Nov. 3, 1964 L. H. COHEN 3,154,938

LOCK FOR A SEQUENTIAL LOCKING SYSTEM

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FIG. 2.

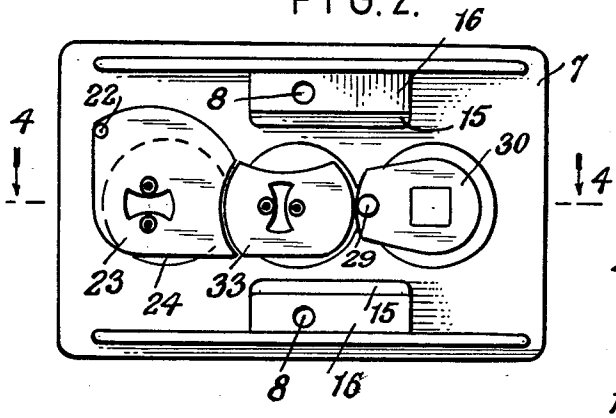


FIG. 1.

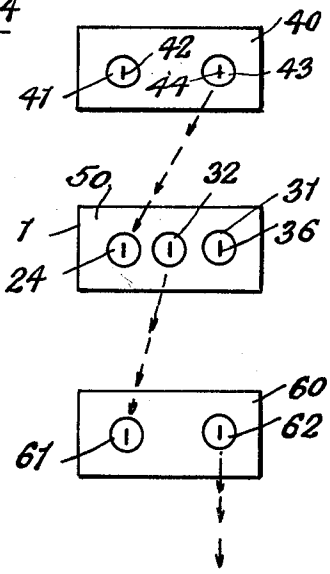


FIG. 3.

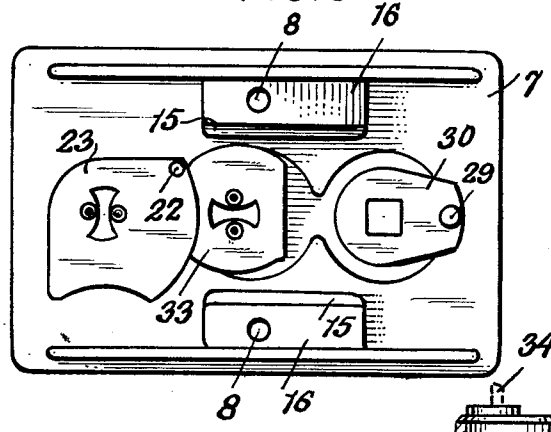


FIG. 4.

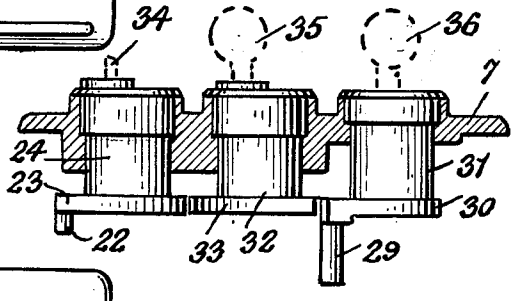
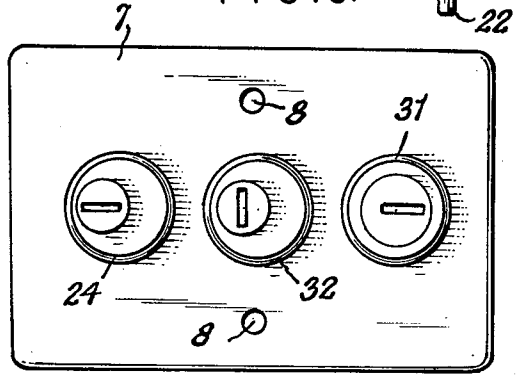


FIG. 5.



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FIG. 6.

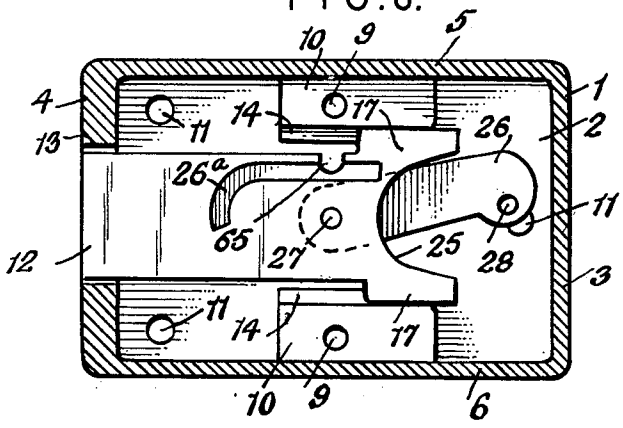
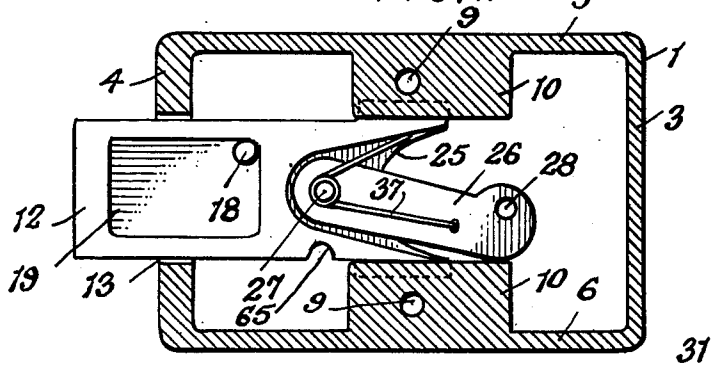


FIG. 7.



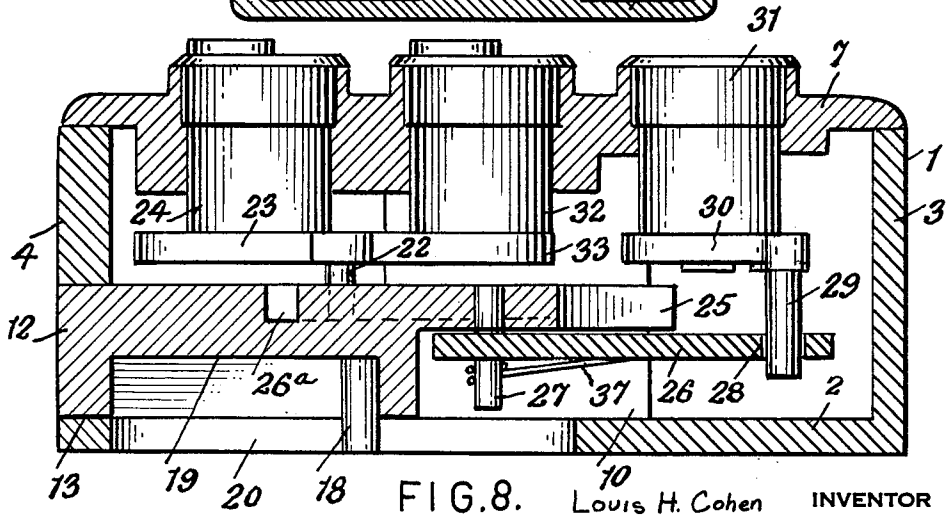


FIG. 8.

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LOCK FOR A SEQUENTIAL LOCKING SYSTEM

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5 Claims. (Cl. 70—134)

This invention relates to locks and more particularly to a type of lock especially adapted for use in a sequential locking and unlocking arrangement by which a store, place of business or a home cannot fail to lock all of its doors at closing time. The arrangement is one in which the locks on the various doors or other outlets are locked in sequence, one after another, so that only after all of the other doors in the group are locked, can the last exit door be locked.

In a known arrangement of this kind, the locks must be locked or unlocked in a regular, established sequence which cannot be varied. However, with such an arrangement it has been found that the inability to lock or unlock a particular door in the group is sometimes inconvenient and constitutes an obstacle to the use of sequential locking system as presently known.

It is therefore one of the objects of the present invention to provide a lock which can be used in a sequential locking arrangement, and while requiring a series of locks to be sequentially manipulated to lock or unlock them, will nevertheless permit one or more doors provided with this particular lock, to be locked or unlocked out of sequence.

More particularly, the invention contemplates the provision of a lock of this kind having three cylinders which control co-operating cams, one of the cylinders constituting a setting cylinder; the second cylinder being an interlock cylinder, and the third being the bolt-operating cylinder, the cams actuated by the cylinder mechanism being arranged for co-operative positioning to permit bolt operation under certain circumstances or to prevent such bolt operation according to the insertion or removal of certain keys in a required sequence.

With these and other objects to be hereinafter set forth in view, I have devised the arrangement of parts to be described and more particularly pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed;

FIG. 1 is a diagrammatic view, showing the relationship of the improved lock with other locks in the group;

FIG. 2 is a view of the under side of the lock casing cover plate, showing the cylinders carried by the cover plate and the cams operated by the cylinder mechanism;

FIG. 3 is a view similar to FIG. 2, but showing the several cams in a different position of operation;

FIG. 4 is a sectional view through the cover plate, the view being taken substantially on the line 4—4 of FIG. 2 looking in the direction of the arrows;

FIG. 5 is a top plan view of the cover plate;

FIG. 6 is a horizontal sectional view through the lock casing, with the cover removed and disclosing the slidable bolt;

FIG. 7 is another horizontal sectional view through the casing, as viewed from the under side of the same; and

FIG. 8 is a vertical sectional view in an enlarged scale, through the lock.

The improved lock includes a casing body 1, having a bottom wall 2, end walls 3 and 4 and side walls 5 and 6. The casing also includes a cover plate 7 fitting over and closing the top of the casing body 1 and secured in position thereon by means of screws entering through holes 8 provided in the cover plate and received in the internally threaded holes 9 provided in the body of the

casing and formed in the bolt-guiding lugs 10 on the side walls 5 and 6 and connecting bottom wall 2 of the casing body. The casing bottom wall 2 is formed with holes shown at 11 through which screws or other fastening elements may be extended to mount the lock on a door at its point of use.

The lock is provided with a sliding bolt 12, capable of being projected through an opening 13 in the end wall 4 of the casing body to extend the bolt to locking position, substantially as shown in FIG. 7, or retracted to the unlocked position shown in FIGS. 6 and 8, The bolt 12 is guided in its sliding movement by means of ledges 14 formed on the lugs 10 and by similar ledges 15 formed on lugs 16 provided on the under face of the cover plate 7. The ledges 15 take over the side portions 17 of the bolt 12 so that these portions of the bolt are slidably guided between the lower ledges 14 and the upper ledges 15.

Projecting downwardly from the lower face of the bolt 12 is a stop pin 18, the same being located in a recess 19 formed in the under face of the bolt, and the pin 18 enters a slot 20 provided in the bottom wall 2 of the casing body, this pin and slot arrangement serving to limit the sliding movements of the bolt. Provided in the upper face of the bolt 12 is a groove 26*a* receiving a projecting pin 22 on a cam 23 operated by the mechanism contained in a conventional lock casing 24, which constitutes the setting cylinder of the lock. A notch 65 enters into the groove 26*a* to permit the entry in and withdrawal of the pin 22 from the groove when required.

At its inner end, the bolt 12 is forked as shown at 25 and in said forked end is pivoted a spring-biased lever 26. The pin 27 constitutes the pivot pin which pivotally attaches the lever to the bolt, and a torsional spring 37 encircles the pin and is effective to place tension on the lever to prevent binding or hard locking of the bolt.

Provided at the free end of the lever 26 is a hole 28 for the reception of a pin 29 projecting from a cam 30, the operation of which is controlled by the mechanism contained in a lock cylinder 31 and which constitutes the bolt-operating cylinder of the lock.

Disposed between the two cylinders 24 and 31 is a third cylinder 32, the same constituting an interlock by means of its cam 33. Cylinder 24 is controlled by a key 34; cylinder 31 is controlled by the key 36 and cylinder 32 is controlled by a key 35.

Referring to FIG. 1, it will be therein noted that 40 represents a two-cylinder lock of known construction, having one of its cylinders or that shown at 41 controlled by a key indicated at 42. Said cylinder constitutes the setting cylinder of this particular lock. At 43 is shown the bolt-operating cylinder of this lock.

The lock of the present invention is indicated at 50 in FIG. 1 and is provided on another door, said lock having the three cylinders 24, 32 and 31 as previously described. The door that is to be locked out of sequence is that which carries the lock 50 while the regular sequential locks on the other doors are respectively shown at 40 and 60.

When unlocking the lock 50 a key taken from the master lock of the assembly is placed in the bolt-operating cylinder of the lock 60 and is turned to release the key in the setting cylinder 61. This key is then removed from cylinder 61 and is then inserted in cylinder 32 of the lock 50 and turned. Prior to the turning of the said key in the cylinder 32 the cams were in the positions shown in FIG. 2 wherein it is noted that a peripheral convex portion of the edge of the cam 33 fits in a concave part of the edge of the cam 23 so that turning of cam 23 cannot take place until cam 33 is rotated by the key and moved to the position of FIG. 3. It will also be noted that when the cams 30, 23 and 33 are in

the relative positions substantially shown in FIG. 2, the movement of the cam 30 is blocked by its engagement with one of the curved edges of the cam 33. Therefore, until the cam 33 is moved to the position shown in FIG. 3, wherein its flattened edge portion faces the cam 30, the cam 30 cannot be rotated. This movement of the cam 33 permits turning of the cam 23 to the position of FIG. 3 and causes the pin 22 to enter the slot or groove 26*a* through notch 65. It also releases cam 30 for rotative movement. This releases the key 34 from the setting cylinder 24 of the lock 50, and said key can be transferred to cylinder 43 of the lock 40 in the position designated at 44. The lock 50 can now be kept locked or unlocked as desired since the operating cylinder 31 is left free for operation by its key 36. In performing the operations above described, the manner in which the keys are shifted from one lock to the other is the reverse of the arrow heads shown in FIG. 1.

When the locks in the system are to be locked, the operating key at 44 is removed from the cylinder 43 and is inserted in cylinder 24 to occupy the position of key 34. This permits the rotation of the interlock cylinder 32 and also permits the withdrawal of the key 35 therefrom, but only if the operating cylinder is in its locked position. The key 35 is then removed from cylinder 32 and is transferred to cylinder 61 of the lock 60. Operating key in the cylinder 62 is transferred to the setting key of the next lock in the group and this is continued until all of the locks are locked. The transfer of the keys for the locking operations above described is indicated by the arrows in FIG. 1.

Having thus described a single embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. A lock for inclusion in a sequential locking arrangement comprising, a casing, a bolt movable to advanced or retracted position relative to the casing, a groove in the bolt, a first lock cylinder, a setting cam operable thereby, said cam having a pin for engagement in the groove when said setting cam is in bolt-release position, an interlock cam engaging the setting cam and when in a definite position holding the setting cam against rotative movement with its pin out of the groove, a second cylinder for controlling the operation of the interlock cam, a third cylinder, a bolt-engaging cam carried thereby and operative to move the bolt when permitted by the unlocked positions of the setting and interlock cams and the entry of the pin into the groove.

2. In a lock, a casing, a bolt slidable to projected or retracted position, a groove in the bolt, three lock cylinders arranged in side-by-side relation, one of the cylinders being operative to rotatively move a setting cam, said cam having a pin engaging the groove when the said cam is disposed in bolt-release position, a second cylinder carrying an interlock cam effective to prevent movement

of the pin into the groove and the rotation of the setting cam when the interlock cam is in a certain position, a third cylinder carrying a bolt-operating cam, the bolt-operating cam having a pin, the bolt having a pivoted part engaged by the pin, the bolt being movable by the bolt-operating cam when the interlock cam is disposed in a position of freeing the setting cam and when the setting cam is in a position where its pin is disposed in the groove.

3. In a lock as provided for in claim 2, wherein the groove is notched, the part of the bolt that is engaged by the pin on the bolt-operating cam consisting of a spring-biased arm mounted at one end of the bolt.

4. In a lock, a casing, a bolt slidable through an opening in the wall of the casing, stop means for limiting the sliding movements of the bolt, a spring-biased arm pivotally mounted at the end of the bolt, a cylinder located in the casing, a bolt-operating cam controlled by the cylinder, a pin on said cam engaging the arm and causing advancing or retracting movements of the bolt upon rotative movements of the bolt-operating cam, an interlock cam, a second cylinder for controlling the rotative movements of the interlock cam, a setting cam, a third cylinder controlling the movements of the setting cam, said setting cam being maintained against rotative movement by the interlock cam when the interlock cam is in a certain position, the bolt having a groove, and a pin on the setting cam for engagement with the groove when the setting cam is in bolt-release position.

5. A lock for inclusion in a sequential locking arrangement comprising, a plurality of lock cylinders, the first of said cylinders operating a setting cam carrying a projection, a slidable bolt having a groove in which said projection enters when the setting cam is in bolt-release position, said setting cam having concave and convex edge areas, a second one of the lock cylinders operating an interlocking cam, said interlocking cam also having concave and convex edge areas, a third cylinder having a cam provided with a projecting pin, the bolt being provided with a pivoted lever engaged by the pin, the cam of the first cylinder being rotative to move its projection in the groove and to permit bolt-moving operation by the third cylinder only when the convex surface of the setting cam fits within the concave surface of the interlocking cam.

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