May 25, 1937. R. L. McILVAINE 2,081,757

AUTHORIZED ACCESS MEANS FOR SAFES OR THE LIKE

Filed Nov. 9, 1934 2 Sheets-Sheet 1

Fig. 1

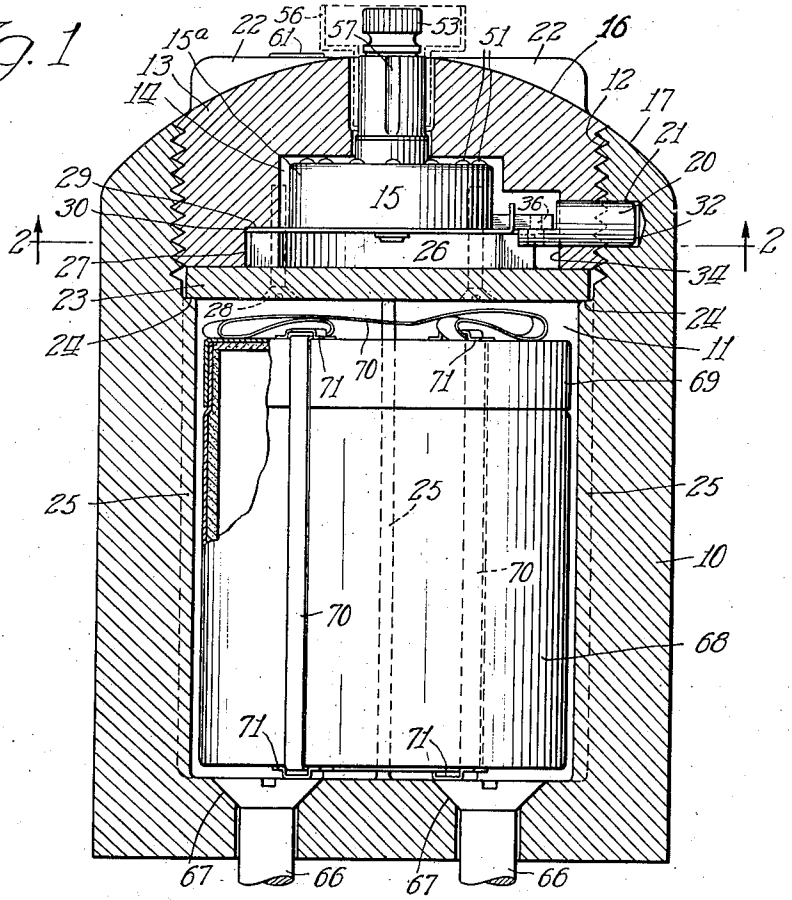


Fig. 5

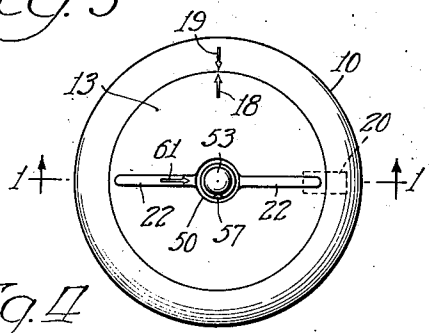


Fig. 7

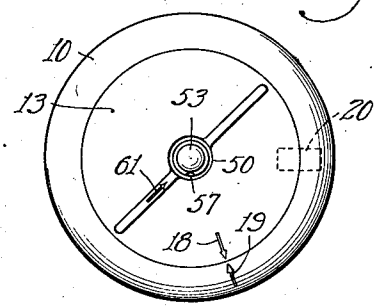
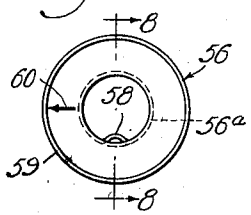


Fig. 4



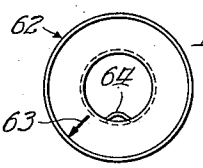


Fig. 6

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Fig. 2

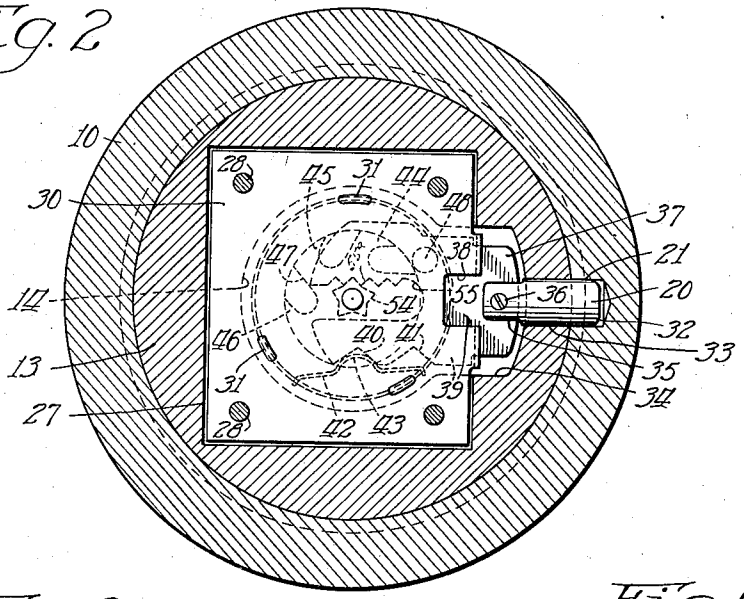


Fig. 3

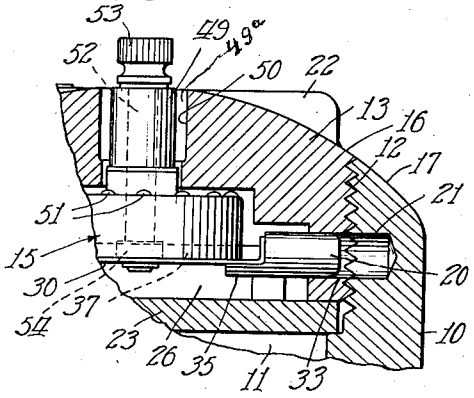


Fig. 9

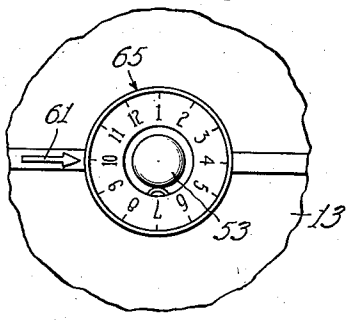
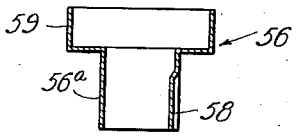


Fig. 8



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UNITED STATES PATENT OFFICE

2,081,757

AUTHORIZED ACCESS MEANS FOR SAFES OR THE LIKE

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Application November 9, 1934, Serial No. 752,216

3 Claims. (Cl. 70—331)

This invention relates to safes provided with closures carrying permutation locking mechanism and more particularly to small wall safes or other burglar-proof receptacles for homes, offices and small places of business where small amounts of money and valuables may be desired to be safeguarded temporarily.

Among other objects, the invention aims to provide an improved safe for this purpose and desirably includes means for preventing access to the combination mechanism except by persons having not only knowledge of the correct combination but also in possession of a key for operating the combination. Thus, not only may the combination be varied, as is customary, but also the starting or zero point for different safes may be so varied that even though a person may know the series of combination numbers for a particular safe even though such person may be able to rotate the mechanism, without the proper key therefor, he would be unable to locate the starting or zero position and thus would be unable to open the safe.

To further this purpose, the keys may be constructed of an easily breakable or deformable material so that they may be readily rendered useless in an emergency.

Other objects and advantages will be apparent from the following description, taken together with the accompanying drawings, in which—

Figure 1 is a vertical axial section of my improved safe, parts being shown in elevation and showing the closure in locked position;

Figure 2 is a cross-section taken on the line 2—2 of Figure 1;

Figure 3 is a partial section similar to Figure 1 but showing the closure in unlocked position;

Figure 4 is a plan view of one form of key shown in dotted lines in Figure 1;

Figure 5 is a reduced plan view of a safe adapted for the key of Figure 4;

Figure 6 is a slightly different key;

Figure 7 is a view similar to Figure 5 showing a safe adapted for the key of Figure 6;

Figure 8 is a longitudinal section of the key of Figures 4 and 6, being a section taken on the line 8—8 of Figure 4; and

Figure 9 is a partial plan view of a structure similar to Figure 1 but with a key associated therewith having modified indicating means thereon.

Referring in detail to the illustrative construction shown in the drawings, the safe body 10 is advantageously made of a single materially heavy casting of iron or the like with the hollow interior 11 and closure-receiving opening 12 in one end thereof, this opening 12 being desirably interiorly threaded to receive in screw engagement therewith the threaded closure 13, as is clear from Figure 1 of the drawings.

The closure 13, which is of material similar to the body 10 and as shown is relatively long axially to be received to a considerable depth in the body 10, is axially recessed as at 14 to house suitable locking mechanism indicated generally by the numeral 15.

When the closure 13 has been screwed into the body 10 so that the outer face 16 of the closure is substantially flush with the outer face 17 of the body, and in a given relative rotative position of the closure with respect to the body which may be known when the fixed arrow or other marking 18 (see Fig. 5) on the closure is in register with the fixed arrow 19 on the body, the locking bolt 20 extending radially of the closure is then received in a radially extending recess 21 in the body, to prevent rotation of the closure and body and thus to prevent access to the interior 11 of the safe. Wings 22 integral with the closure facilitate rotation thereof by affording a finger grasp thereon.

The locking mechanism 15 as a whole is maintained in fixed position within the recess 14 of the closure, in this instance by a backing-plate 23, which in the main is a flat circular metallic plate of slightly less diameter than the closure and adapted to abut shoulders 24 spaced about the interior 11 of the safe, when the closure is in locked position. This abutment of the backing-plate 23 and shoulders 24 guards against any attempt to drive the locking mechanism inwardly. The shoulders 24 may be provided by ribs 25 running lengthwise of the safe interior and integral with the body 10, there being preferably at least three of these ribs. As here shown also, the plate 23 may have reduced circumferentially segmental block portions 26, in this instance two of these, extending into the recess 14 in the closure and into a counterbored portion 27 thereof of advantageously jointly rectangular cross-section, thus preventing rotation of the backing-plate with respect to the closure. Block portions 26 are spaced apart so that the bolt 23 may move therebetween and in their opposed faces the block portions are cut out arcuately. Screws 28 pass through the plate 23 and block portions 26 into threaded engagement with the closure and the plate may clamp between its block portions 26 and an axial shoulder 29 in the closure, the base-plate 30 of the locking mechanism 15. The base-

plate 30 is also of rectangular shape to fit rather snugly into the counterbored recess 27, thus preventing rotation of the main portion of the locking mechanism 15 which may be cylindrical and may be received in the main recess 14 which may be also cylindrical. The base plate 30 of the locking mechanism may be riveted to the main casing 15a thereof as by lugs 31 (Fig. 2) passing through the base-plate and turned thereover.

The locking bolt 20 is desirably of solid cylindrical form about ⅜ of an inch in diameter for one size of the safe described and is of rolled steel or other strong material having a somewhat rounded nose portion 32 so as to facilitate sliding the bolt into the recess 21 in the body. For reciprocation the bolt passes through an aperture 33 in the closure which communicates with a lateral enlargement 34 of the recess 14. As here shown, the bolt 20 has a relatively flat reduced shank 35 which is perforated to have passed therethrough a relatively small link pin 36, which may screw into a reciprocable locking plate 37. The pin 36 is desirably frangible so that if anyone should succeed in damaging the lock, the pin 36 would break leaving the bolt 20 in locked position. The base plate 30 is conveniently cut away as at 38 to permit reciprocation of the bolt 20 to the position shown in Fig. 3 in which the bolt is withdrawn from the recess 21 of the body permitting withdrawal of the closure 13 for access to the safe interior. The locking plate 37 has a flat enlarged portion 39 which lies within the locking mechanism casing 15a and in the edge of this portion may be formed notches 40 and 41. A spring detent 42 anchored within the locking mechanism has a hump 43 thereon which is resiliently received in the notch 40, when the locking plate 37 and bolt 20 are in locked position, and in the notch 41 when these parts are in unlocked position, thus yieldingly establishing these alternative positions of the lock.

Any suitable combination mechanism may be employed in association with the locking mechanism 15 to prevent retraction of the bolt 20 when it is desired to lock the safe. For present purposes, it is sufficient to state that the combination mechanism may include a series of concentric discs 44, 45, 46 each of which has a peripheral notch 47 therein. The locking plate 37 has a stop pin 48 thereon which is received in the notches 47 when the discs 44, 45, 46 are in relative rotative position so that all three of their peripheral notches are in register. Otherwise, the locking plate 37, because of the stop pin 48, cannot be reciprocated from its locked position. Conventional means are provided, not necessary to be here described in detail, for rotating the discs 45, 46 and 47 to place their notches in register or out of register as may be desired, either to unlock or lock the safe respectively. Such means for rotating the discs includes, as here shown, the combination cylinder 49 which passes through an axial opening 50 of the closure 13, but is discontinued beyond the outer face thereof as more particularly described at a later point. By means of the cylinder 49, for example, to unlock the safe, disc 45 is first turned to a given predetermined rotative position which may be considered the starting or zero point of the combination, this starting point being established, for example, when the cylinder 49, after having been turned say two complete rotations to the right, is then brought to rest with the cylinder in a given rotative position with respect to say the bolt 20. Means including the circumferentially-spaced bulges 51 are provided for indicating, by the click of a resilient detent (not here shown) received in said bulges, the degrees of partial rotation of the cylinder. Thus, continuing to turn the cylinder 49, say, eight clicks farther in the same direction, will align, say, the notch 47 of the intermediate disc 45 with the stop pin 48. Then, reversing the rotation of the cylinder, say for twelve clicks in the opposite direction, will bring notch 47 of the disc 46 into alignment with the stop pin 48. Thereupon reversal of rotation of the cylinder again and turning it say five clicks in the same direction as it was originally turned will align notch 47 of disc 44 with the two other notches 47 and with the stop pin 48. Thereupon the locking plate 37 may be reciprocated to retract the bolt.

Reciprocation of the locking plate 37, as here shown, is accomplished through a shaft 52 passing through the cylinder 49, which is hollow for this purpose, the shaft 52 extending beyond the outer face of the closure in a knob 53 for manual rotation, the knob being advantageously knurled throughout its periphery. At its other end the shaft 52 terminates in a pinion 54 coplanar with the locking plate 37 which is centrally cut out as at 55 to receive the pinion. One edge of the plate 37 along this cut-out 55 is serrated to provide a rack 55a in engagement with the pinion 54, and which, upon rotation of the shaft 51, causes reciprocation (when permitted by the discs 44, 45 and 46) of the plate 37 and with it the locking bolt 20.

As already intimated, the combination cylinder 49 is substantially protected from unauthorized access by being wholly within the closure 13 and is practically inaccessible for rotation without the use of a key 56 which my invention contemplates. Such a key is illustrated in Figs. 4, 6 and 8. The key which I have here shown is desirably of hollow cylindrical form and is made of an aluminum die casting so as to be desirably brittle. It has a shank portion 56a which telescopes over the knob 53 and cylinder 49 in only one relative rotative position of the key with respect to the cylinder. Such position is determined, in this instance, by a longitudinal groove 57 in the cylinder 49 and a radially inwardly directed nib 58 on the shank portion 56 of the key, which nib slides in the groove 57 but prevents relative rotation of the key and cylinder when interengaged, as shown in dotted lines in Fig. 1. For purposes of telescoping of the key and cylinder, the cylinder is spaced from the closure affording an annular space 49a between the cylinder and the wall of the opening 50, which receives the annular key shank 56a. The other end of the key is desirably enlarged in a thumb portion 59 which may be knurled upon its exterior and which carries an indicating mark, for example, such as the arrow 60 (Fig. 4). The closure 13, in accordance with my invention, is also provided with a mark or arrow 61 advantageously located on one of the wings 22, as best shown in Fig. 5. When the key 56 is interengaged with the cylinder 49, my invention contemplates that it be turned until the arrow 60 on the key registers with the arrow 61 on the closure. This thereby determines a given angular distance between the arrow 61, and, say, the groove 57 of the cylinder, and the locking mechanism may be so adjusted that when this occurs the combination mechanism is in its first

or starting position as already explained. Having determined this position by means of the key, as just described, the cylinder may be placed in its successive rotative positions in series as already described by means of the key **56**, in the usual way. That is, in the example above given, eight clicks to the right, twelve to the left, and five to the right. It will thus be understood, that without the use of the correct key, in this instance the key **56** (having its nib **58** located ninety degrees from its arrow **60**) the starting or zero point could not be known, since there is nothing to indicate the correct rotative position of the cylinder with respect to anything on the closure, at this starting or zero point, and therefore, mere knowledge of the combination itself would not suffice to open the safe.

It will be noted with respect to the closure of Fig. 5, for example, and with the key of Fig. 4, that the correct rotative position of the cylinder with respect to the closure for the starting point of the combination occurs when the groove **57** of the cylinder is ninety degrees from the arrow **61**. At this time it will also be noted that the groove **57** is ninety degrees from the bolt **20**.

These angular distances may be varied indefinitely for different safes, so that a key **62** similar to key **56** but having its arrow **63** at a different angular location with respect to its nib **64**, and the arrow **63** aligned with the arrow **61**, would place the cylinder **49** in incorrect position for its starting or zero point so that the safe could not be opened even though the correct combination were known.

With a safe as shown in Fig. 7, however, adapted for the key **62**, knowledge of the proper combination will permit opening of the safe. It will be noted with the safe of Fig. 7, assuming that the first position of the combination still occurs when the groove **57** is ninety degrees from the bolt **20**, these relative positions of the bolt and groove **57** occur when the groove **57** is at say forty-five degrees from the arrow **61**. Since the nib **64** of the key **62** is also forty-five degrees from the arrow **63** when the key **62** is used with the safe of Fig. 7, the correct starting or zero point for the combination will be automatically determined by the key **62**, as it would not be, in this instance, by the key **56** or by any key other than a key identical with the key **62**.

Instead of the arrows **60**, **63** on the keys, the key might carry a series of clock-like numbers as indicated in Fig. 9. For example, the key **65** might be used in place of the key **56** to open the safe of Fig. 5, by locating the number 10 in alignment with the arrow **61** to determine the starting or zero point of the combination. Thereafter the key, and with it the cylinder, might be turned a certain number of angular spaces to the right or left as predetermined. The use of the key such as **65** would also eliminate the necessity for the clicking of the lock to indicate the amount which it is rotated, the numbers on the key serving the same purpose. That is, with the example above given, rotating the key eight clicks to the right would be the equivalent of rotating the key **65** from the position shown in Fig. 9 to the rotative position where the number "2" coincides with the arrow **61**, and so on as will be readily understood.

The safe, which may be otherwise portable although quite heavy, is intended to be secured in a wall, floor or the like, as by large lag screws **66** passing through the rear wall of the body **10** with their flaring heads countersunk in the interior **11** as indicated at **67**, no access being had to the screw **66** when the safe is closed.

I desirably provide an inner container **68** fitting snugly into the space **11**, which may be made of heat-resisting or insulating material and may be lined with felt or the like for the reception of jewelry as well as money and other valuables. A cover **69** fits snugly on the container **68** and to provide means always accessible when the safe is open for withdrawing the container, I place a loose, flexible, endless band or strap **70** about both the cover **69** and container **68**, the strap being retained in permanent engagement with these parts by passing through loops **71** formed on the cover and container. Thus there is always a portion of the band **70** which is accessible when the container is placed in the safe. The band **70** is of sufficient length so that the cover may be separated from the container but may not be lost therefrom. The safe may be hidden behind a picture, for example, or in back of a drawer in a bureau, to minimize discovery.

The invention embraces, in addition to the apparatus shown, a novel and useful practice adaptable to guard against tampering with the combination mechanism by unauthorized persons, since, for example, the owner of the safe can have two keys for the same safe, both of which will rotate the lock cylinder, and both of which therefore appear to be the correct keys, but only one of these seemingly correct keys would open the safe, that is only the key in which the angle between the interengaging formations and the indicator on the key is the correct angle. Thus, under coercion, the owner of the safe might even disclose the correct combination and could deliver up one of the keys—the wrong key, but which appears to be the right key—all without enabling the unauthorized person to open the safe.

Having described my invention, I claim:—

1. Means for safeguarding locks including a key having a shank portion adapted to be interengaged with a rotatable cylinder in but one relative rotative position of the key and cylinder for rotation of the key and cylinder on a longitudinal axis, and a single indicator directed radially of said axis, the shank portion having a single formation interengaging with a similar formation on said cylinder to transmit motion from the key to the cylinder, the said formation on the key lying in one plane passing through and extending along said axis, and the said indicator lying in another plane passing through and extending along said axis, said planes being angularly related.

2. Means for safeguarding permutation locks for safe closures or the like having a rotatable cylinder carried by the safe and operatively connected with the locking mechanism for the closure and having a starting mark on the safe in the vicinity of the cylinder, said means comprising a key having a shank portion adapted to be interengaged with the cylinder in but one relative rotative position of the key and cylinder for rotation of the key and cylinder on a longitudinal axis, the shank portion of the key having a formation for interengaging with a similar formation on said cylinder to transmit motion from the key to the cylinder, said key also having a fixed indicator directed radially of said axis, the said formation on the key lying in one plane passing through and extending along said axis and the said indicator lying in another plane passing through and extending along said axis, said

planes being angularly related and said angle being individual to said key and to said locking mechanism whereby to permit the key to open said locking mechanism by having its indicator initially aligned with the starting mark on the safe and thus locating the said formation in the correct first position for permutation and thereafter the cylinder may be rotated by use of said key.

3. Means for safeguarding locking mechanisms including a separable key having a tubular shank portion adapted to be interengaged with a rotatable cylinder by telescopic engagement with the cylinder in but one relative rotative position of the key and cylinder for rotation of the key and cylinder on a longitudinal axis, said shank portion having a single formation interengaging with a similar formation on said cylinder to transmit motion from the key to the cylinder, and a single indicator on said key directed radially of said axis, the said formation and said indicator being disposed at spaced-apart locations circumferentially of said tubular shank portion.

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