Feb. 21, 1933. J. E. FREY 1,898,947

COMBINATION LOCK

Filed June 28, 1932

Fig-1-

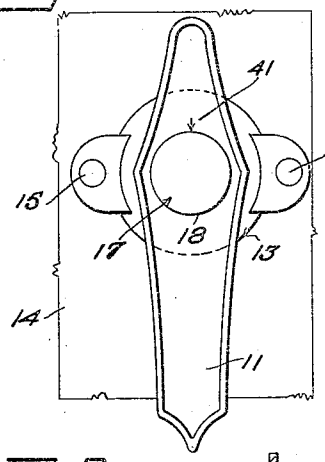


Fig-2-

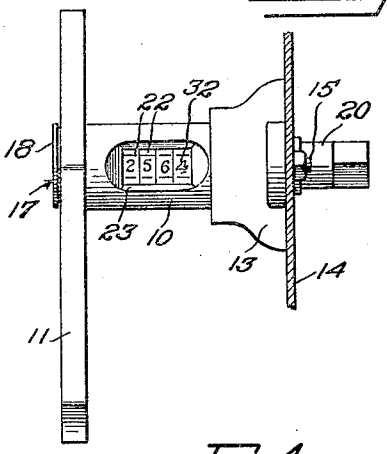


Fig-3-

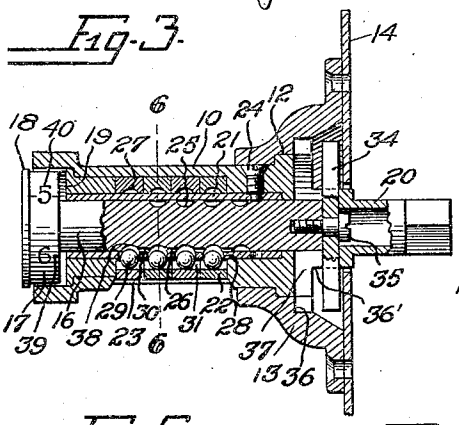


Fig-4-

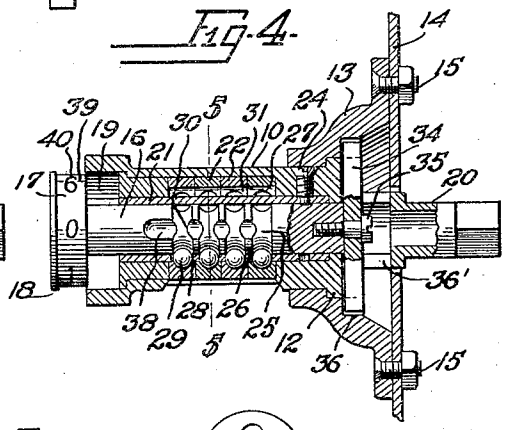


Fig-5-

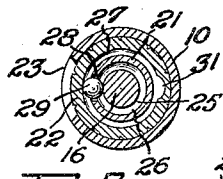


Fig-6-

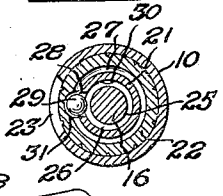


Fig-7-

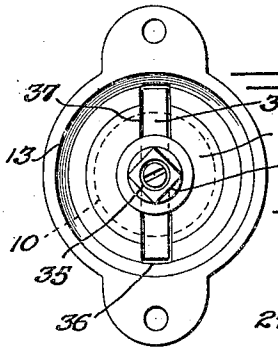


Fig-8-

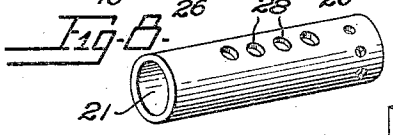


Fig-9-

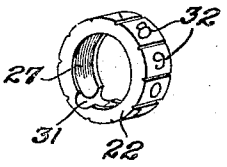
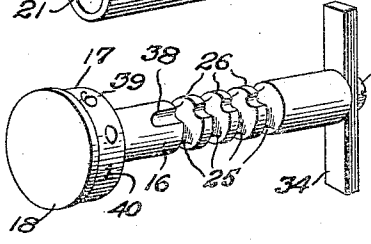


Fig-10-



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Patented Feb. 21, 1933 1,898,947

UNITED STATES PATENT OFFICE

JOHN E. FREY, OF PITTSBURGH, PENNSYLVANIA

COMBINATION LOCK

Application filed June 28, 1932. Serial No. 619,309.

The invention relates to a combination lock mechanism and more particularlyto a keyless and springless dial bearing lock.

The primary object of the invention is the provision of a lock of this character wherein the combination is effected through the use of numeral rings and ball bearings, thereby eliminating the employment of springs and the use of a key and such lock in its operation is noiseless and clickless and is absolutely foolproof, as well as burglarproof.

Another object of the invention is the provision of a lock of this character wherein the construction thereof is novel in form so that in its assembly and in the operation there will be no evidence or indication to give a person a hint as to the combination numbers and thus eliminating easy opening of the lock or the picking thereof by one lacking knowledge of the combination for its authorized opening, thus the said lock under its organization is of a design to meet all conditions for locking purposes.

A further object of the invention is the provision of a lock of this character wherein the picking of the lock for the opening thereof cannot be accomplished due to the assembly, design and organization of the parts and unscrupulous manipulation will be impossible for a person to ascertain the combination, the lock being especially adaptable for automobiles although it may be used with other structures, as for example, safes, vaults or the like.

A still further object of the invention is the provision of a lock of this character which is extremely simple in construction, thoroughly reliable and efficient in its purpose, requiring but few parts, assembled in a compact manner, strong, durable, and inexpensive to manufacture and install.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully described in detail, illustrated in the accompanying drawing, which discloses the preferred embodiment of the invention, and pointed out in the claims hereunto appended.

In the accompanying drawing:—

Figure 1 is a fragmentary elevation of a door and its handle as installed in automobiles showing the combination lock constructed in accordance with the invention applied.

Figure 2 is a side elevation, a portion of the door being shown and the lock in position for the locking of the door.

Figure 3 is a vertical sectional view through the lock, the same being in the position shown in Figure 2.

Figure 4 is a view similar to Figure 3 with the lock in a shifted position.

Figure 5 is a sectional view on the line 5—5 of Figure 4.

Figure 6 is a sectional view on the line 6—6 of Figure 3.

Figure 7 is a view looking toward the inner end of the lock.

Figure 8 is a detail perspective view of the cylinder of the lock.

Figure 9 is a perspective view of one of the numeral rings.

Figure 10 is a perspective view of the actuating stem of the lock.

Similar reference characters indicate corresponding parts throughout the several views in the drawing.

Referring to the drawing in detail, the combination lock comprises a casing or barrel 10 which is of cylindrical or tubular form and is integral with and constitutes the shank of a door handle 11 which may be of any conformation or design and in this instance being of the turn lever type of standard character employed with an automobile. The casing or barrel 10 is formed with a circular or annular shoulder 12 at its inner end for interfitting engagement of the said barrel or casing with an escutcheon plate or bearing 13, the latter being of truncated substantially conical shape and is secured at the proper locality upon the door 14 through the medium of fasteners 15.

Rotatably and slidably fitted within the casing or barrel 10 is a lock operating member or stem 16 formed at its outer end with a circular head 17 provided with a peripheral bead 18 and this head constitutes a turning knob. The head 17 is adapted to be accommodated in a correspondingly shaped seat

19 formed in the outer end of the casing or barrel 10 when the stem 16 is pushed fully inwardly of the casing or barrel.

The casing or barrel 10 at its inner end portion is reduced at 20 and extends through a suitable opening in the door 14 for coupling engagement with the door latching or locking mechanism (not shown) so that when the handle 11 is released by the lock it can be turned for the working of the door locking mechanism to free the door for the opening thereof.

The stem 16 of the lock is the control element for the locking or unlocking operation and this stem is operative and regulated by a combination mechanism hereinafter fully described.

Surrounding the stem 16 is a cylinder 21, the same being located within the casing or barrel 10 and snugly fits about said stem, while concentrically disposed about the cylinder 21 is a series of numeral rings 22, these being exposed at their outer peripheries to a determined extent by a slot 23 in the casing or barrel 10 at one side thereof. The cylinder 21 is held stationary but is susceptible of adjustment in the casing or barrel 10 through the medium of a fastener 24, the latter being concealed from view by the escutcheon plate or bearing 13 as is clearly shown in Figures 3 and 4 of the drawing. By adjusting the cylinder 21 a change of combination of the lock can be effected in a manner presently described.

Formed in the stem 16 is a series of annular grooves or channels 25, these being disposed side by side and spaced uniformly a slight distance from each other to provide an intermediate rib 26 therebetween. Formed in the numeral rings 22 are internal channels or grooves 27 adapted to match the channels or grooves 25, while formed in the cylinder 21 is a like number of openings or holes 28 with respect to the grooves or channels 25 and 26 respectively, these holes or openings being in matched or registering relation to the said grooves or channels and are of a size to permit the passage therethrough of a series of balls 29 simulating ball bearings and these functioning as tumblers in the lock. The balls 29 are adapted to travel in the grooves or channels 25 and 27 with the cylinder functioning for holding the balls in longitudinal alignment and in fixed relationship in a row within the lock.

The stem 16 has the ribs 26 between the grooves or channels 25 therein notched to provide a longitudinally disposed way for constituting by-passes 30 for the balls 29 so that the stem 16 can be shifted in a longitudinal direction when the balls 29 confront the by-passes 30.

Each numeral ring 22 is formed with a transverse way 31 communicative with the channel or groove 27 therein which permits the interchanging of the numeral rings for alteration of the combination of the lock.

Each numeral ring 22 has on its outer face a series of numerals 32 ranging from 1 to 0 and one of these numerals is located with respect to the way or by-passes 30 and the openings or holes 28 in the cylinder 21 so that the stem may be set whereby it may be pushed or pulled upon for the operation of the lock to either release the same or make it secure. In the setting of the stem 16 the way or by-passes 30 which are in longitudinal alignment must be brought into confronting relation to the balls 29 as held in the openings or holes 28 in the cylinder 21 and in this the said stem 16 can be shifted to the position shown in Figure 3 or the position shown in Figure 4 of the drawing. It is necessary that the numeral rings 22 be turned and under a combination of the numerals 32 of the series the said stem 16 can be set with respect to the balls 29 in the cylinder 21 to allow said stem 16 to be pushed inwardly or pulled outwardly and when pushed inwardly it will free the shank of the handle 11 so that the latter can be turned for actuating the locking mechanism in the door 14 for the opening or releasing thereof. When the stem 16 is pulled outwardly the handle 11 will be locked against movement and thus the locking mechanism in the door cannot be manipulated.

The stem 16 at its inner end has carried thereby a cross bar 34 which is connected with said stem by a fastener 35 so that the stem can be freely rotated without rotation of the bar 34. This bar 34 is traversible in a slot or cutout portion 36′ formed in the reduced inner end 20 of the casing or barrel 10, while provided in the escutcheon plate or bearing 13 interiorly thereof is a seat 36 for said bar 34, the barrel or casing 10 being cut away at 37 as a clearance for the bar to engage the seat 36 when the stem 16 is pulled outwardly of said barrel or casing. When this bar 34 is engaged in the seat 36 the handle 11 is held against turning movement and thus the lock mechanism in the door can be manipulated.

The member or stem 16 outwardly with respect to the channels or grooves 25 therein is formed with a notch 38 communicative with the outermost channel or groove 25 so that when the stem 16 is pushed inwardly of the barrel or casing 10 the said stem will be held stationary in said barrel or casing and thus will turn with the handle 11 when operated manually.

The knob 17 constituted by the head on the stem 16 has upon its outer periphery dial graduations 39 and numerals 40 respectively, these coacting with a pointer 41 upon the handle 11 so as to enable the setting of the stem congruous with the combination of the lock for the operation thereof.

Now it will be apparent that by releasing the bearing or escutcheon plate 13 access may be had to the fastener 24 to free the cylinder 21 and by turning this cylinder in the barrel or casing 10 the combination of the lock can be altered and this is also true by interchanging the numeral rings 25 with respect to each other. The numerals 32 on the numeral rings 22 are clearly visible through the slot 23 in the barrel or casing and such numeral rings 22 can be manually manipulated for the setting of the same in the working of the combination of the lock for the operation thereof.

It should be apparent that the lock is operated without the use of a key and also is springless.

When the stem 16 is moved outwardly and the bar 34 engaged in the seat 36 the handle 11 is locked against turning movement and likewise the lock mechanism in the door 14 cannot be manipulated. On moving the stem 16 inwardly and taking the bar 34 away from its seat 36 the handle 11 may be turned and in so doing the lock mechanism in the door 14 will be operated for the release of the door to permit opening thereof.

What is claimed is:—

1. In a lock of the character described, a barrel, a plurality of numeral rings arranged therein and having internal channels, a rotatable and slidable member fitted within the barrel and having a plurality of channels for registration with the channels in the rings, a cylinder surrounding the said member and having holes therein for registration with the channels in the rings and member, a plurality of balls movably fitted in the holes in the cylinder and adapted to travel in the channels in said rings and member, said member having a way establishing communication between the channels therein, a handle formed on the barrel, and a bearing rotatably supporting the barrel.

2. In a lock of the character described, a barrel, a plurality of numeral rings arranged therein and having internal channels, a rotatable and slidable member fitted within the barrel and having a plurality of channels for registration with the channels in the rings, a cylinder surrounding the said member and having holes therein for registration with the channels in the rings and member, a plurality of balls movably fitted in the holes in the cylinder and adapted to travel in the channels in said rings and member, said member having a way establishing communication between the channels therein, a handle formed on the barrel, a bearing rotatably supporting the barrel, and means for fixing the cylinder in the barrel.

3. In a lock of the character described, a barrel, a plurality of numeral rings arranged therein and having internal channels, a rotatable and slidable member fitted within the barrel and having a plurality of channels for registration with the channels in the rings, a cylinder surrounding the said member and having holes therein for registration with the channels in the rings and member, a plurality of balls movably fitted in the holes in the cylinder and adapted to travel in the channels in said rings and member, said member having a way establishing communication between the channels therein, a handle formed on the barrel, a bearing rotatably supporting the barrel, means for fixing the cylinder in the barrel, and a stop collar on said member.

4. In a lock of the character described, a barrel, a plurality of numeral rings arranged therein and having internal channels, a rotatable and slidable member fitted within the barrel and having a plurality of channels for registration with the channels in the rings, a cylinder surrounding the said member and having holes therein for registration with the channels in the rings and member, a plurality of balls movably fitted in the holes in the cylinder and adapted to travel in the channels in said rings and member, said member having a way establishing communication between the channels therein, a handle formed on the barrel, a bearing rotatably supporting the barrel, means for fixing the cylinder in the barrel, a stop collar on said member, the said barrel having a seat for the head, and means for interlocking the head with the seat.

In testimony whereof I affix my signature.

JOHN E. FREY.