June 13, 1933. A. SPERDUTI 1,913,859

LOCK

Filed Feb. 15, 1932 3 Sheets-Sheet 1

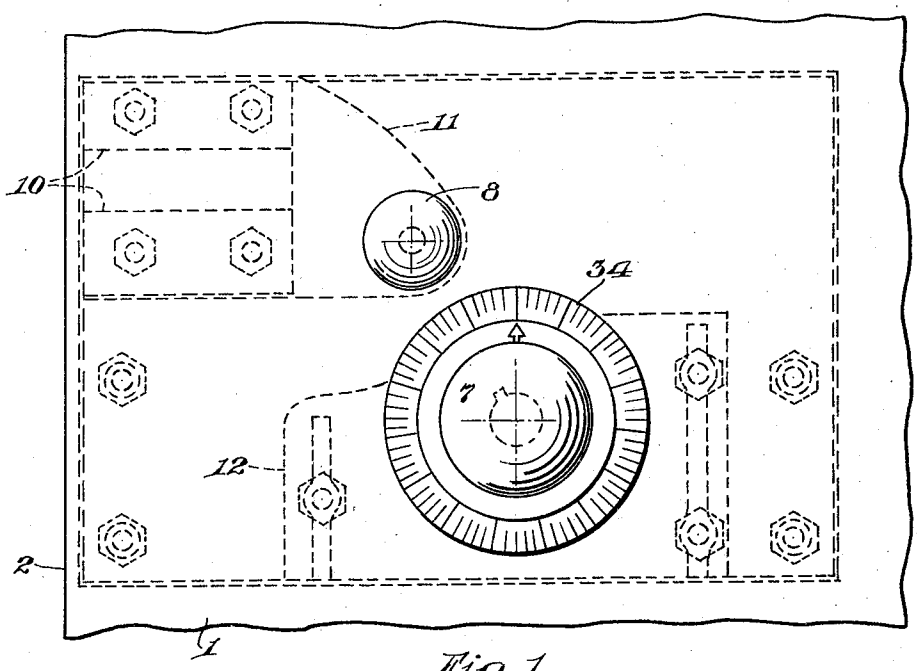


Fig. 1.

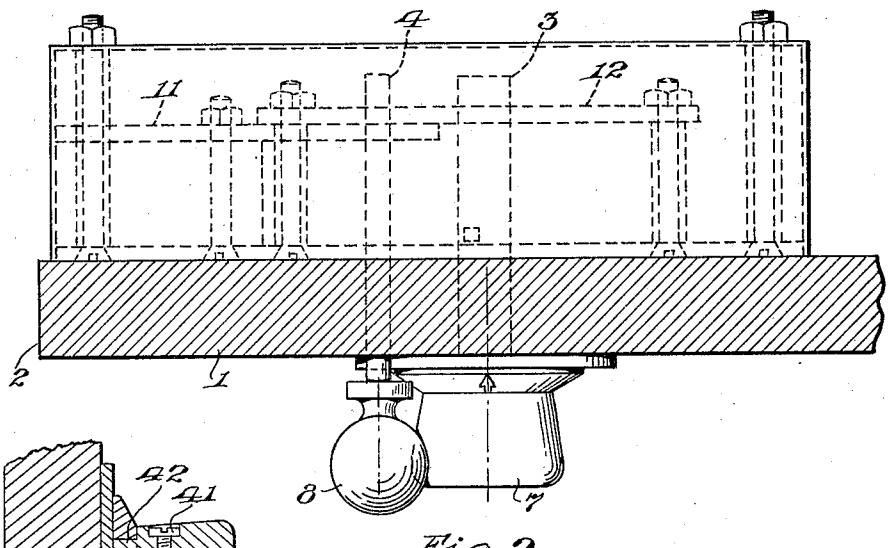


Fig. 2.

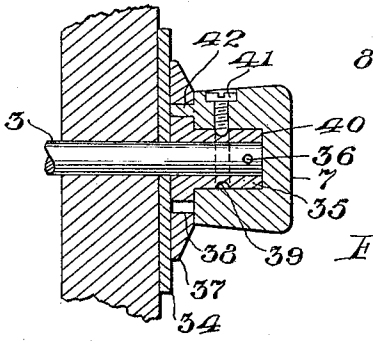


Fig. 13.

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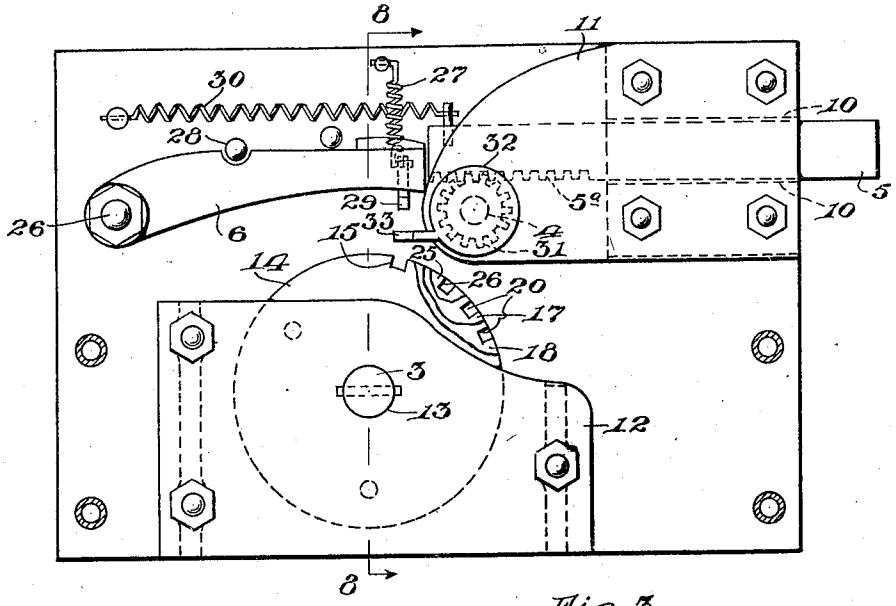


Fig. 3.

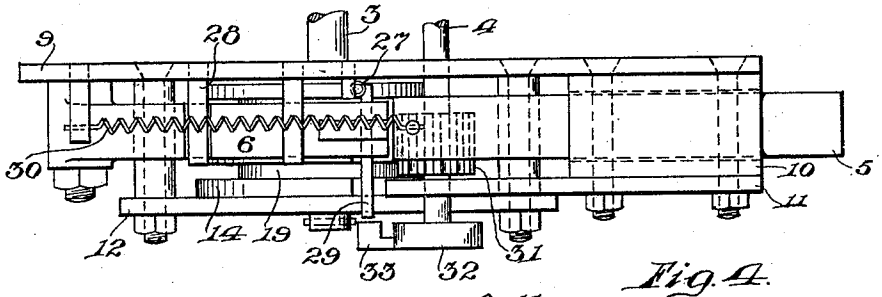


Fig. 4.

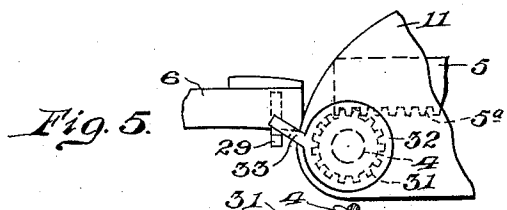


Fig. 5.

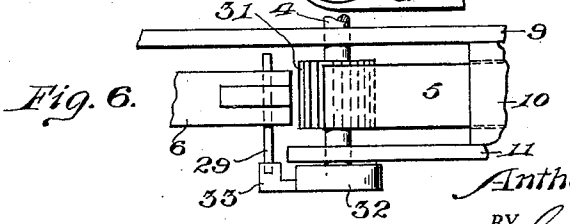


Fig. 6.

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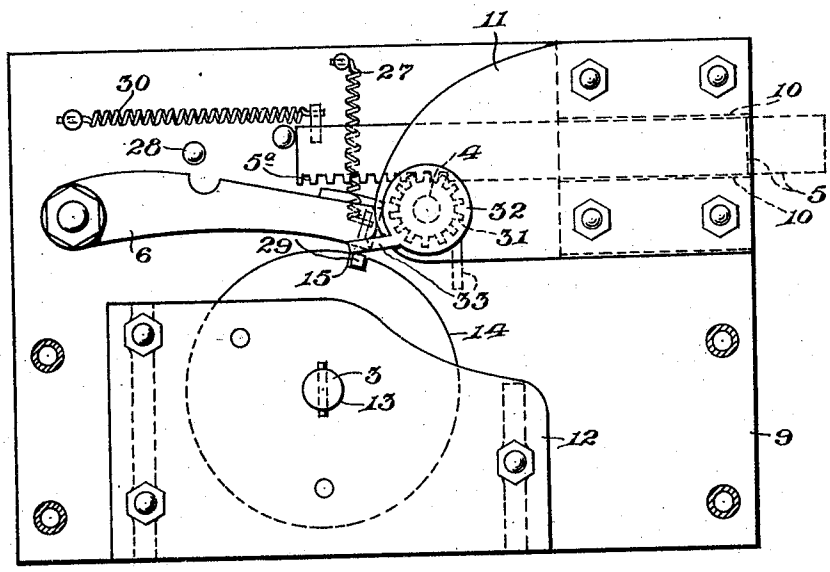


Fig. 7.

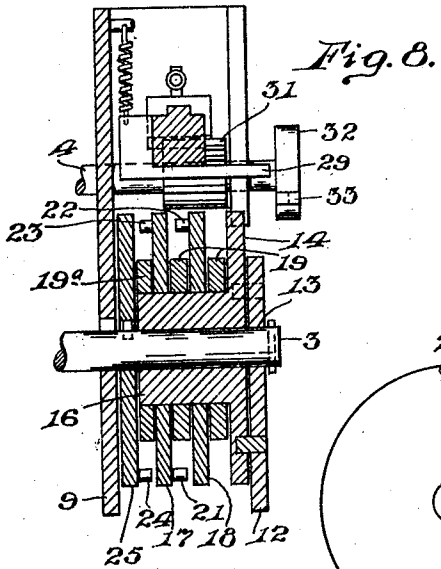


Fig. 8.

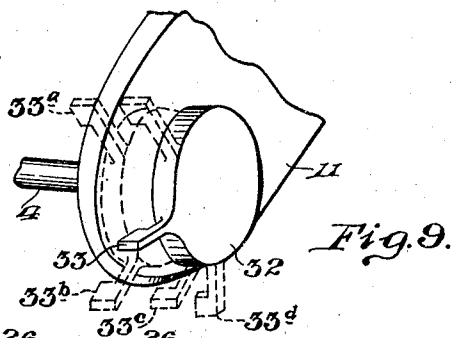


Fig. 9.

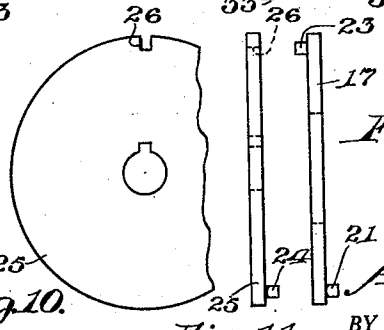


Fig. 10.

Fig. 11.

Fig. 12.

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Patented June 13, 1933 1,913,859

UNITED STATES PATENT OFFICE

ANTHONY SPERDUTI, OF PHILADELPHIA, PENNSYLVANIA

LOCK

Application filed February 15, 1932. Serial No. 592,863.

The object of the invention is to provide improvements in locks broadly, but more particularly in combination locks.

Much of the effort towards improving combination locks has been centered upon various constructions and arrangements of the rotatable discs, by which the necessary combinations are effected, and towards the elimination from such locks of all forms of telltale sounds or vibrations, whereby one skilled in the art might be enabled to decipher the correct combination for opening the lock.

An object of this invention, however, in addition to eliminating all such sounds and vibrations, is to construct a lock in which there is incorporated an additional secret element of operation, so that even when the controlling combination of discs or the like has been brought about, one who is unfamiliar with the additional secret element is still unable to open the lock.

A further object is to provide in a lock, the combination of a lock bolt, a manually actuatable shaft which is adapted to be moved both angularly and longitudinally, a movable member in normal engagement with and operative to normally prevent the movement of the bolt, combined with a combination disc or equivalent structure, and means whereby a combined sequential longitudinal and angular movement of the shaft, when the combination is attained, is adapted to move said member out of restraining alignment with said bolt, and then to move said bolt free from engagement with an extraneous lock element, such as the keeper in a doorjam.

With these and other objects in mind, the invention comprises further details of construction and operation, which are fully brought out in the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a front elevation of a fragmentary portion of a door or other member to which one embodiment of the invention is secured; Fig. 2 is a horizontal section of the mounting for, and a plan view of, the lock structure shown in Fig. 1; Fig. 3 is a rear elevation of the lock mechanism as exposed upon the removal of the protective casing; Fig. 4 is a top plan view of the same; Fig. 5 is a fragmentary elevational view of a portion of the structure shown in Fig. 3; Fig. 6 is a top plan view of the same; Fig. 7 is an elevational view similar to Fig. 3 but showing the parts in the positions held when the bolt is withdrawn; Fig. 8 is a section on the line 8—8 of Fig. 3; Fig. 9 is an enlarged perspective view of the several positions of the keeper-depressing mechanism; Fig. 10 is a fragmentary portion of the end disc; Fig. 11 is an edge elevation of the same; Fig. 12 is a similar view of an intermediate disc; and Fig. 13 is a section of the combination knob mounting.

Referring to the drawings, a lock embodying the present invention is shown as being secured in any suitable manner to a door or the like 1, adjacent to the free edge portion 2 of the latter. Through suitable apertures in such door extend shafts 3 and 4, respectively, for adjusting the interior disc or other mechanisms to attain the proper combination, and for actuating the bolt 5 and restraining member 6, said bolt being provided upon its under side with teeth 5^a. These shafts are provided with any suitable type of actuating knobs 7 and 8, and the shafts themselves are comparatively characterized by the fact that the first is merely rotatable while the latter is both longitudinally and rotatably or angularly movable.

The lock mechanism is mounted in the first place upon a base plate 9, which is preferably secured directly to the door and through which said shafts also extend. When viewed from the normal rear or inner side of a door, for a so-called left-hand lock, there is secured to and in spaced relation with the upper right corner of said base plate a housing for the bolt, comprising a pair of spaced guides 10 between which said bolt reciprocates, and a cover plate 11 which is secured to and spans the distance between said guides.

When the lock is viewed in the same position, there is secured in any suitable manner to and in spaced relation with the lower portion of the base plate, a secondary plate 12 having an aperture 13 through which rotatably extends the disc-adjusting shaft 3. Surrounding said shaft between said base and

secondary plates is a disc 14, having a peripheral notch 15 and an axially extending hub 16, upon which are rotatably mounted additional discs 17 and 18, spaced apart by washers 19. Each of these last-named discs is provided with a peripheral notch 20 and with inter-engaging laterally extending pins 21 and 22, while the disc 17 is provided with a similar pin 23 adapted to engage a pin 24, carried by a disc 25, having a notch 26 and which is mounted directly upon and is keyed to the operating shaft 3, said discs 17 and 25 being also separated by a washer 19a.

The restraining member 6 is pivotally mounted upon the base plate 9 by means of a post 26, and a spring 27 tends to maintain said member upwardly against a stop 28, said member being provided with a transverse terminal enlargement 29, which enters the several notches in said discs when they are in alignment. The bolt 5 is also connected to the base plate through a spring 30, which tends to keep the bolt in an innermost position normally against the restraining member 6, and when said member is depressed tends to assist in moving said bolt into a withdrawn position, in spaced relation with an extraneous keeper so that the door, being then unlocked, may be opened or otherwise moved as desired.

The shaft 4 is provided with a gear 31 which meshes with the teeth 5a of the rack, said shaft extending through and being journalled in both of the plates 9 and 11, while beyond the latter plate said shaft fixedly carries a head 32 provided with a radially extending arm 33, which is adapted to engage the transverse enlargement 29 of the restraining member, depending upon the longitudinal and angular position of said shaft. For instance, no matter what the arrangement of the disc notches as to alignment or other predetermined relative position, when the shaft 4 is in the longitudinally innermost position shown in Fig. 8, no amount of turning effort will depress the restraining member.

Consequently, after the shaft 3 has been oscillated in accordance with any definite plan, as represented by numerical positions indicated upon the face dial 34, and until the disc notches are in a definite predetermined relationship with one another, the shaft 4, if not in the position shown in Fig. 8, is moved longitudinally inwardly into that position and turned as far to the left as possible, to bring the arm 33 above the enlargement 29 of the member 6, as shown in Fig. 5, and with the adjacent end of the bolt 5 still sufficiently spaced from said member 6, to permit said member to be lowered as said bolt moves towards it in its unlocking movement. Said shaft 4 is therefore then turned to the right so that said arm depresses said enlargement into the disc notches, and with such turning pressure continued said shaft is moved longitudinally inwardly until said arm slips off of said enlargement, and a continued further turning of the shaft permits the gear 31 aided by the spring 30 to move the bolt 5 inwardly over the depressed restraining member 6, and thereby freeing the lock from any extraneous keeper or the like.

When the door or similar device is intended to be again locked, the shaft 4 is rotated in the reverse direction so as to force the bolt outwardly, and in so doing the member 6 is released, and the spring 27 returns it to its uppermost position against the stop 28, after which the slightest turn of the disc-setting shaft 3 will derange the combination of disc notches, and prevent the subsequent withdrawal of the bolt until such combination is again restored.

As the invention lies largely in the release of the lock bolt by means of a combination of longitudinal and angular movements of the actuating shaft 4, it is by no means intended to limit the invention to the number, construction, or arrangement of the disc, pins, notches, etc. Such discs may be of any desired number, their proper positioning in order to withdraw the bolt may be in any sequence and by means of parts or whole turns of their common shaft, and the notches may be designed for alignment or other arrangement, depending upon the shape of the transverse enlargement 29 of the bolt-restraining member. The essential detail is that, even if an unauthorized person happens to properly arrange the disc notches, but does not know in what manner and sequence to move the shaft 4 both angularly and longitudinally, he will not be able to operate the lock to withdraw the bolt.

Referring particularly to Fig. 9, when the arm 33 is oscillated in the plane of the full-line position of the head 32, said arm is entirely free from and inoperative so far as the extension 29 is concerned. It is when the head is withdrawn into the dotted position in this figure that said arm is oscillatable in a plane which intersects said extension and is therefore adapted to actuate the same. In sequence, said arm is first brought into the position 33^a, and by rotating the shaft 4 said arm normally engages the extension 29 and continues to move downwardly as far as said arm can go into the disc notches, said arm then being in the position 33^b, after which the shaft upon being shifted longitudinally moves said arm into the position 33^c from said extension, and then is further rotated into the position 33^d while said shaft through the gear 31 has effected the retraction of the bolt 5.

Referring now to Fig. 13, it will be seen that the disc-carrying shaft 3 has a sleeve 35 secured to its outer end by means of a pin 36,

said sleeve being provided with a radial flange 37 normally rotatable adjacent to the dial 34, and provided with circumferentially positioned apertures 38, said sleeve having a circumferential groove 39. The knob 7 is provided with a recess 40 to receive the shaft 3 and with a radially extending threaded aperture to receive the retaining screw 41, while the inner face of said knob is provided with an integral pin 42, which engages within any one of the apertures 38 selectively. With this construction and assembly, one method of altering the combination required for opening the lock is to release the screw 41, draw the knob 7 partially from its supporting shaft, thus removing the pin 42 from its recess, and then rotating said knob partially until said pin enters another of said recesses, when the screw may be again made to engage within said groove 39.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:—

1. A combination lock, comprising a plurality of discs respectively having notches adapted to be brought into predetermined relation, a movable restraining member adapted to enter said notches when in predetermined relation, a lock bolt normally arrested by said member and adapted to pass by said member when it enters said notches, and an oscillatable shaft cooperating with said bolt and having an offset, when said disc notches are in predetermined relation, oscillation of said shaft being operative through said offset to move said member into said notches and permit a further movement of said shaft to move said bolt past said member.

2. A combination lock, comprising a plurality of discs respectively having notches adapted to be brought into predetermined relation, a movable restraining member adapted to enter said notches when in predetermined relation, a lock bolt normally arrested by said member and adapted to pass by said member when it enters said notches, and a longitudinally movable oscillatable shaft cooperating with said bolt and having an offset, when said disc notches are in predetermined relation an angular movement of said shaft with said offset engaging said member causing said member to be moved into said notches out of the path of said bolt, so that a longitudinal movement of said shaft to disengage said offset from said member and thereafter a continuation of the angular movement of said shaft causing said bolt to be withdrawn past said member.

3. A combination lock, comprising a plurality of discs respectively having notches adapted to be brought into predetermined relation, a lock bolt, a restraining member normally in the path of said bolt and having a portion adapted to enter said notches when in such relation as to permit said member to be removed from said path, and a shaft engaging said bolt and having an offset engageable with said member when rotated to shift said member out of said path and said shaft thereafter being operative upon continued rotation to move said bolt past said member.

4. A combination lock, comprising a plurality of discs respectively having notches adapted to be brought into predetermined relation, a lock bolt, a restraining member normally in the path of said bolt and having a portion adapted to enter said notches when in such relation as to permit said member to be removed from said path, and a longitudinally and angularly movable shaft having an offset engageable with said member, whereby angular movement of said shaft with said offset engaging said member, while said notches are in predetermined relation, causes said member to be removed from said path, and subsequent longitudinal movement of said shaft permits said offset to be released from said member, after which continued angular movement of the shaft operates to move said bolt past the withdrawn member.

5. A combination lock, comprising an actuating shaft adapted to move both angularly and longitudinally and having an offset and bolt reciprocating means, a restraining member adapted to be engaged by said offset, a series of discs having notches adapted to be moved into a predetermined relation and thereafter receive said member, and a reciprocatory bolt in the path of which said member normally extends, angular movement of said shaft in one longitudinal position causing said offset to engage and move said member out of its normal position when said notches are in predetermined relation, after which longitudinal movement of said shaft permits said offset to disengage said member, following which continued angular movement of said shaft causes said bolt to move past said member.

6. A combination lock, comprising an actuating shaft, a reciprocatable lock bolt, a restraining member normally in the path of said bolt, and means to normally maintain said member in said path and adjustable to permit said member to move out of said path, when said last-named means is properly adjusted said shaft being operative to move said member out of the path of said bolt and then to move said bolt.

7. A combination lock, comprising an actuating shaft adapted to move both angularly and longitudinally, a reciprocatable lock bolt, operatively connected to said shaft and movable therewith when said shaft rotates, a restraining member normally in the path of said bolt and movable out of said path upon engagement by said shaft, and means to normally maintain said member in said path and adjustable to permit said member to be moved out of said path, when said last-named means

is properly adjusted said shaft by an angular movement being operative to move said member out of the path of said bolt, then a longitudial movement of said shaft disengaging the same from said member, and a further angular movement of said shaft operating to shift said bolt.

In testimony whereof I have affixed my signature.

ANTHONY SPERDUTI.