Jan. 7, 1936. B. F. CISOR 2,026,932

COMBINATION LOCK

Filed Feb. 6, 1935

Fig. 1.

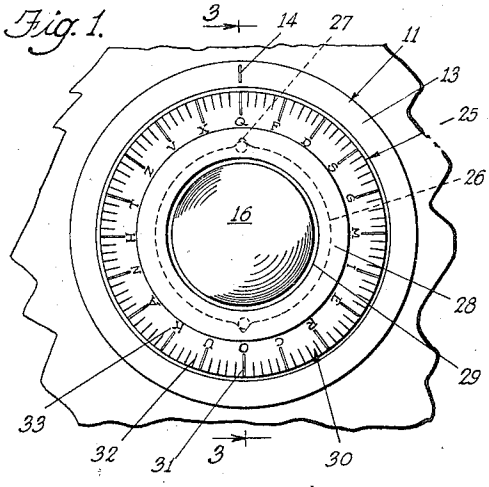



Fig. 2.

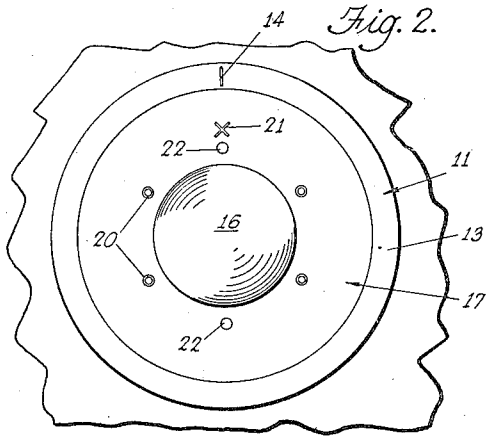



Fig. 3.

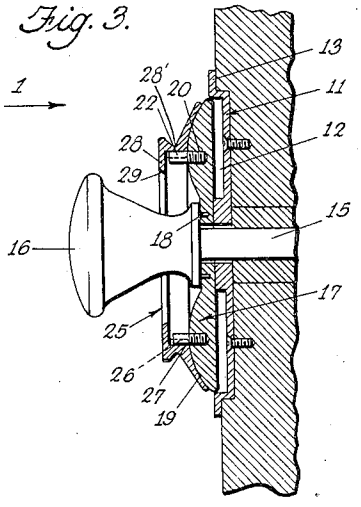
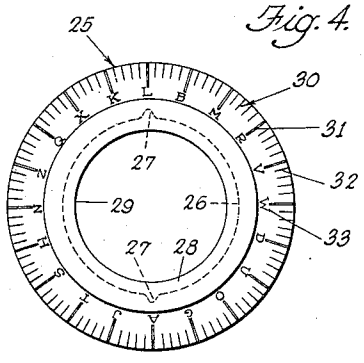



Fig. 4.




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# UNITED STATES PATENT OFFICE

2,026,932

## COMBINATION LOCK

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Application February 6, 1935, Serial No. 5,240

2 Claims. (Cl. 70—56)

My invention relates to the dial construction for a combination lock of the type employing a visible dial to be used in indicating the various positions to which a stem is to be rotated to unlock the combination lock.

A particular feature of my invention relates to a readily removable dial which, when it is desired to lock the combination lock may be removed and thus the lock has no dial and it would be difficult to turn the rod or stem the correct number of spaces in either direction of rotation to arrange the tumblers of the lock for opening or unlocking such lock.

My invention further relates to detachable centering devices for the dial so that the dial may be changed to a plurality of different positions and thus readily change the combination of the lock without necessitating the changing of the tumblers or other parts of the lock but merely changing the combination by a shift of the dial.

My invention further comprehends the use of a disk which may be connected to a knob on a rotatable stem and this disk having means for holding and centering the dial so that the dial may readily be removed from or attached to the disk. Thus, when the dial is removed, the disk by itself has no indicia to show the amount of rotation that should be given to the disk to obtain the correct combination for opening the lock.

A further feature of my invention is the employment of a plurality of securing devices on the disk which attach the dial, which is in the form of a ring, to the disk by which the dial may be adjusted to enter one of a plurality of different relations as regards the disk.

In this connection, a feature of the holding devices for the dial consist of providing more than two threaded perforations preferably an even number in which two removable pins may be inserted in two of these perforations and these pins engage in slight grooves or notches in the removable dial and thus not only function to attach the dial to the disk but to have these two elements in any one of a plurality of adjusted relationships.

Another object and feature of my invention is constructing dials for combination locks in which there is a circle of various marks or indicia, each being distinctively different from all of the others on the dial.

My invention is illustrated in connection with the accompanying drawing, in which:

Fig. 1 is a front elevation of the dialing portion of a combination lock taken in the direction of the arrow 1 of Fig. 3.

Fig. 2 is a similar elevation with the dial removed and exposing the rotatable disk.

Fig. 3 is a diametrical section on the line 3—3 of Fig. 1 in the direction of the arrows.

Fig. 4 is an elevation of a removable dial, showing a different combination or arrangement of letters and in which a different pair of letters register with the notches of the dial.

In connection with my invention I illustrate a face plate 11 which is indicated as having a shallow annular recess 12. This is attached to a door or other device to be locked by a combination lock. The face plate has an annular rim 13 and on this rim there is a mark 14, which is common practice, to show a zero or indicating mark used in connection with the rotatable portions of the combination lock.

A rotatable stem 15 operates through the face plate and the portion of the device to be locked. This has a knob 16 secured thereto to rotate the stem. A disk 17 is indicated as secured by pins 18, or the like, to the knob and hence rotates with the knob. This disk is illustrated as having a convexly curved surface 19 considered in a radial direction. The disk is provided with a plurality of screw-threaded sockets 20, these preferably being an even number and equally spaced on the disk. There is a key mark 21 on the disk which may be adjacent one of the pin sockets 20 and thus adjacent what is termed a key pin inserted in the socket. There are two of these pins 22 illustrated and these may be inserted in any opposite sockets.

The rotatable dial designated by the assembly numeral 25 has an inner cylindrical opening 26 with two diametrically opposite notches 27. These notches engage the two diametrically opposite pins 22 and thus attach the dial to the disk. The dial preferably has an inturned flange 28 which covers the heads of the pins. The dial has a contracted neck 28' formed by the projection of the outer portion of the flange 28 which forms a finger grip to facilitate removing the dial. This rim or flange terminates in a central opening 29 which is of a sufficient diameter to clear the largest diameter of the knob 16 when the dial is attached to or removed from the rotatable disk. The dial has graduations 30 adjacent its peripheral edge. These have major marking lines 31 and minor intermediate lines 32. Also, there are preferably letters 33. The inner face of the dial is curved in a concave manner to form a close fit with the convex surfaces 19 of the disk 17.

The manner of operating and functioning of my invention is as follows:

Presuming the dial is lettered as shown in Fig. 1, and attached to the two pins in the manner illustrated, the letter Q is therefore associated with one of the notches **27** and hence one of the pins which may be the key pin and the letter O, the diametrically opposite notch and pin, but unless a person knows which letter should be associated with any key pin, they might reverse these. Again, if a substitute dial such as shown in Fig. 4 is used, the letters L and A are associated with the notches and an unauthorized person would not know which of these letters should be adjacent the key pin. Moreover, the pins may be shifted to different positions, in which case the authorized person having charge of the combination lock should either make a written memorandum or remember how many letters or degrees change on the dial are involved in changing the position of the pins, also the person authorized should make a note of the new combination. It would also be necessary to remember or note which of the two pins would be the so-called key pin in reference to the key mark **21**.

After a person has locked the safe or other equipment with which my lock is used, he may then detach the dial and either carry the dial or store the dial where it is not apt to be found by persons who might wish to open the safe or other article under lock. Hence, when the dial is removed, it would be difficult for a person to open the lock, even if he knew the combination. Thus the feature of having a removable dial adds materially to the safety factor of the lock.

Should the owner of the safe or other device locked by such a lock suspect that the combination is known, or desires to change the combination of the lock, that is, the combination of letters which are to be aligned with the fixed mark in unlocking the lock, the two pins may be removed and inserted in any of the other pair of diametrically opposite sockets **20**. Then, when the dial is replaced on the disk with the pins engaging in the notches **27**, a new set of letters will be required to read and determine the combination. This change of the combination is thereby obtained without changing the tumblers or the internal parts of the lock.

Manifestly, no matter what position the pins **22** occupy, the dial may be removed from or attached to the disk, which disk obviously rotates and occupies a constant position in regard to the stem **15** and to the knob **16**.

It will be noted, referring to Fig. 1, that I show a certain arrangement of the letters **33** marked in a circle around a dial, each letter registering with one of the larger marking lines **31** and thus each being separated by the minor graduation lines **32**. In this figure the letters Q and O are in registry with the notches **27** which are secured to the supporting pins. In Fig. 4 the arrangement of the letters is changed and in this case the letters L and A register with the notches **27**. Hence, even with twenty letters as illustrated, which, as there are five minor spaces between the larger lines **31** and give one hundred spaces on the dial, a large number of combinations of letters could be used, this being so great in number that practically every dial could have a different arrangement of letters. Also, if only twenty letters of a twenty-six letter alphabet were used, different letters could be omitted from different dials, thus increasing the number of combinations and if all of the letters of the alphabet were used, a very large number of combinations could be provided. Manifestly I could use numbers instead of letters or any suitable marks.

In this case, where each dial of a certain type of lock is different from every other dial, there will be a certain key letter which should register with a key post, which post may be located in a certain position in reference to the indicia mark **21** on the disk. Only the person in charge of the combination lock would know which letter is the key letter.

Different arrangements of the pins **22** in the sockets **20** may also be obtained by not having the sockets diametrically opposite, they could be in any desired relation one to the other, sufficient to properly engage the notches **27** and thus hold the dial firmly on the disk.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A combination lock having a stem with a knob, a disc secured thereto to rotate with the knob and the stem, the disc having a plurality of sockets with a pair of diametrically opposite pins therein, a ring-like dial having graduations and a pair of diametrically opposite notches to engage the two pins and thereby removably attach the dial to the pins.

2. A combination lock as claimed in claim 1, the pins being removable for insertion in any two diametrically opposite sockets to change the location of the dial on the disc, one of said pins being a key pin and there being a key mark on the disc to indicate the location of the key pin in regard to such key mark.

BENJAMIN F. CISOR.