C. L. KAPS.

PERMUTATION LOCK.

APPLICATION FILED MAY 3, 1915.

1,161,218.

Patented Nov. 23, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

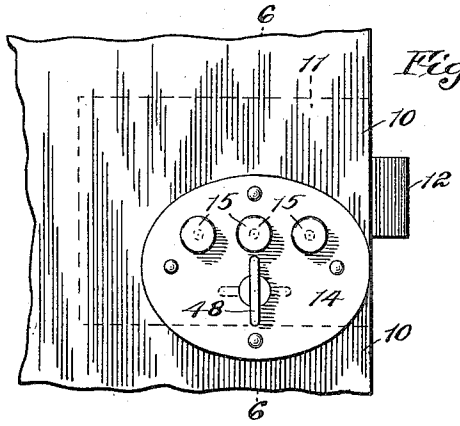


Fig. 2.

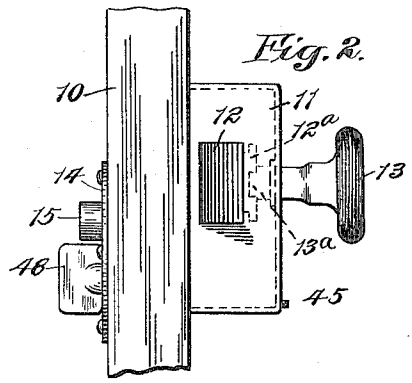


Fig. 3.

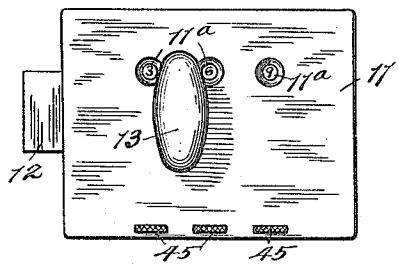


Fig. 4.

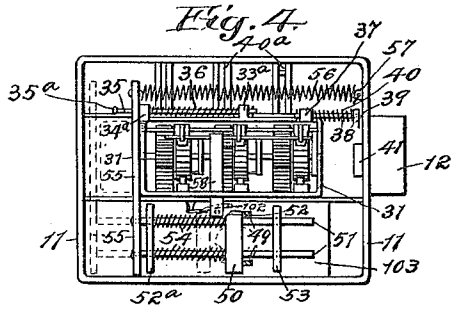


Fig. 5.

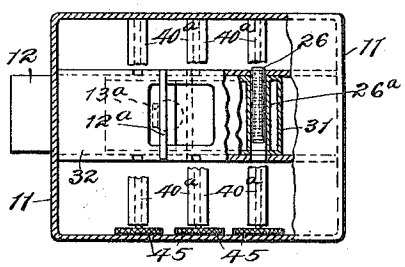


Fig. 6.

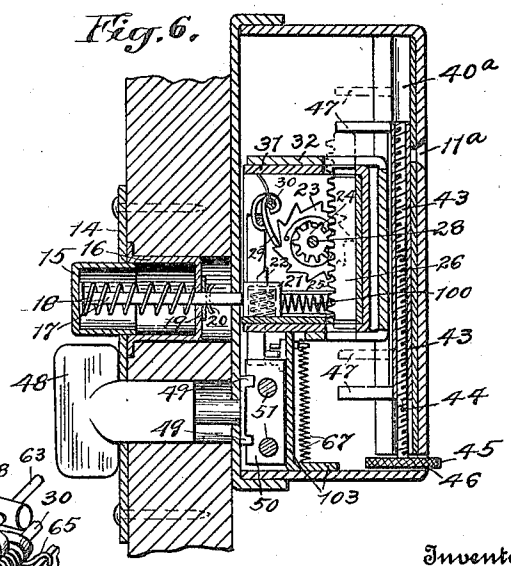


Fig. 8.

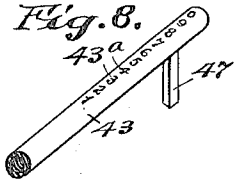
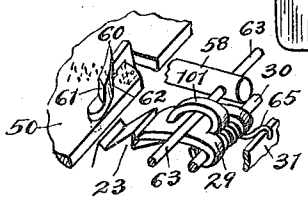


Fig. 7.



Witnesses

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2 SHEETS—SHEET 2.

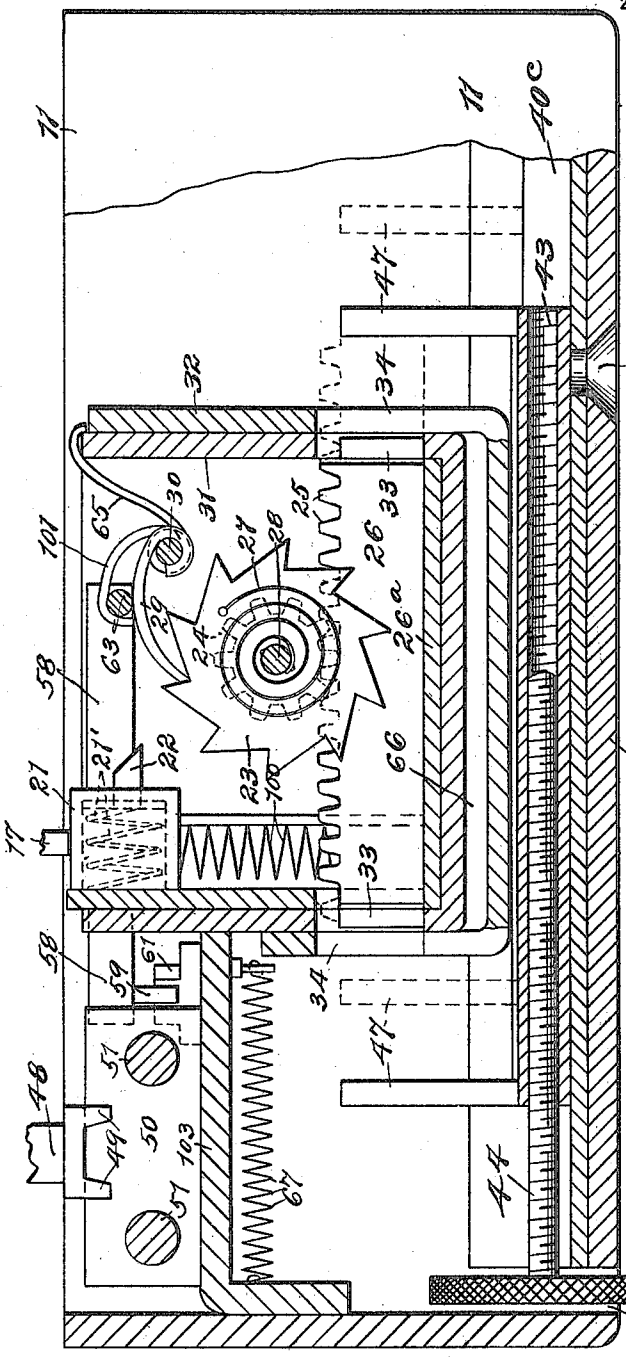


Fig. 9.

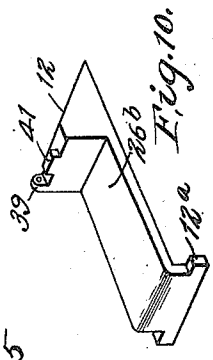


Fig. 10.

Witnesses

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PERMUTATION-LOCK.

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To all whom it may concern:

Be it known that I, CHARLES L. KAPS, citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a specification.

This invention relates to permutation locks of that type having a plurality of sliding tumblers comprising rack bars operated by pawl and ratchet mechanism, the ratchets carrying pinions which engage the rack bars, and the pawls being operated by push buttons to set the tumblers and permit the bolt to be retracted.

The invention is illustrated in the accompanying drawings in which—

Figure 1 is an outside elevation of the lock. Fig. 2 is an end elevation. Fig. 3 is an inside elevation. Fig. 4 is an elevation of the lock mechanism as seen from the side next to the door. Fig. 5 is a vertical section with the inner lock plate broken away. Fig. 6 is a vertical section on the line 6—6 of Fig. 1. Fig. 7 is a detail in perspective of the detent releasing mechanism. Fig. 8 is a perspective of an indicating device. Fig. 9 is an enlarged vertical transverse section of the lock. Fig. 10 is a perspective of the bolt.

Referring specifically to the drawings, 10 indicates a door, on the inside of which is mounted a lock casing 11 provided with a sliding latch bolt 12. An inner knob 13 is mounted to turn on the lock casing, and has at its inner end a lug 13^a arranged to strike a projection 12^a at the tail of the latch bolt 12, so as to retract said bolt when desired, the projection 13^a acting as a crank against the latch bolt. The latch bolt is normally advanced by a spring 40 coiled around a rod 38 and in compression between a lug 39 on the bolt, and to which the rod 38 is attached, and a lug 37, through which the rod works, on a sliding frame or carriage 31, to be hereinafter described. A lug 41, on the latch bolt 12, acts as a stop against the casing 11 to limit the advance of the bolt. The knob 13 and connecting parts enable the latch to be readily withdrawn or released from the inside of the door. The latch bolt 12 can move inwardly independently of the carriage 31, the spring 40 being then compressed.

On the outside of the door 10 is an escutcheon plate 14 in which is mounted a set of push buttons 15 which work in guide bushings 16 set in openings through the door, and the push buttons operate against push rods 17 which extend through the door and into the lock casing. Springs 18 normally advance the push rods and buttons, the movement being limited by pins 20 and washers 19 behind the bushings 16. The inner ends of the push rods 17 bear against blocks 21 which slide laterally in the casing, being normally pressed out by springs 100. These blocks carry pawls 22 which are pressed up by springs 21′, which will permit back slip of the pawls. When moved forwardly or inwardly the pawls 22 engage the teeth of ratchets 23, to turn the same one tooth at each advance of the pawls. Each ratchet is fixed to a pinion 24 and each pinion meshes with the rack 25 on a vertically sliding tumbler 26. The pawls turn on a fixed shaft 28 mounted in the frame 31. A spring 27, connected between each ratchet and the shaft 28, tends to return the ratchet when its detent 29 is released. This detent 29 is secured to a rock shaft 30, mounted in the frame 31, and the shaft 30 is normally turned to engage the detents with the ratchets, to prevent back turn thereof; but the detents may be released by rocking the shaft 30 by means to be hereinafter described.

The pawl and ratchet mechanism, and the tumblers 26, are mounted in a sliding carriage or box like frame 31 which is adapted to slide horizontally in a guide frame 32 fastened to the casing 11, the frame 32 being U shaped in cross section, with its upper and lower flanges projecting inwardly or toward the door 10. The carriage 31 has openings 33 in the upper and lower sides thereof, and the guide frame 32 has corresponding openings or slots 34 in the upper and lower flanges thereof. The tumblers 26 may slide up or down through said openings, which correspond in size and position to the tumblers. The tumblers are of such length that when in a certain or releasing position, as shown in Figs. 6 and 9, their ends do not project beyond the upper and lower flanges of the carriage 31. Consequently the carriage can be moved in the guide frame 32. But when the tumblers are advanced through the openings 33 and 34, as shown in dotted lines in Fig. 9, the carriage is locked to the frame 32 and cannot be moved. The tumblers 26 slide up and down in guide

channels 26ª fastened to, or forming a part of, the frame 31. A spring 36 is coiled in compression around a rod 35 between a lug 33ª on the frame 32 and a lug 34ª on the carriage 31. This spring 36 is of sufficient strength to force the carriage 31 to the left in Fig. 4 when the carriage is released, and such movement of the carriage retracts the bolt 12 by means of the connecting rod 38, and thereby unlocks the door. The rod 35 has a head 35ª to limit the movement.

A bar 55 extends vertically behind the frame 31 at the end thereof opposite the latch bolt 12, and this bar is normally pulled to the right by a tension spring 56 connected between the bar and the lug 57 on the casing. The bar 55 is secured to a pair of parallel rods 51, which slide in guide brackets 52ª and 53 supported on the casing. Fixed to these bars is a block 50, and springs 54 are coiled in compression between the block 50 and the bracket 52ª. The springs 56 and 54 tend to move the carriage 31 to the right in Fig. 4, and thus advance the latch bolt 12, said springs being stronger than the spring 36 which tends to retract the bolt. But the bar 55 may be moved to the left in Fig. 4 which, when the tumblers are properly set, permits the carriage 31 to be slid back by the spring 36 and thus retract the bolt. The bar 55 is or may be moved by means of a turning handle or plug 48 which is located on the outside of the door and extends through the same and is provided at its inner end with cam lugs 49 which bear against the block 50, so that when the handle is turned in either direction the block 50 will be pushed to the left in Fig. 4 and the bar 55 moved to the position shown in dotted lines in said figure, thereby permitting the frame 31 to slide to the left and the bolt to retract and unlock the door.

For setting the combination, the face plate of the casing 11 is provided on the inner side with a set of guide channels 40ª each of which receives an internally threaded tube 43 which may be raised or lowered by a screw 44 having knurled heads 45 projecting through slots 46 in the casing. Each tube 43 has at each end an arm 47 which acts as a stop for the tumbler 26, and the position of these tubes and arms determines the number of pushes of the buttons 15 necessary to move the tumblers to releasing position, since, when the detents 29 are released the springs 27 act to turn the pinions and shift the tumblers to the extent permitted by the arms 47, and by turning the heads 45 the arms are raised or lowered and set accordingly. The back of the tubes has numbers 43ª indicating the combination or position of the tubes, these numbers being readable through openings 11ª in the face plate of the lock casing.

To release the detents 29 after each operation of the bolt, and thereby lock the latter, the block 50 has a beveled upper end 52 adapted to engage and lift a releasing bar 58 which slides up and down in a guide opening in the frame 31 and is connected at its upper end to a cross rod 63 which engages under loops 101 on the back of the pawls 29. When the block 50 is moved to the left in Fig. 4 the bar 58 is lifted and the rod 63, bearing against the loops, swings the detents 29 and rocks the shaft 30, to release the detents 29 from the ratchets 23. The bar 58 has a rearwardly projecting pin 59 which projects over a swinging plate 61 which is pivoted at 102 to a plate or frame 103, to swing vertically. As the block 50 moves to the left it wipes against the under side of the plate 61 and swings the same upwardly against the pin 59, and thereby holds the bar 58 in raised position during the continued travel to the left of the block 50, and also during the return travel to the right (Fig. 4) of said block. Consequently the detents 29 are held out of engagement with the ratchets until the block 50 and the frame 31, and the latch bolt 12, complete their retracting and advancing movements, at the completion of which the block 50 will have passed to the right a sufficient distance to release the bar 58 and the plate 61, as shown in full lines in Fig. 4. At this time, also, the frame 31 will have brought the openings 33 in line with the openings 34, and, the ratchets being then free, the springs 27 will turn the same and thereby shift the tumblers 26 downwardly through the openings 34, thereby locking the sliding carriage 31 to the guide plate 32 and preventing further movement of the latch bolt until the tumblers are raised by proper operation of the push pins 15 to set the retracting tumblers in releasing position. The tumblers will drop to the extent permitted by the stop arms 47. A spring 67, connected to the plate 61, retracts the same, or causes it to drop after it is released by the block 50. The flat part 12ᵇ of the latch bolt slides freely in the space 66 between the back of the carriage 31 and the guide frame 32.

It will be seen that the frame 31 and the latch bolt are released or retracted by the action of the spring 36 when the tumblers are set by manipulation of the push pins 15, and the plate 55 is backed off by turning the handle 48, and when said handle is released the springs 36 and 54 return the bar 55, carrying with it the carriage 31 and the latch bolt, and the tumblers then drop automatically to lock the carriage until the tumblers are again set to releasing position.

The invention is not limited to the exact construction shown, but may be varied within the scope of the following claims.

What I claim as new is:

1. In a permutation lock, the combination

of a sliding bolt, a guide frame, a carriage connected to the bolt and slidable in the frame, tumblers mounted on the carriage and engageable with the frame to prevent movement of the carriage, means to disengage the tumblers from the frame, to permit movement of the carriage and bolt, and means to reëngage said tumblers with the frame, to prevent movement to the carriage and bolt.

2. In a permutation lock, the combination of a sliding bolt, a carriage having a yielding connection to the bolt, permutation mechanism controlling movement of the carriage, means at one side of the lock to move the bolt independently of the carriage, said movement being permitted by said yielding connection, and means at the opposite side of the lock to move said carriage and bolt.

3. In a permutation lock, the combination of a sliding bolt, a fixed guide frame having openings, a carriage slidable in said frame and connected to the bolt, tumblers mounted on the carriage and slidable into and out of said openings to lock the carriage to the frame, means to operate the tumblers to withdraw the same from the said openings, to permit movement of the carriage and bolt, means to produce such movement, and means to reëngage the tumblers in said openings.

4. In a permutation lock, the combination of a bolt, a sliding carriage connected thereto, sliding rack tumblers mounted on said carriage, a frame normally engaged by said tumblers to prevent movement of the carriage, pinions in mesh with the racks, to move the tumblers, push pin devices operatively connected to said pinions respectively, to operate the same and release the tumblers, and means to restore the tumblers to engaging position.

5. In a permutation lock, the combination of a sliding tumbler having a rack, a bolt whose movement is controlled by said tumbler, a pinion in mesh with the rack, to shift the tumbler, a ratchet wheel attached to the pinion, a pawl engageable with the ratchet, and a push pin bearing against the pawl to advance the same and turn the ratchet.

6. In a permutation lock, the combination of a sliding bolt, a carriage connected thereto, a set of sliding tumblers mounted on the carriage, a frame engageable by said tumblers to prevent movement of the carriage, means to shift the tumblers to engaging or releasing position, and adjustable stops to limit the movement of the tumblers to engaging position.

7. In a permutation lock, the combination of a sliding bolt, a carriage connected thereto, a set of sliding tumblers mounted on the carriage, a frame engageable by said tumblers to prevent movement of the carriage, means to shift the tumblers to engaging or releasing position, and adjustable stops to limit the movement of the tumblers to engaging position, said adjustable stops comprising shiftable sleeves with stop arms in the line of movement of the tumblers, and screws engaged with said sleeves to adjust the same.

8. In a permutation lock, the combination of a guide frame having openings, a sliding bolt, a sliding carriage in said frame, connected to the bolt, sliding tumblers in the carriage, engageable in the openings to prevent movement of the carriage, pawl and ratchet mechanism mounted on the carriage and operatively connected to the tumblers respectively to shift the same, push pins engaging the pawls respectively to operate said mechanism in one direction to withdraw the tumblers from said openings, means to retract and advance the carriage and bolt, and means to return said mechanism and reengage the tumblers when the carriage and bolt are advanced.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES L. KAPS.

Witnesses:

JOHN A. BOMMHARDT,

S. W. BRAINARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."