Sept. 9, 1924. 1,508,139

G. D. FULL

LOCK

Filed July 30, 1923

Fig. 1.

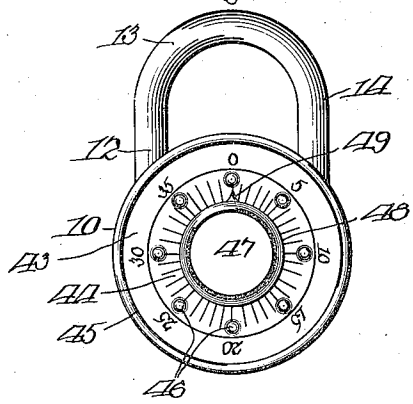


Fig. 2.

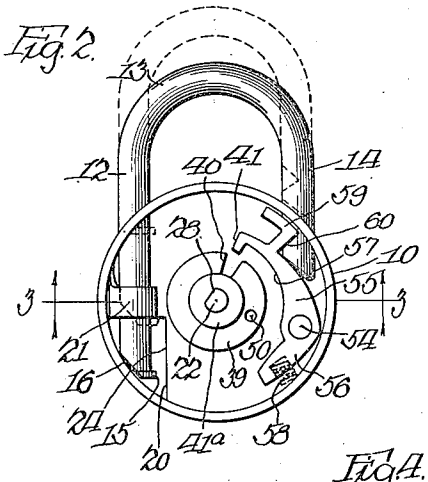


Fig. 3.

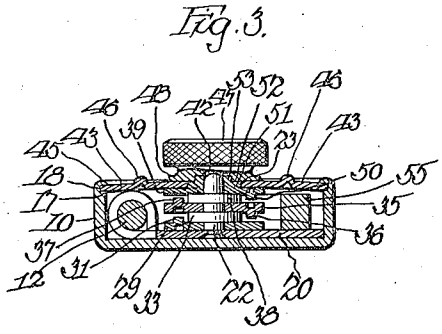


Fig. 4.

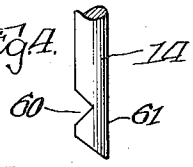
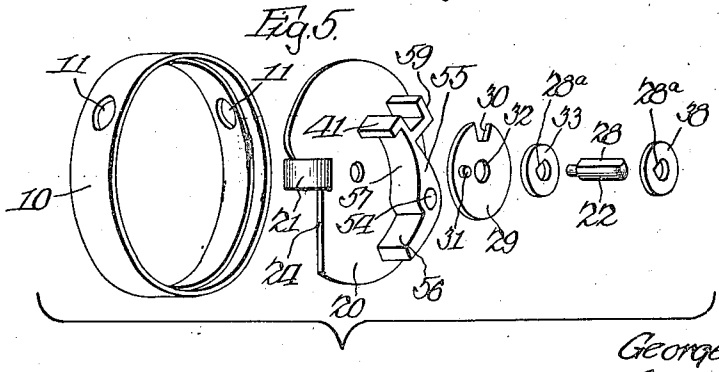


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE D. FULL, OF WAUKEGAN, ILLINOIS.

LOCK.

Application filed July 30, 1923. Serial No. 654,571.

To all whom it may concern:

Be it known that I, GEORGE D. FULL, a citizen of the United States, residing at Waukegan, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Locks, of which the following is a specification.

This invention relates to improvements in permutation or key-less locks, of the pad-lock type, and is an improvement on, or embodies improvements over the lock disclosed in Letters Patent No. 1,369,850, dated the 1st day of March, 1921, and issued to John I. Steen of Waukegan, Illinois.

The main object of the present invention is the provision of means to prevent the combination of the lock being unlawfully or unauthorizably acquired (by the sense of hearing or feeling) in turning the tumblers thereof, as can be done in the locks constructed according to the above mentioned patent, as well as, in other combination locks, as is well known.

My invention also contemplates as one of its objects and one of its advantages over said patented structure, the provision of means whereby the shackle of the lock will be held in its locked position more securely against being pried open.

In addition to the above mentioned objects and advantages, my invention includes those set forth in the aforesaid patent, and is quite similar thereto in its construction.

The invention consists in certain peculiarities of the construction, novel arrangement and combination of the various parts thereof as will be hereinafter more fully set forth and specifically claimed.

In the accompanying drawing, which serves to illustrate an embodiment of the invention,—

Fig. 1 is a face view of the lock showing its parts in locked positions.

Fig. 2 is a face view with the dial plate and operating knob removed but showing the parts in position for the release of the shackle.

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 2 looking in the direction indicated by the arrows.

Fig. 4 is a view in side elevation of a portion of one of the prongs of the shackle, and

Fig. 5 is a group view showing some of the members comprising the lock in detached perspective relation to one another.

Corresponding numerals of reference refer to similar parts throughout the different views of the drawing.

The casing of the lock is indicated in the different views of the drawing by the reference numeral 10 and as shown in Fig. 5, has in its wall a pair of slightly elongated openings 11 for the reception and operation of the prongs 12 and 14 of the shackle 13. One of the prongs, for example, the prong 12, is provided at its free end with a laterally extended lug 15 and opposite said lug with a beveled portion 16 for the purpose to be presently explained. The casing 10 is preferably annular in shape and has one of its ends closed and its other end provided on its inner surface with an annular shoulder 17 from which is upwardly or outwardly extended a reduced portion 18 of the wall of the casing, which construction is employed for an important object, as will be below explained.

Snugly fitted in the casing to fit on the bottom or closed end thereof is a disk 20 which has at its periphery a sleeve or loop 21, which is located in alignment or register with the opening 11 in the casing, in which the prong 12 of the shackle operates, in such a manner that the prong 14 can be inserted through the sleeve and from thence through the opening 11 adjacent thereto and moved outwardly from the casing until the lug or projection 15 on the inner end of the prong 12 rests against the sleeve 21 thereby preventing upward or outward movement of the shackle. When in this position, it is obvious that the prong 14 can be turned so as to register or align with the other opening 11 of the casing where it will be in place to enter the same by pressing the shackle inwardly to cause the parts to assume the positions shown in Fig. 2 of the drawing.

The disk 20 can be secured to the bottom or closed end of the casing 10 in any suitable manner and has extended centrally therefrom a spindle 22 which is by preference riveted to the disk 20 and is of sufficient length to extend through a suitable opening 23 in the dial plate. This disk

20 is provided near the lower end of the sleeve 21 thereon with a recess 24 for the reception of the projection 15 on the prong of the shackle when the same occupies the position to permit of the prong 14 being freed from its engagement with the casing, as will be understood by reference to Fig. 2 of the drawing.

By reference to Figs. 2 and 5 of the drawing, it will be seen that the spindle 22 is provided with a longitudinally flattened portion 28 for co-operation with the flattened portion 28ª in each opening of each of the spacing members or washers for the tumblers, to prevent said washers turning on the spindle. Located on the upper or inner surface of the disk 20 and surrounding the spindle 22 thereof, is the base or lower tumbler 29 which is provided in its periphery with a recess 30, and on its upper surface with a pin or projection 31 which is located between the opening 32 in said tumbler and its periphery, all of which will be clearly seen and understood by reference to Fig. 5 of the drawing.

Mounted on top of the tumbler 29 is a spacing member or washer 33 which surrounds the spindle 22 and is in the form of a ring or washer and has its inner periphery flattened as at 28ª to engage the flattened portion 20 of said spindle to prevent the washer turning thereon as before stated. Located on the upper surface of the member 33 is an intermediate tumbler 35 which is of the same construction as the tumbler 29 except that the tumbler 35 has projecting pins or projections 36 and 37 extending from its opposite faces as is clearly shown in Fig. 3 of the drawing.

Mounted on the upper or outer surface of the tumbler 35 is another spacing member or washer 38 which is of the same construction as the member 33 and above described. On the upper or outer surface of the last named spacing member or washer is mounted the uppermost or outer tumbler 39 which has in its periphery a recess 40 to receive an extension 41 on one end of the locking pawl of the device when the parts of the lock are placed in the position they will assume when the shackle is unlocked. The tumbler 39 is provided on its outer or upper surface with a cylindrical projection 41ª, see Figs. 2 and 3, which has an opening 42 to receive the outer portion of the spindle 22 on which the tumbler and its projection 41ª is closely fitted.

As is clearly shown in Fig. 3, the projection 41ª extends through the central opening 23 of the dial plate 43 which has a graduated scale 44 surrounding said opening. This dial plate is of sufficient size to fit snugly in the annular and reduced portion of the wall of the casing 10 and to rest on the shoulder 17 thereof, in which position it will be firmly held by means of an inturned bead or flange 45 produced by spinning the upper portion of the reduced part 18 of the wall of the casing over said dial plate.

It will be seen and readily understood by reference to Figs. 1 and 3 of the drawing, the dial plate 43 is provided at suitable spaced-apart positions on the graduated scale 44 with a series of outward projections 46 which are by preference formed by being embossed thereon, that is, by forcing said projections outwardly on the outer surface of said plate. Firmly fitted on the outer portion of the projection 41ª of the tumbler 39 is a cap or knob 47 which has on its inner portion an annular flange 48 provided with an indicator 49 to be used in pointing out the numbers or graduated marks of the scale 44 on the dial plate. The cap 47 may be milled on its periphery so as to be readily turned to operate the lock mechanism.

By reference to Fig. 3, it will be seen that the tumbler 39 has on its lower surface near its periphery a downwardly or inwardly extended projection 50 to engage the upwardly extended pin 37 on the intermediate tumbler. The tumbler 39 also has an annular shoulder 51 from which projects upwardly an annular portion 52 which is of slightly greater length than the thickness of the dial plate, which plate surrounds said annular portion and rests on the shoulder 51 as shown in Fig. 3 of the drawing. At the upper portion of the annular part 52 the tumbler 39 is provided with another shoulder 53 on which the base of the knob or cap 47 rests. By this arrangement it is obvious that the spun bead or flange 45 will hold the dial plate and the other parts of the lock against dislocation without great difficulty.

Pivotally mounted on a pin 54 secured to the disk 20 on the opposite side of the spindle 22 from that on which the sleeve 21 is located is a locking and releasing pawl for the shorter prong 14 of the shackle. This pawl is designated as a whole by the reference numeral 55 and as is clearly shown in Figs. 2 and 5 of the drawings, is somewhat in the shape of a bell-crank-lever; that is, it has an arm 56 extended from its pivot away from the prong 14 of the shackle and another and longer arm 57 extended from its pivot 54 between the group of tumblers and the opening 11 in the casing for the reception of the shorter arm 14 of the shackle.

The shorter arm 56 of this locking and releasing pawl has interposed between it and the wall of the casing 10 a coil spring 58 which normally holds the pawl in the position shown in Fig. 2 of the drawing. At its extremity or free end the arm 57 of the pawl is provided with an extension 41 directed towards the spindle 22 and is employed for the purpose of entering the re-

leasing notches or recesses 30 and 40 of the tumblers in the operation of unlocking the shackle. On its outer surface and near its upper end the arm 57 of the pawl is provided with an angular projection 59 for engagement with an angular recess 60 in the surface of the prong 14 adjacent the other prong of the shackle. As is clearly shown in Figs. 2 and 4 of the drawing, the end of the shackle 14 is downwardly and outwardly beveled as at 61 for the purpose of causing it to slide on the upper portion of the angular projection 59 of the pawl when the prong 14 of the shackle is being inserted into the opening of the casing therefor.

An important feature of the invention is that the pawl is of such construction and so located that it will constantly be out of contact with the tumblers, (except when it shall have been actuated by the release of the prong 14) thus preventing the combination of the lock being ascertained tactually or by hearing.

In order to release the shackle, the tumblers of the lock are turned through the instrumentality of the turning knob 47, to predetermined positions until the releasing recesses of the tumblers are brought into register with one another as shown in Fig. 2, when it is obvious that by pulling the shackle outwardly and one wall of the angular recess 60 acting against the lower portion of the angular projection 59, will force the pawl 55 towards the tumblers and the projection 41 of the pawl into the recess of the tumblers, whereby the projection 59 will be freed from the recess 60, thus enabling the shackle as a whole to be positioned about as shown by dotted lines in Fig. 2 of the drawing. As soon as the projection 59 is released from the prong 14, the spring 58 will cause the pawl 55 to assume its normal position or that shown in Fig. 2, when it will be understood the upper angular portion of the projection 59 will be located so as to be in the path of the beveled end 61 of said prong.

To lock the shackle, it is only necessary to press the same inwardly of the casing, when the beveled portion 61 will slidably engage the upper portion of the projection 59 and cause the longer arm 57 of the pawl to be forced towards the tumblers until the apex of the projection 59 shall have passed from the beveled portion 61 when it is manifest the spring 58 will cause outward movement of the arm 57 and the engagement of the projection 59 with the recess of the shorter prong of the shackle.

The operation of setting the combinations of the lock is so well understood by those skilled in the art that it is deemed unnecessary herein to explain the same, and, besides, this subject is fully set forth in the above mentioned patent.

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

1. In a lock of the class described, the combination with a casing having a pair of openings, of a shackle having one of its prongs longer than the other, the shorter prong provided with an angular recess near its end and having its end beveled, said longer prong being rotatably and slidably mounted in one of said openings and having means to restrict its movement outwardly, said shorter prong adapted for insertion into and withdrawal from the other of said openings, a plurality of superimposed and spaced disk-tumblers centrally mounted in the casing for rotation and each having a recess in its periphery and co-operating means for imparting rotary movement one to another, a locking and releasing pawl pivotally mounted in the casing near the end of the shorter prong of the shackle, said pawl having an arm extended between the tumblers and the opening in the casing for said shorter prong and having at its end an inwardly extended projection to fit in said recesses of the tumblers when in register and on its outer surface an angular projection for engagement with the beveled end and angular recess of said shorter prong, means connecting the pawl and casing for normally holding the pawl out of contact with the tumblers and in locking engagement with the shorter prong of the shackle, a dial plate surrounding a portion of the outer tumbler and closing the end of the casing adjacent to said tumbler, and an indicator for registering with the graduations on the dial plate.

2. In a lock of the class described, the combination with a casing having a pair of openings, of a shackle having one of its prongs longer than the other, the shorter prong provided with an angular recess near its end and having its end beveled, said longer prong being rotatably and slidably mounted in one of said openings and having means to restrict its movement outwardly, said shorter prong adapted for insertion into and withdrawal from the other of said openings, a plurality of superimposed and spaced disk-tumblers centrally mounted in the casing for rotation and each having a recess in its periphery and co-operating means for imparting rotary movement one to another, a locking and releasing pawl pivotally mounted in the casing near the end of the shorter prong of the shackle, said pawl having an arm extended from its pivot between the tumblers and the opening in the casing for said shorter prong and having at the end of said arm an inwardly extended projection to fit in said recesses of the tumblers when in register and on its outer surface an angular projection for engagement

with the beveled end and angular recess of said shorter prong, the pawl also having another arm extended from its pivot away from the shorter prong, a spring interposed between the last named arm and the casing for normally holding the pawl out of contact with the tumblers in locking engagement with the shorter prong of the shackle, a dial plate surrounding a portion of the outer tumbler and closing the end of the casing adjacent to said tumbler, and an indicator for registering with the graduations on the dial plate.

GEORGE D. FULL.