R. C. LEWIS.

COMBINATION LOCK.

APPLICATION FILED JUNE 6, 1914.

1,145,377.

Patented July 6, 1915.

2 SHEETS—SHEET 1.

FIG. 1.

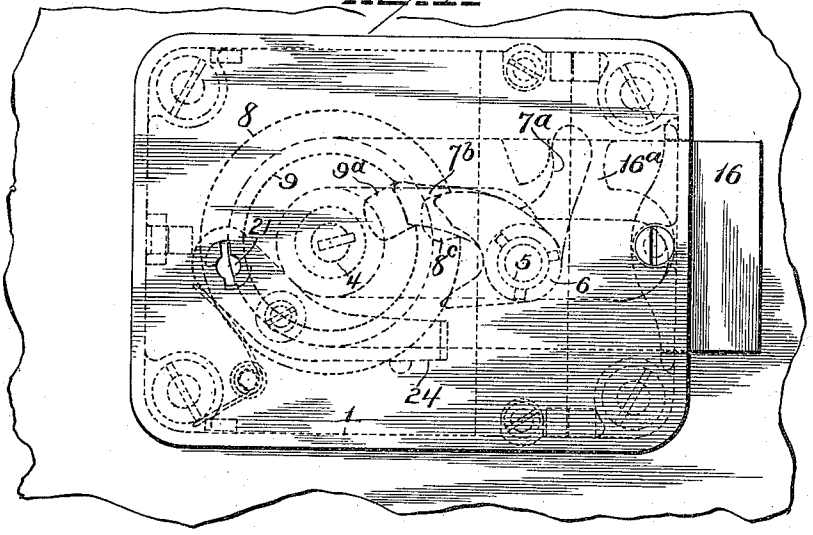
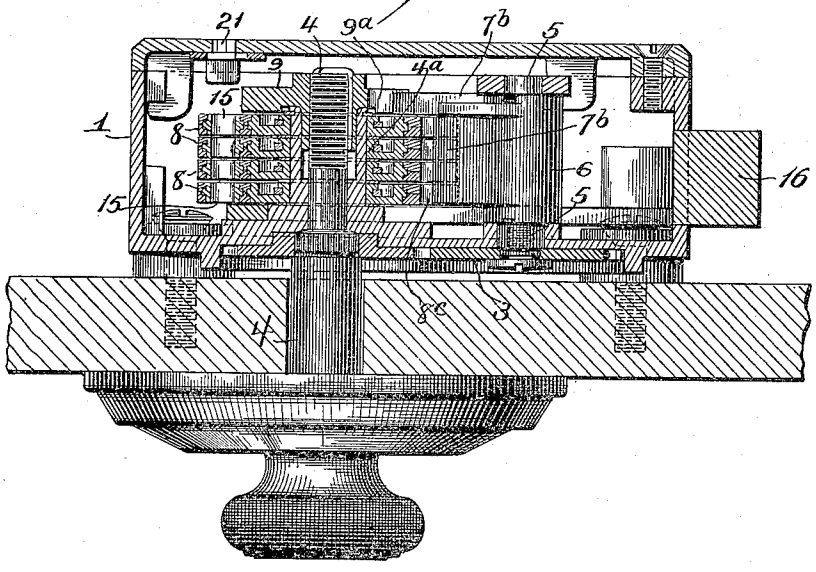


FIG. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

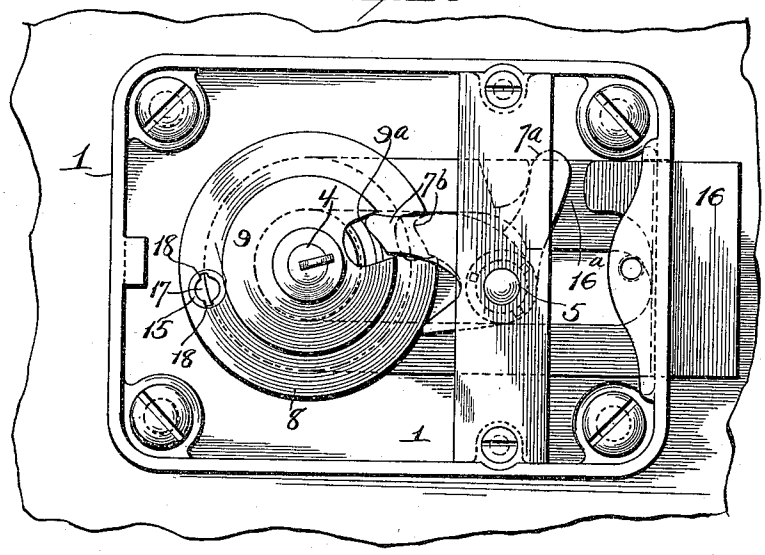


Fig. 4.

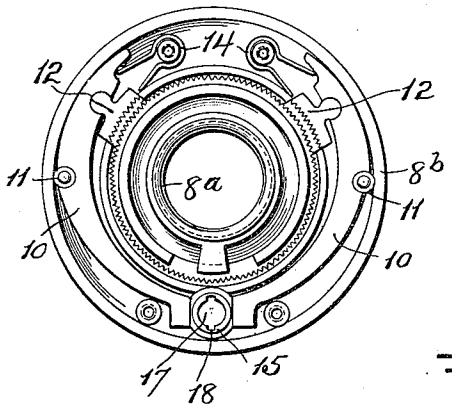


Fig. 5.

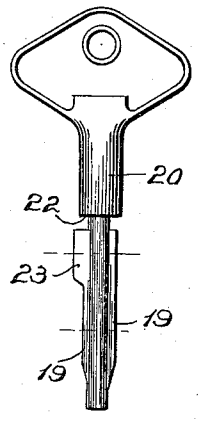


Fig. 6.

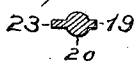
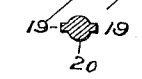


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROLLIN C. LEWIS, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF STAMFORD, CONNECTICUT.

COMBINATION-LOCK.

1,145,377. Specification of Letters Patent. Patented July 6, 1915.

Application filed June 6, 1914. Serial No. 843,522.

To all whom it may concern:

Be it known that I, ROLLIN C. LEWIS, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Combination-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in combination locks, and particularly to means for changing the combination of the lock.

In locks of this type, the tumblers are made of two sections the sections of each tumbler being normally locked together so as to move in unison, but which sections may be released by a proper key so as to permit the inner section to be turned by the dial spindle while the outer sections thereof are held by the key, thus changing the combination.

Heretofore it has been possible to insert the key, which unlocks the section of the tumblers, part of the way and then turn it, so that only part of the nest of tumblers will be unlocked, and if the dial be then turned, some of the tumblers remain on the old combination and part set to a new combination, with the result that no one can tell what the actual combination of the lock then is, and in the hands of the ordinary user, puts the lock out of commission until an expert can be summoned to reset it.

The object therefore of my invention is to provide means for preventing the key which unlocks the tumbler sections, from being turned to unlock any of them until it has penetrated sufficiently to act upon the entire nest of tumblers, and it consists in the parts and combinations of parts as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in elevation of the rear face of a lock embodying my invention; Fig. 2 is a view in section through the lock and cover plate; Fig. 3 is a view of the lock with the cap plate removed; Fig. 4 is a view of one of the tumblers, the top face of the outer section thereof being removed; Fig. 5 is a view of the key and Figs. 6 and 7 are views in transverse section of the same.

In order to enable the invention and its application to a lock to be thoroughly understood, I have illustrated it as applied to the lock patented to the Yale & Towne Manufacturing Company No. 1,092,874, April 14th, 1914, and will now describe the parts of said patented lock with which my improvement coacts.

1 represents the lock case the front face of which is recessed on its outer side for the reception of the meshing gear wheels 2 and 3, the former of which is fixed to the dial spindle 4, and the latter to the shaft 5 carrying the bearing or sleeve 6 which is a part of the fence. As the two gears are always in mesh, it follows that when the spindle 4 is rotated, the shaft 5, carrying the fence will be rotated in the opposite direction. The spindle 4 and shaft 5 pass through the front plate of the lock case, and the former actuates a series of tumblers 8 and the cam 9. Each tumbler is disk shaped and is composed of an inner section 8^a and an outer section 8^b. These tumblers are loosely mounted on a sleeve 4^a fixed to or integral with the front plate of the lock case and are rotated by the cam 9 and by the next adjacent tumbler in sequence starting from the cam, in the well known manner.

The inner section 8^a of each tumbler is serrated on its periphery, and each outer section 8^b, is provided with a central opening of a size sufficient to receive the inner section so that when the two sections are assembled and locked together, they form in effect a single disk structure with a central opening to receive the sleeve 4^a on which the several tumblers are mounted to rotate.

The outer section 8^b of each tumbler is hollowed out, and carries two locking levers 10 each of which is fulcrumed at 11. Each lever carries or engages at its inner edge near one free end, a dog 12 having a pivotal or loose connection with its lever, and each lever is acted upon by a spring 14 which normally tends to hold the dog out of contact with the serrated periphery of the inner disk. The dogs project through the inner wall of the outer section of the tumblers, and are of a length sufficient to engage a plurality of serrations or teeth on the inner section 8^a. Located between the opposite free ends of the levers 10, of each tumbler, is the cam 15, which is so constructed that when in one position the springs 14 are free to force the adjacent ends of the

levers carrying the dogs outwardly, thus removing the dogs out of contact with the serrated edge of the inner section 8[a] of the tumbler, and when turned 90°, move the levers in a direction to force the dogs into contact with the periphery of the inner disk.

The fence 7, is as before explained, mounted on the shaft 5 connected with gear wheel 3. The sleeve 6 of this fence is a friction sleeve in that it is provided with means which make contact with the shaft, with sufficient friction to cause the fence to move, or tend to move in the direction of rotation of said shaft, so that after the tumblers have been turned to bring the notches thereof into alinement, for the entrance of the arm 7[b] of the fence 7, the rotation of the gear in a direction to retract the bolt will cause the arm 7[b] of the fence to enter the notches of the tumblers and cam so as to be actuated by the latter to retract the bolt.

The fence 7 is provided with an arm 7[a] adapted to rest within slot 16[a] of the bolt 16, and with a second arm 7[b] adapted to enter the notches 8[c] in the peripheries of the tumblers, and also the notch 9[a] in the cam 9.

The features above described are all disclosed in the patent above referred to.

My invention consists in providing the cams 15 which actuate the levers 10, each with an opening 17 and with a slot or slots 18 communicating with said opening to receive the wings or wards 19 or a key 20. The cover plate is also provided with a key slot 21, of the same shape in cross section as the key so that after the end of the key has been inserted in the key slot 21, it cannot be turned until the wards 19 on the key have passed through the cover plate of the lock. The parts are so constructed that when wards are clear of the inner face of the cover plate, the key will be fully entered in all the tumblers and may then be turned, but is absolutely locked against all turning movement until fully inserted. The key is provided with a shoulder 22 which when the key is inserted in the lock, rests against the outer face of the cover plate, and the portion of the key stem between said shoulder and rear ends of the wards is approximately equal the thickness of the cover plate, so that when the key is in place it cannot be pushed inwardly beyond the proper working position, nor can it be withdrawn until it has been actuated to turn the cams 15 into position for locking the dogs 12 to the inner section of the tumblers.

In the operation of the lock, the bolt is retracted and the door opened thus giving access to the rear face of the lock. The key 20 is then inserted and turned, which actuates all the cams 15 in a direction to permit the ends of levers 10 carrying the shoes 12 to move away from the serrated peripheries of the inner sections of the several tumblers, thus disconnecting said inner section from their outer sections so that they will be free to be turned by the dial spindle to set up the tumblers on any desired combination. After the combination has been changed, the key is withdrawn, and is not again used until it again becomes necessary or desirable to change the combination of the lock.

I have also shown one of the wards of the key widened at the rear end as at 23 for the purpose of shifting the lever 24 which operates to hold the fence against movement while the dial spindle and cam secured to the latter are being turned, while changing the combination. This lever is pivoted to the inner face of the cover plate of the lock, and is normally held by a spring with one end adjacent the key hole in the cover plate, so that when the widened rear end of the ward is fully entered within the lock case, it will, when the key is turned, engage one end of said lever 24 and turn same in a direction to carry its other end away toward the fence, so as to engage and hold the same against a turning movement toward the notches of the tumblers and cam.

When the bolt is retracted the cams 15 all rest in a plane of the key hole in the door so that by inserting the key and pushing it home, all of the tumblers will be engaged.

With this construction the operator can proceed with certainty that when the key is free to be turned all of the tumblers have been engaged thereby and that all will be reset to the changed combination.

It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention. Hence I would have it understood that I do not wish to confine myself to the exact construction and arrangement of parts shown and described but,

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a combination lock, the combination of a series of two part disk tumblers, each having means whereby the two parts thereof may be disconnected so as to permit the central members thereof to be turned to change the combination, and each provided with a cam for actuating said connecting and disconnecting means, each cam having an opening for the stem of the key and a slot for a ward on said key, a cover plate for the lock having a key hole conforming in shape to the cross section of the key, and a key having a ward of sufficient length to remain in contact with the cover plate of the lock until it has engaged the cams of the entire nest of tumblers.

2. In a combination lock, the combination of a series of two part disk tumblers, each

having means whereby the two parts thereof may be disconnected so as to permit the central member thereof to be turned to change the combination, and each provided with a cam for actuating said connecting and disconnecting means, each cam having a central opening and a plurality of slots communicating with said opening, a cover plate for the lock having a key hole conforming in shape to the cross section of the key, and a key having a plurality of wards so located that all of the cams will be engaged by a ward on the key so as to be turned thereby, before the key is free to turn in the cover plate.

3. In a combination lock, the combination of a series of two part disk tumblers, each having means for connecting and disconnecting the section thereof, and each having a cam for actuating said means, each cam having a central opening and a slot communicating with said opening, a cover plate for the lock having a key hole conforming in shape to the cross section of the key, and a key having two wards so located that all of the cams will be engaged by the key so as to be turned thereby before the key is free to turn in the cover plate, and also provided with a shoulder for limiting its penetration into the lock.

4. In a combination lock, a lock casing having a key hole, a series of two part disk tumblers each having means for connecting and disconnecting the sections thereof, and a key for actuating said connecting and disconnecting means, the cross sections of the key and the shape of the key hole being such that the key cannot turn in the key hole until the connecting and disconnecting means of all the tumblers are in engagement with the key, thus preventing the sections of any one or more of the tumblers from being disconnected or connected independently of the others.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

ROLLIN C. LEWIS.

Witnesses:
SCHUYLER MERRITT,
WARREN H. TAYLOR.

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