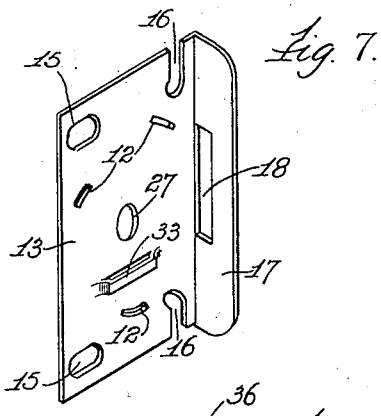
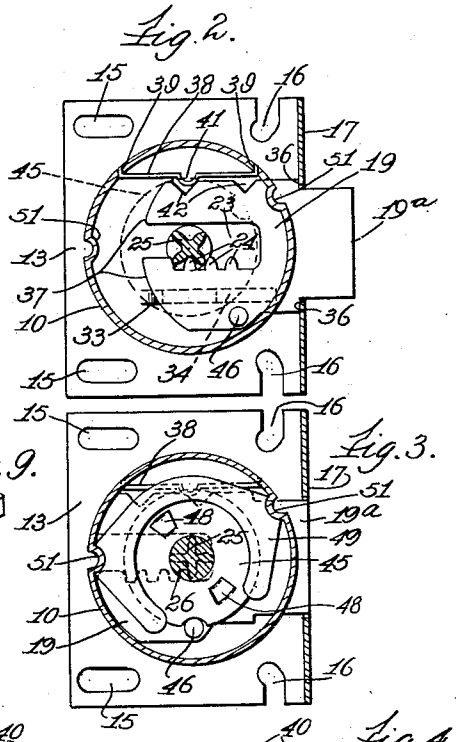
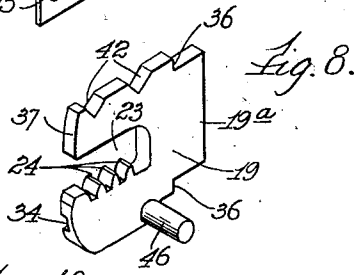
March 1, 1932. G. D. FULL ET AL 1,847,392

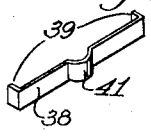
COMBINATION CABINET LOCK

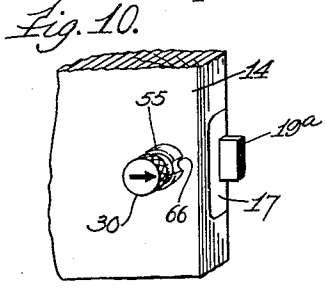
Filed Feb. 28, 1929

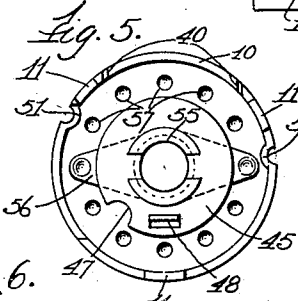


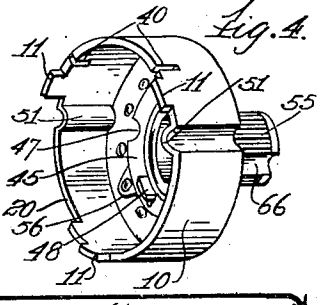


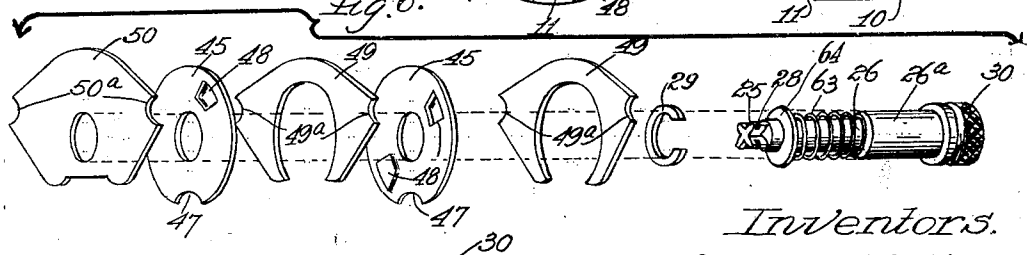


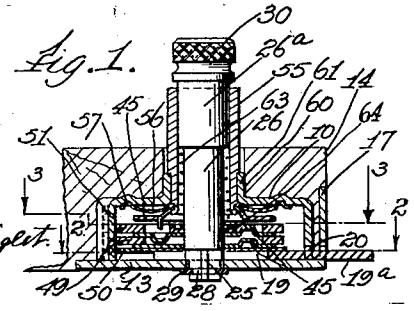












Witness
H. C. McKnight.

Inventors.
George D. Full.
John J. Neitz.
Joseph M. Muntner.
Raymond J. Buettner.
Joseph Birbaum.
by Burton & Burton
his Attorneys.

Patented Mar. 1, 1932 1,847,392

UNITED STATES PATENT OFFICE

GEORGE D. FULL, OF WINNETKA, JOHN J. NEITZ, OF NAPERVILLE, AND JOSEPH M. MUNTNER, OF CHICAGO, ILLINOIS, AND RAYMOND J. BUETTNER AND JOSEPH BIRBAUM, OF WEST ALLIS, WISCONSIN, ASSIGNORS TO DUDLEY LOCK CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

COMBINATION CABINET LOCK

Application filed February 28, 1929. Serial No. 343,340.

This invention relates to permutation or keyless type locks, and more particularly to locks of that general character especially suited for use in connection with various forms of closures, such as cabinets, desk drawers, etc. The main object of the invention is to produce a lock of generally improved and simplified construction, that will be economical to manufacture, durable in use, and capable of free and easy manipulation. It consists in certain features and elements of construction in combination as herein shown and described, and as indicated by the claims.

In the drawings:

Figure 1 is an axial section through a lock embodying the present invention, shown secured to a cabinet door, with the lock bolt in locking position.

Figure 2 is a transverse section taken at line 2—2 on Fig. 1, showing the lock bolt in locking position, with a tumbler indicated in dotted outline.

Figure 3 is a section taken as indicated at line 3—3 on Fig. 1, showing the lock bolt in unlocked position.

Figure 4 is a perspective detail view of a part of the casing.

Figure 5 is a plan view looking into the casing part.

Figure 6 is an axial disassembly of the tumblers, spacers and spindle.

Figure 7 is a perspective detail of the casing back plate.

Figure 8 is a perspective view of the lock bolt.

Figure 9 is a perspective detail of the lock bolt spring

Figure 10 is a perspective view showing the lock applied to a cabinet door.

The lock embodying the present invention is conveniently designed and constructed for original installation, or for replacement of many of the conventional key type cabinet and drawer locks. As illustrated in the drawings, the lock includes a casing comprising a substantially cylindrical, cup shaped part, 10, having at its open end a plurality of tangs, 11, adapted to be firmly secured in apertures, 12, of the casing back plate, 13, which is fastened in any suitable manner to the inside of a mounting member, herein shown as a cabinet door indicated at 14; the operating knobs of the lock being projected through and beyond the face side of the door. As may be noted, the back plate is provided with elongated apertures, 15, and open slots, 16, so located as to insure accommodation to former or original fastening elements of a lock being replaced. The outer edge of the back plate is formed with an upstanding flange, 17, adapted to be "inset" in the mounting member, as shown in Fig. 10. The flange serves to reinforce the mounting and is formed with a slot, 18, for guiding the latch end, 19a, of a lock bolt, 19, as it is removed into and out of locking position; the edge of the cup shaped casing part, 10, adjacent the back plate, 13, being recessed at 20 to provide clearance for the locking bolt.

The lock bolt is formed of relatively thin flat stock, mounted for reciprocable movement in sliding contact with the inner surface of the casing back plate 13, and is provided with an elongated slot, 23, opening at the end opposite the latch end 19a. One of the longer edges of the slot (herein shown as the bottom edge) is formed with a plurality of teeth, 24, spaced to form a rack, with which is cooperatively meshed a toothed pinion, 25, formed integrally in a spindle or shaft, 26, which extends concentrically into the casing with the end portion beyond the pinion 25, extending through and journaled in aperture 27 in the casing back plate; the portion of the spindle projecting outwardly beyond the back plate being provided with a peripheral groove, 28, in which is crimped or secured in a suitable manner, a split washer or flange member, 29, adapted to abut against the outer surface of the back plate, for stopping the spindle against movement in one direction. The other end of the spindle extends beyond the top of casing part, 10, and is provided with an operating knob, 30, for convenient manipulation. Thus by rotating the spindle in the respective directions, the rack and pinion drive causes shifting of the lock bolt 19 into and out of locking position.

Formed on the inner side of the back plate is an upstanding rib or tongue, 33, of sub-

stantial length, extending parallel to the direction of movement of said lock bolt, and slidably engageable in a cooperating groove, 34, formed in the adjacent side of the lock bolt, for insuring true guidance of the same throughout its entire range of reciprocation.

As may be seen in Fig. 2, the lock bolt is formed with offset portions forming shoulders, 36, adjacent the latch end 19ª, adapted to abut against the inner side of the back plate flange, 17, for limiting its outward movement to locking position, and the inner end of the bolt is rounded at 37 to conform to the inner contour of the wall of casing part 10 against which it abuts to limit its inward movement in unlocking position. A substantially flat spring member, 38, is provided for yieldingly maintaining the lock bolt at either of its limits of movement. This spring member is held in place by its bent end portions 39 which are inserted in properly spaced slots, 40, opening at the open edge of the cupshaped casing part, 10, so as to be disposed adjacent a longitudinal edge of the lock bolt. Said spring which is preferably slightly less in width than the thickness of the bolt, is formed with an offset node or projection, 41, which acts as a keeper and is adapted to register and engage in either of a pair of longitudinally spaced notches, 42, in the adjacent edge of the lock bolt; the spacing of the notches corresponds to the respective locking and unlocking positions of the lock bolt. This feature of construction as will be more fully apparent hereinafter, is of especial advantage in that once the combination has been set and the bolt retracted to unlocking position, it cannot be unintentionally thrown, causing upsetting of the tumbler combination.

Movement of the lock bolt by the spindle 26 is controlled by a series of axially spaced, disk type tumblers 45 loosely mounted on the spindle and arranged for engagement with an upwardly extending pin 46, projecting perpendicularly from the flat surface of the lock bolt. As indicated in Fig. 2, the bolt is held in locking position by the tumblers abutting against the pin 46 in tangential relation. Said tumblers are each provided with a peripheral notch, 47, adapted to register with the pin when the tumblers are set in a predetermined arrangement or combination, providing clearance for the pin, permitting the lock bolt to be retracted to unlocking position. It will be apparent that in moving the lock bolt into or out of locking position, the tumblers (which are set in combination) are caused to rotate in engagement with the pin. The tumblers which are herein shown as metal stampings are formed with interengaging driving lugs 48 by which the tumblers are adjusted, one by the other, as usual, for setting up a predetermined arrangement or combination for releasing the lock bolt. Interposed between the tumblers are horse shoe shaped spacer washers 49, and a bearing washer 50 is interposed between the lower tumbler and the lock bolt 19. These washers are each formed with a pair of notches 49ª and 50ª respectively, adapted to cooperatively engage with the pair of longitudinally extending ribs 51 formed on the inside of the cup casing part 10, and adapted to permit axial movement of said washers, but positively restraining against rotative movement. Preferably, these ribs and notches in the washers are located so as to be equidistant from the medial position of movement of the pin of the lock bolt so that the washers may be symmetrical in outline and hence reversible.

The upper or master tumbler as shown in Figs. 4 and 5 is rigidly secured to the inner end of a tumbler actuating knob 55, and is rotatable therewith for adjusting the other tumblers. Associated with the knob and master tumbler is a spring clip 56 formed to cooperate with a series of depressions 57 in the inside of the casing top 10 for producing audible sounds and tending to yieldingly arrest rotation of the knob 55 each time said knob is turned a fractional unit of rotation, corresponding to the distance between depressions, and causing registration of the clip 56 with one of the depressions; thus in setting one of the tumblers in combination, one may be guided by the clicking sounds or the sense of feel in rotating the knob.

The top of the cup shaped casing part 10 is formed with a drawn out sleeve 60 serving as a bearing in which is journaled the tumbler knob 55; said knob being formed as a hollow tubular member disposed concentrically about the spindle and extending beyond the bearing sleeve 60, and adapted to be projected through the mounting member 14 for convenient manipulation. This knob is reduced at 61 to form a shoulder for abutment against the end of sleeve 60 for limiting axial movement of the knob and swivelly securing it to the casing part 10. The outer end of the hollow knob 55 serves as a journal for the enlarged portion 26ª of the spindle, and terminates short of the lock bolt actuating knob, 30. A coil spring 63 circumscribes the spindle abutting against the enlargement 26ª at one end, and against the washer seat 64 to exert pressure against the tumblers for yieldingly maintaining them in driving relation and in frictional contact with the spacers and the bolt 19.

The outer end of the lock bolt operating knob 30 is provided with an arrow or equivalent directional indicating characteristic designed to visibly indicate the position of the lock bolt, and as shown in Fig. 10, the arrow points in the direction to indicate when the lock bolt is in locking position; if the knob is turned so that the arrow points in any other

direction than toward the edge of the cabinet door, it indicates that the lock bolt is out of locking position. This feature is especially helpful where a large number of cases or cabinets are fitted with locks of this type, so as to readily indicate at a glance whether or not the doors or drawers are all locked.

This arrow on the lock bolt operating knob 30 also provides a neutral or initial starting point, and for this purpose the tumbler knob 55 is formed with a longitudinal groove 66 which should be registered with the arrow upon commencing the adjustment of the tumblers for setting them in the predetermined arrangement or combination.

The operation of the lock is substantially as follows: The tumbler adjusting knob, 55, is rotated several revolutions in one direction (dependent upon the manner of original assembly for determining the lock's combination) and the groove, 66, is then aligned substantially with the arrow on the end of the bolt-operating knob, 30, as the neutral or initial starting point. The knob, 55, is then rotated in one direction a predetermined amount which may be understood to be indicated by the number of clicking sounds produced by the flat spring, 56, engaging in the depressions, 57, on the inner surface of the casing which will then properly position the bottom-most tumbler of the series, and then by reverse rotation a predetermined amount the second or intermediate tumbler is adjusted, and again by rotating said knob in the opposite direction the top or uppermost tumbler is positioned so that all of the tumblers are aligned with their peripheral notches, 47, adapted to receive the upstanding pin, 46, of the lock bolt. Then by rotating the lock bolt operating knob, 30, its pinion, 25, meshing with the rack formation, 24, of the bolt will thus retract the bolt in the casing, overcoming the reaction of the spring keeper, 41, which may then engage in the forward-most notch, 42, for holding said bolt in retracted or unlocking position. The lock is projected to operative or locking position by first rotating the knob, 30, in opposite direction so as to project the latching end, 19a, of the lock bolt into locking position and then the tumbler adjusting knob, 55, is rotated (preferably at least a single revolution) so as to shift the tumblers for disposing their peripheral notches, 47, out of alignment and thus insuring that at least one of the tumblers will have its solid peripheral edge disposed for encounter with the projection, 46, of the lock bolt and preclude retraction of the lock bolt in the casing until said tumblers have again been adjusted in their predetermined arrangement.

We claim:—

1. In a permutation lock, a casing, a lock-bolt, movably supported in a casing provided with an elongated slot having one edge formed as a toothed rack, a spindle extending into the casing and projecting into the slot of said lock-bolt, said spindle having a fixed pinion meshed with the rack adapted for shifting said lock-bolt into and out of locking position by the rotative movement of said spindle, and tumbler mechanism in the casing disposed concentrically about the spindle and arranged for directly controlling the movement of said lock-bolt independently of the spindle.

2. In a permutation lock, a casing, a lock bolt slidably supported against the back wall of the casing and provided with an elongated opening having one edge formed as a toothed rack, a lock-bolt actuating spindle extending into said casing and having a pinion integrally formed therein adjacent the inner end, meshed with the rack for shifting said bolt into and out of locking position, the teeth of said pinion lying within the diametral outline of said spindle, and tumbler mechanism in the casing disposed concentrically with respect to the spindle and operable independently thereof for controlling the movement of the lock-bolt.

3. In the combination defined in claim 2, the pinion end of said spindle extending through the back-wall of the casing and being provided with a peripheral groove, a flange member disposed in the groove and adapted to abut against the exterior of the casing for limiting axial movement of said spindle in one direction.

4. In a permutation lock, a casing, a lock-bolt of substantially flat, uniform thickness, slidably mounted in the casing, provided with a laterally extending pin, said bolt having a toothed rack extending longitudinally of its direction of movement, a spindle having one end provided with a knob and the other end extending into the casing provided with a pinion meshed with said rack for shifting the lock-bolt into and out of locking position, a series of spaced tumblers for controlling the movement of said bolt arranged concentrically about said spindle and having interengaging features for adjusting one with respect to the other, said tumblers normally abutting said pin in tangential relation for holding the lock-bolt in locking position, each of said tumblers having a peripheral recess adapted when positioned in registration with the pin to permit movement of the bolt to unlocking position, and means for adjusting said tumblers in such position.

5. In the combination defined in claim 4, the front wall of the casing being formed with an annular outwardly extending sleeve, said tumbler adjusting means including an annular knob disposed concentrically about the spindle, and having a reduced part journaled in said sleeve, forming a shoulder abutting against the end of the sleeve for limiting

the axial movement of said knob in one direction.

6. In the combination defined in claim 4, means for yieldingly holding the lock-bolt stationary when it is moved to unlocking position, the recesses of said tumblers being positively engaged by the pin of the bolt when the bolt stands in unlocking position.

7. In a permutation lock, a casing, a lock-bolt slidably mounted in the casing and having a laterally projecting pin, said bolt having a toothed rack, a spindle having an operating knob at one end, the other end extending into the casing and having a pinion meshed with the rack for shifting the lock-bolt into and out of locking position, a series of spaced tumblers for controlling the movement of said bolt, arranged concentrically about the spindle and having inter-engaging features for adjusting one with respect to the other, means for actuating the tumblers, said tumblers being of substantially circular outline and being normally positioned to abut said pin in tangential relation for maintaining the bolt in locking position, each of said tumblers having a peripheral notch adapted to be registered with the pin when the tumblers are set in combination to permit shifting of the bolt by rotation of the spindle to unlocked position, such movement of the bolt causing corresponding rotational movement of said tumblers as a unit, by engagement of their notches by said pin, and means adapted to yieldingly maintain said lock-bolt and tumblers in such position.

8. In a permutation lock, a casing, a lock-bolt slidably mounted in the casing and having a laterally projecting pin, a spindle having an operating knob at one end, the other end extending into the casing, means connecting said other end of the spindle with the lock-bolt shifting said lock-bolt into and out of locking position, a series of spaced tumblers for controlling the movement of said bolt, arranged concentrically about the spindle and having interengaging features for adjusting one with respect to the other, means for actuating the tumblers, said tumblers being of substantially circular outline and being normally position to abut said pin in tangential relation for maintaining the bolt in locking position, each of said tumblers having a peripheral notch adapted to be registered with the pin when the tumblers are set in combination to permit shifting of the bolt by rotation of the spindle to unlocked position, such movement of the bolt causing corresponding rotational movement of said tumblers as a unit, by engagement of their notches by said pin, spacer members interposed between said tumblers each having a central opening to permit engagement of the tumblers, said spacers each having an opening located to permit unhampered movement of the pin.

9. In a permutation lock, a casing, a lock bolt slidably mounted in the casing, said bolt having a toothed rack extending longitudinally of its direction of movement, a spindle having one end extending exteriorly of the casing forming a knob and the other end projecting into the casing and provided with a pinion meshed with said rack for shifting the lock bolt into and out of locking position in response to rotation of the spindle, a series of spaced tumblers for controlling the movement of the lock bolt disposed concentrically about the spindle and having inter-engaging features for adjusting one with respect to the other, an annular knob disposed concentrically about said spindle knob and rotatable independently thereof for adjusting said tumblers in a predetermined arrangement, said tumblers normally abutting in tangential relation a projection on the lock bolt for maintaining it in locking position, and each of said tumblers having a peripheral recess adapted when positioned in registration with said projection to permit movement of the lock bolt to unlocking position, and a spring member encompassing a reduced portion of the spindle and reacting against a shoulder thereof and said tumblers for maintaining them in operative driving relation with each other.

10. In a permutation lock, a casing, a lock bolt slidably supported in the casing, a spindle having an operating knob at one end, the other end extending into the casing and operably connected to said bolt for shifting it into and out of locking position, tumbler mechanism in the casing controlling the movement of the lock bolt, and a tumbler actuating knob disposed concentrically with respect to the spindle operating knob, said spindle knob carrying an indicating feature which indicates by its position when the bolt is in locking position and the tumbler knob carrying an indicating feature which is movable relatively to that of the spindle knob when the tumbler knob is rotated, said feature of the spindle knob serving without other index means to provide a starting point for the tumbler knob in setting up the combination.

GEORGE D. FULL.
JOHN J. NEITZ.
JOSEPH M. MUNTNER.
RAYMOND J. BUETTNER.
JOSEPH BIRBAUM.