the same upon the key cylinder, whereby the pin tumblers of one group in the annular rotatable sleeve are held in cooperative relation with the pin tumblers of the key cylinder until it is desired to change the combination.

3. A structure as specified in claim 1 in combination with a slidable bolt; and means actuated through the oscillation of the key cylinder, whereby upon inserting a key in the key cylinder, the latter may be oscillated to shift the slidable bolt to either a locked or unlocked position as may be required.

4. A structure as specified in claim 1, in combination with a fixed sleeve screwed into the wall of the lock casing having a bore eccentric to the axis of the sleeve to receive the end of the key cylinders; spring actuated pin tumblers lodged in the fixed sleeve, adapted when aligned with opposing pin tumblers carried by the key cylinder to cooperate in locking and releasing the key cylinder; a slidable bolt; and means for shifting the slidable bolt actuated by the oscillation of the key cylinder.

5. In a lock, a key cylinder fitted with a row of axially aligned pin tumblers; a rotatable sleeve encircling the key cylinder fitted with a plurality of longitudinal rows of radially extending spring actuated pin tumblers, whereby upon the insertion of a suitable "combination changing key" in the key cylinder, said sleeve may be manually rotated to bring the several longitudinal groups of pin tumblers lodged in the sleeve successively into longitudinal alignment with the row of pin tumblers carried by the key cylinder, to effect changes in the pin-tumbler lock combinations, without removing the lock cylinder from the rotatable sleeve.

6. In a lock, a key cylinder, a row of axially aligned pin tumblers fitted to the key cylinder; a rotatable sleeve encircling the key cylinder; a plurality of longitudinal rows of radially extending spring actuated pin tumblers fitted to the rotatable sleeve, whereby upon the insertion of a suitable "combination changing key" in the key cylinder, said sleeve may be manually rotated to bring the several longitudinal groups of pin tumblers lodged in the sleeve successively into longitudinal alignment with the row of pin tumblers carried by the key cylinder, to effect changes in the pin-tumbler lock combinations, without removing the lock cylinder from the rotatable sleeve.

7. A structure as specified in claim 5 in combination with a fixed sleeve screwed into the wall of the lock having a bore eccentric to the axis of the fixed sleeve to receive the end of the rotatable key cylinder; and spring actuated pin-tumblers housed in the fixed sleeve, adapted to cooperate with the radial longitudinally aligned pin-tumblers of the key cylinder for locking and releasing the key cylinder.

In testimony whereof, I sign this specification.

FREDERICK S. HARDY.