Nov. 6, 1934. E. N. JACOBI 1,979,939

TUMBLER LOCK AND METHOD OF FITTING THE SAME TO A PREDETERMINED KEY CHANGE

Filed June 29, 1931 2 Sheets-Sheet 1

FIG. 1.

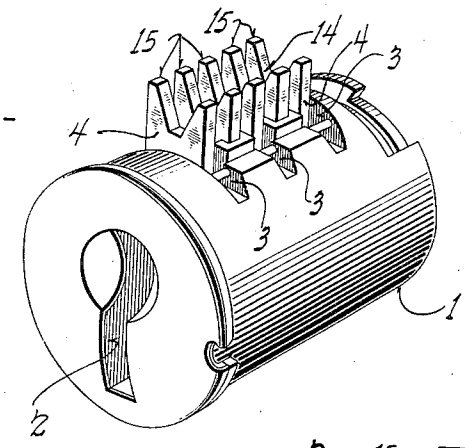


FIG. 12.

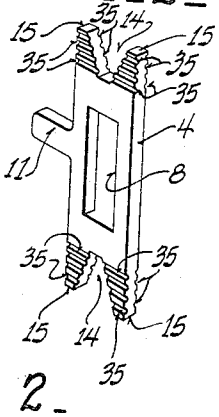


FIG. 2.

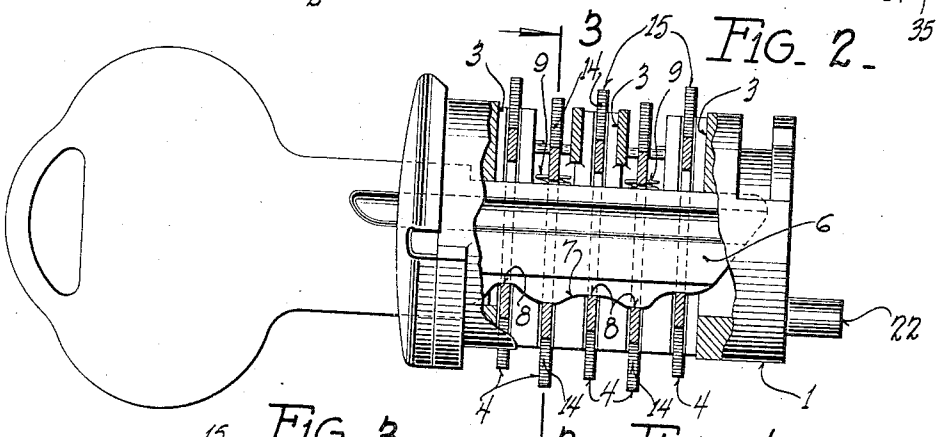


FIG. 3.

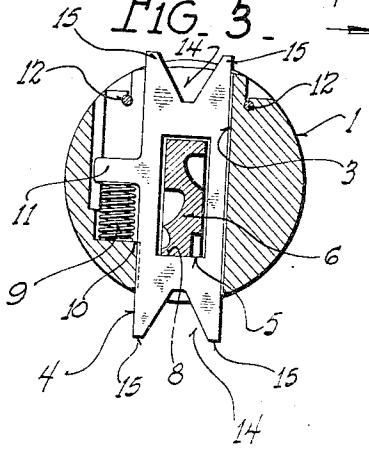
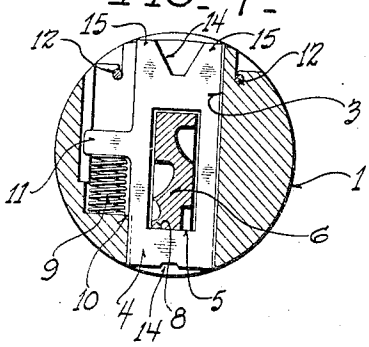


FIG. 4.



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FIG. 5.

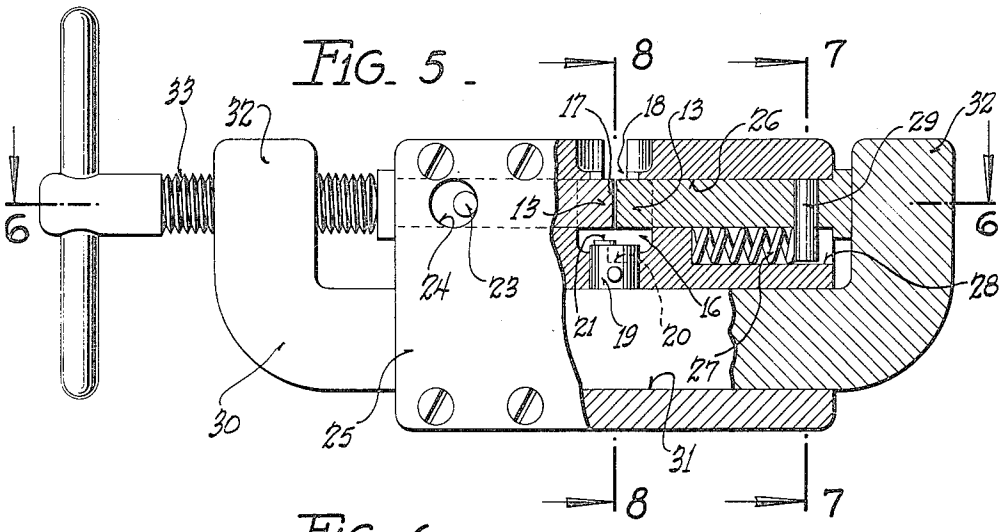


FIG. 6.

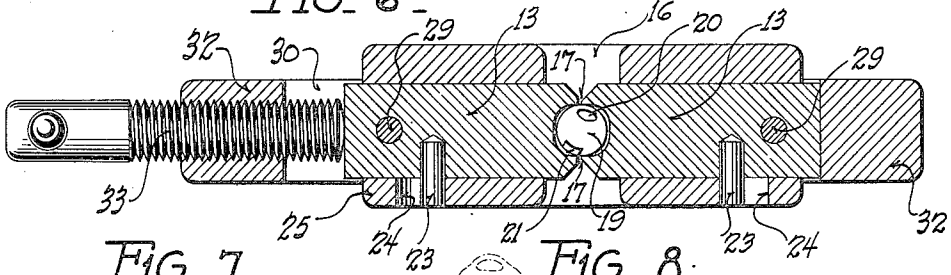


FIG. 7.

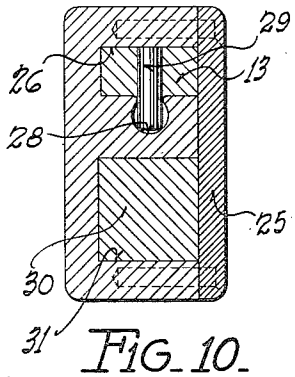


FIG. 8.

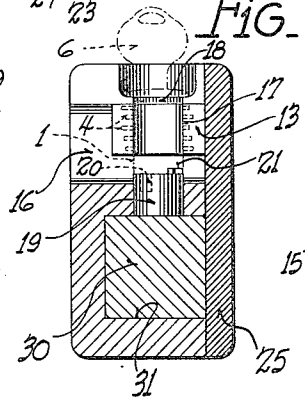


FIG. 9.

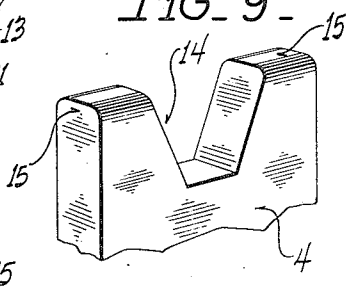


FIG. 10.

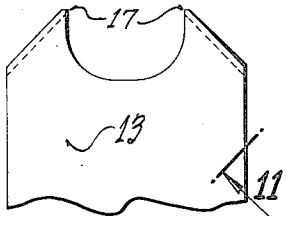
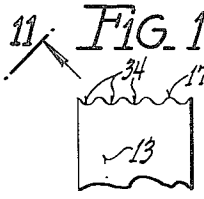


FIG. 11.



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UNITED STATES PATENT OFFICE

1,979,939

TUMBLER LOCK AND METHOD OF FITTING THE SAME TO A PREDETERMINED KEY CHANGE

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Application June 29, 1931, Serial No. 547,513

17 Claims. (Cl. 29—148)

This invention relates to certain new and useful improvements in locks and refers more particularly to cylinder locks having key operable tumblers.

Locks of this type have a wide variety of applications, and in certain instances it is often desirable to fit a new lock to a particular key change to avoid the necessity for additional keys, or to serve as replacements for defective locks.

With this purpose in mind this invention contemplates as an object the provision of a lock which is so constructed at the time of its manufacture as to enable its tumblers to be readily bitted to any desired key change.

Another object of this invention resides in the particular method by which the tumblers of the lock are bitted to fit the desired key.

Another object of this invention resides in the specific construction of the tumblers whereby their ends may be easily and quickly sheared off without setting up bending stresses in the tumblers.

And a further object of this invention resides in the provision of a novel tool whereby the ends of all of the tumblers of a lock may be simultaneously sheared off.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, one complete example of the physical embodiment of this invention is illustrated constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view of a lock cylinder showing the condition of its tumblers before they are bitted to any particular key change;

Figure 2 is a side elevation of a lock cylinder with a key in place and parts broken away and in section to illustrate the manner in which the ends of the tumblers project beyond the cylinder walls prior to being cut off;

Figure 3 is a cross section view taken through Figure 2 on the plane of the line 3—3;

Figure 4 is a view similar to Figure 2 and showing the tumblers cut off to proper length;

Figure 5 is a side view, with parts broken away and in section, of a tool designed for simultaneously severing the ends of all of the tumblers of a cylinder;

Figure 6 is a section view through Figure 5 on the plane of the line 6—6;

Figure 7 is a cross section view taken through Figure 5 on the plane of the line 7—7;

Figure 8 is a cross section view taken through Figure 5 on the plane of the line 8—8;

Figure 9 is an enlarged detail view of one end of a tumbler after it has been severed;

Figure 10 is a detail view of one of the cutters of the tool;

Figure 11 is a detail view of the cutter, said view being taken on the plane of the line 11—11 in Figure 10; and

Figure 12 is a perspective view of a locking tumbler of slightly modified construction.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, the numeral 1 represents a lock cylinder of conventional construction having a key slot 2 extending longitudinally therethrough, to communicate with a central enlarged tumbler receiving chamber 3, the side walls of which are grooved to form guides for a plurality of flat tumblers 4.

The tumblers are of special construction, best illustrated in Figures 3 and 4, and have a central opening or aperture 5 to receive a key 6 adapted to enter the key slot 2. One edge 7 of the key forms its bit to move the tumblers to their proper positions at which their ends are flush with the outer cylindrical surface of the cylinder, by engaging one edge 8 of their openings 5, so that rotation may be imparted to the cylinder by means of the key.

Expansive springs 9 confined between shoulders 10 communicating with the tumbler guiding grooves in the cylinder and lugs 11 extended from one side of the tumblers, normally yieldably urge the tumblers outwardly of the cylinder in one direction, and stop members 12 preferably in the form of wires extending across the tumbler guiding slots in the path of the tumbler projections 11, serve to limit the outward movement of the tumblers by the springs.

Heretofore it has been customary to make the tumblers with their openings 5 located at different distances from their ends to accommodate the different portions of a key and by the proper selection of tumblers, as governed by the particular key change to which the lock was to belong, the cylinder was made up to respond to a key of said particular key change. But this invention contemplates the making of all of the tum-

blers alike with their openings 5 substantially at a medial point between their ends and with the length of the tumblers greater than the diameter of the lock cylinder.

Figure 3 illustrates a tumbler of this type in position in the lock cylinder and with a key also inserted. It is observed that both ends of the tumbler project beyond the outer surfaces of the cylinder. This is true of all of the tumblers in the cylinder. With the key in position the projecting ends of the tumblers are then cut off flush with the surface of the cylinder and in this manner the lock may be quickly bitted to any particular key change.

Both ends of the tumblers are severed simultaneously by a single uninterrupted shearing stroke, and for this purpose a tool such as shown in Figure 5 is preferably employed. This tool comprises as its essential elements two complementary cutters 13 mounted for movement toward each other and between which the assembled cylinder is positioned so that as the cutters approach each other they simultaneously shear off both ends of all of the tumblers.

To provide relief for the portions to be sheared off and to reduce the amount of metal to be cut, the ends of the tumblers are bifurcated as at 14. In the particular tumblers illustrated the bifurcated ends are provided by forming V shaped slots in the end portions of the tumblers so that the remaining projections 15 are substantially triangular in shape with their bases innermost. If desired, the V shaped slots may be replaced by any other shaped cut which results in roughly triangular shaped projections.

The cutting away of the central portion of the tumbler ends not only serves to reduce the amount of metal it is necessary to cut, but the particular shape of the projections 15 precludes the possibility of the cutting tools bending the ends of the tumblers and insures a clean cut edge, for the triangular ends of projections 15 are so proportioned as cantilever beams, that the shearing stress at any point at which the cutters might act is less than the bending resistance of the remainder of the beam from the cut point to the point of attachment to the body of the tumbler.

The device for shearing the tumbler ends comprises a pair of cooperating cutters 13 slidably mounted in the arms of a substantially U shaped block or supporting element 16. As best illustrated in Figures 6 and 10 the cutting ends of the cutters 13 are substantially U shaped with their cutting edges 17 at the outer extremities of the sides of the U. The distance between the cutting edges of each cutter is equal to the diameter of the lock cylinder and the depth of the U shaped recess is slightly greater than half the diameter of the cylinder.

These cutters are mounted in the mounting block 16 so that their cutting edges 17 are parallel with the axis of a cylinder recess or chamber 18 formed in the adjacent walls of the arms of the mounting member 16. At the bottom of the cylinder receiving chamber 18 is a plug 19 which is non-rotatably secured in the body of the mounting member and has a recess 20 and a projection 21 to receive a cam 22 and extend into an opening (not shown) in the inner end of the cylinder, respectively, so as to hold the cylinder against rotation in its proper position with respect to the cutters 13.

Obviously this position is one at which the axes of the tumblers are parallel the planes of the cutting edges 17 so that as the cutters 13 are brought together they engage simultaneously all four corners of the tumblers, the cutters being wide enough to encompass all of the tumblers.

The movement of the tumblers toward and away from each other is preferably limited by means of stop pins 23 fixed to the cutters and moving in openings 24 in a cover plate 25 secured to the mounting member and serving to close the slots 26 in the mounting member in which the cutters move.

Expansive springs 27 are also provided to yieldably maintain the cutters in open position. These springs may be conveniently located in recesses 28 formed in the mounting member to be confined between the inner ends of the recesses and pins 29 fixed to the cutters.

The cutters 13 may be moved toward each other to sever the tumbler ends in any desired manner, as by placing the tool in a vice with the outer ends of the cutters engaging the faces of the vice and closing the vice. However it has been found preferable to provide means as part of the tool, for moving the cutters toward each other. This means consists of a yoke member 30 having its medial portion slidably received in a guideway 31 formed in the mounting member, with one of its laterally directed ends 32 engaging directly the outer end of one of the cutters 13, and the other laterally directed end 32 provided with an internally threaded bore to receive an apertured screw 33 which engages the outer end of the other cutter. Tightening of the screw 33 draws the cutters toward each other.

To preclude the possibility of sharp edges or burrs on the cut ends of the tumblers, the cutting edges 17 may be serrated to provide round bottomed channels 34, as illustrated in Figures 10 and 11, one being provided for each tumbler so that the ends of the tumblers, after being severed assume a shape such as shown in Figure 9. However it is not essential that the cutting edges be formed in this manner.

If desired, the tumblers may be provided with V shaped grooves 35, see Figure 12, at each side, and extending transversely across the four corners or projections 15 to mark the possible places at which the tumbler may be cut. These grooves would be mere scratches in depth but would relieve the cutting effort and would assure the tumblers being cut clean and free from burrs, without the necessity for special shaped cutting edges to chamfer the tumblers.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of the character described appertains, that I provide a novel lock and method of bitting its tumblers to any desired key change.

What I claim as my invention is:

1. The method of fitting a tumbler lock to a given key which comprises, forming the tumblers of the lock of greater length than the diameter of its cylinder, inserting the key into the lock, and shearing off the projecting ends of the tumblers in one uninterrupted stroke.

2. The method of fitting a tumbler lock to a desired key which comprises, forming the tumblers of the lock of greater length than the diameter of its cylinder, moving the tumblers into the positions to which they are moved by the key, and shearing off the ends of the tumblers projecting from the cylinder in one uninterrupted stroke.

3. The method of fitting a tumbler lock to a desired key which comprises, forming the tumblers of the lock of greater length than the diameter of its cylinder, inserting the desired key in the lock, holding the lock against movement, and shearing off the projecting ends of the tumblers in one uninterrupted stroke.

4. In a lock of the character described, a cylinder having a key slot, and key operable tumblers of greater length than the diameter of the cylinder mounted in the cylinder to be actuated by a key inserted into the key slot, said tumblers having their ends cut to form projections narrow at their outer ends and wide at their bases to facilitate shearing off the tumbler ends.

5. A locking tumbler for use with cylinder locks, comprising a flat member having a key receiving aperture, a spring engaging projection, and both ends bifurcated.

6. A locking tumbler for use with cylinder locks comprising a flat piece of metal having a key receiving aperture, and spaced projections narrow at their outer ends and wide at their bases, extended from each end.

7. A locking tumbler for use with cylinder locks formed of a flat piece of metal with a central key receiving aperture and having both its ends medially cut to form slots wide at their outer ends and narrow at their inner ends.

8. A locking tumbler for use in cylinder locks comprising, a flat member having a key receiving aperture, and having both its ends medially cut away to form spaced projections wider at their connection with the body of the tumbler than at their outer ends.

9. The method of adapting a tumbler lock to a predetermined key change which comprises, forming all of the tumblers of the lock alike and of greater length than the diameter of its cylinder, inserting a key of the predetermined key change into the lock to move the tumblers to their proper positions, and shearing off the projecting ends of the tumblers in one uninterrupted stroke.

10. The method of fitting a tumbler lock to a desired key change which comprises, forming the tumblers of the lock of greater length than the diameter of its cylinder, inserting the desired key in the lock to move the tumblers to their proper positions, holding the cylinder against movement, and simultaneously applying shearing stress to the opposite edges of the opposite tumblers at both their ends to shear off their projected ends.

11. The hereindescribed method of fitting a tumbler lock to a desired key change which comprises, forming the tumblers of the lock of greater length than the diameter of its cylinder, cutting away the medial portions of the tumbler ends to form projections narrow at their outer ends and wide at their connection with the bodies of the tumblers, inserting the tumblers in the cylinder of the lock, inserting the desired key in the lock to move the tumblers to their proper positions, and in applying shearing stress simultaneously to the opposite outer edges of the projections at both ends of the tumblers to simultaneously shear off the projecting ends of the tumblers.

12. The method of fitting a tumbler of a cylinder lock to a particular key change which comprises, forming the tumbler with symmetrically disposed projections forming locking corners, inserting the tumbler in its cylinder, holding the tumbler in a predetermined position with respect to the cylinder, and shearing off the projecting corners in one uninterrupted stroke.

13. The method of fitting a tumbler of a cylinder lock to a particular key change which comprises, forming the tumbler with symmetrically disposed projections providing locking corners, inserting the tumbler in its cylinder, holding the tumbler in a predetermined position with respect to the cylinder, and simultaneously severing all of the projecting corners of the tumbler.

14. A tumbler for cylinder locks of the character described, comprising a flat body portion and a projecting end of such tapered configuration that the shearing stress engendered by a tool acting upon the projecting end to cut off the same is less than the bending stress in the projecting end.

15. The method of fitting a tumbler lock to a given key which comprises forming the tumblers of the lock of greater length than the diameter of its cylinder, inserting the key into the lock and simultaneously shearing off the projecting ends of all of the tumblers.

16. The hereindescribed method of fitting a tumbler lock to a given key which comprises forming the tumblers of the lock of greater length than the diameter of its cylinder, holding the tumblers in their predetermined proper positions with respect to the cylinder, and shearing off the projecting ends of the tumblers by an uninterrupted shearing stroke transverse to the longitudinal axis of the cylinder.

17. The hereindescribed method of fitting a tumbler of a cylinder lock to a particular key change which comprises forming the tumbler of a length greater than the diameter of the cylinder, inserting the tumbler in the cylinder, holding the tumbler in a predetermined proper position with respect to the cylinder, and cutting off the projecting ends of the tumbler by cutting tools simultaneously engaging the opposite sides of the tumbler.

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