March 8, 1932. W. F. DOENGES 1,848,997

SCREENED COMBINATION LOCK

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Fig. 1.

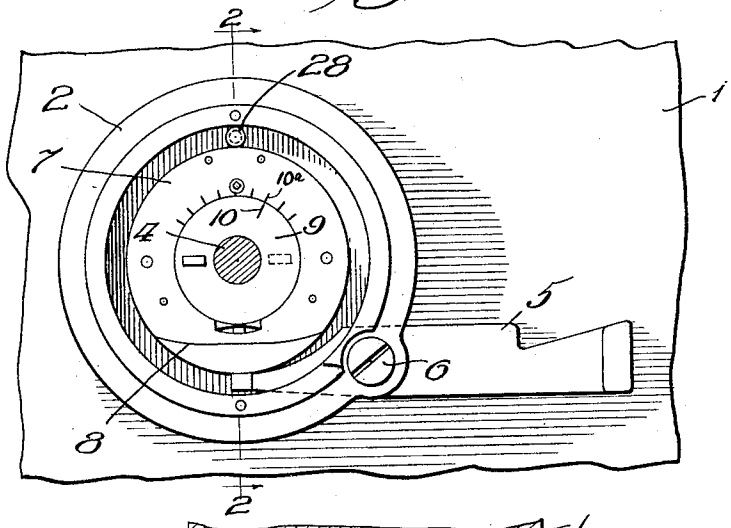
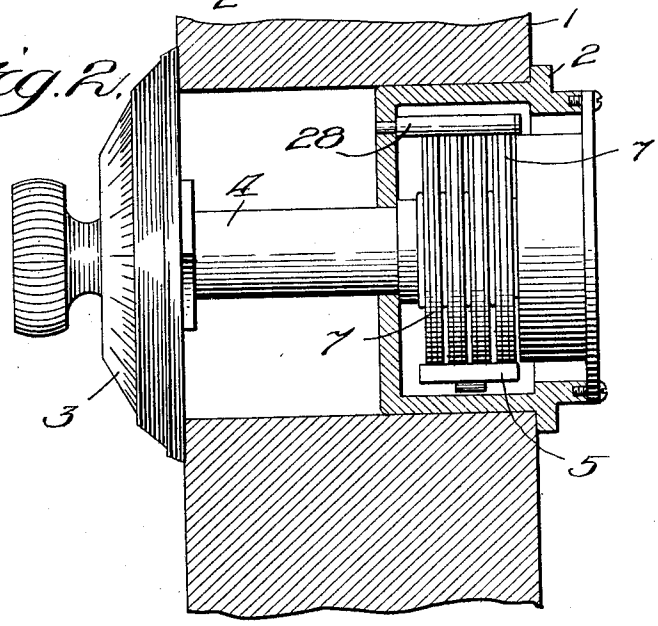


Fig. 2.



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Fig. 3.

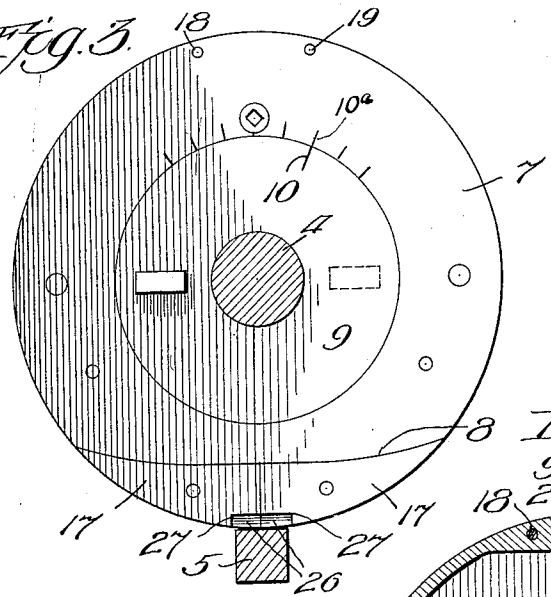


Fig. 4.



Fig. 5.

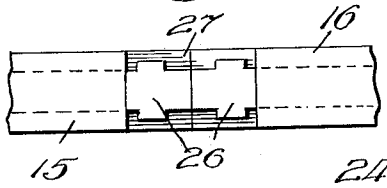


Fig. 6.

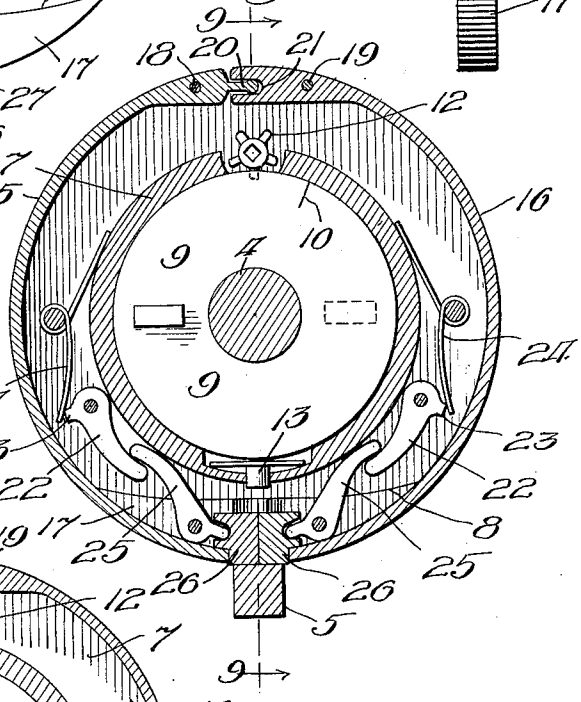
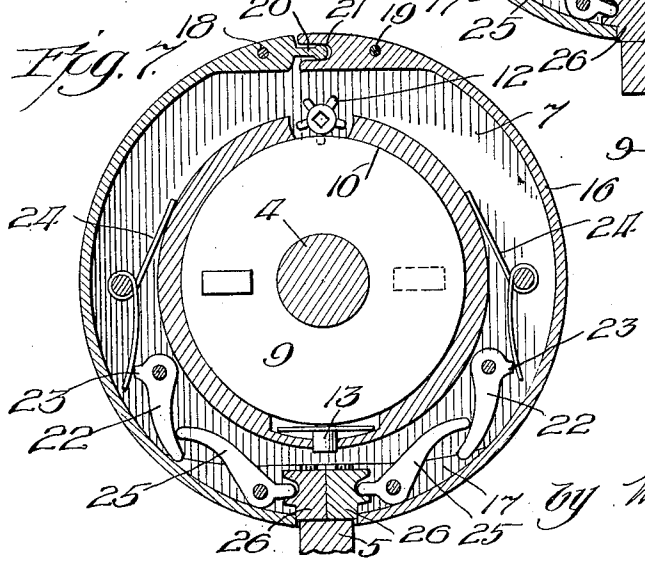


Fig. 7.



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Fig. 8.

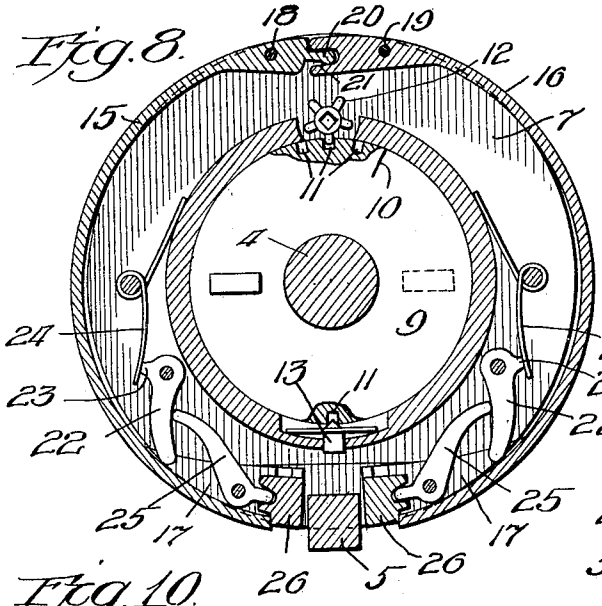


Fig. 9.

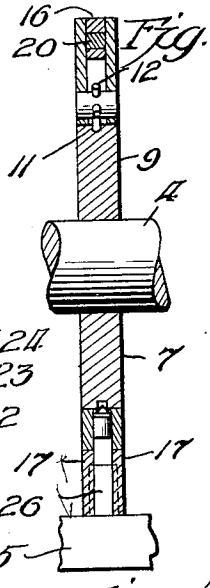


Fig. 12.

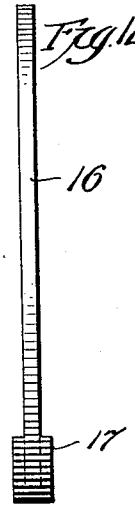


Fig. 10.

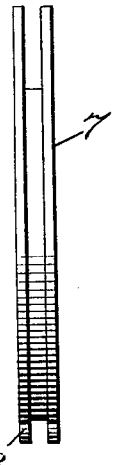


Fig. 13.

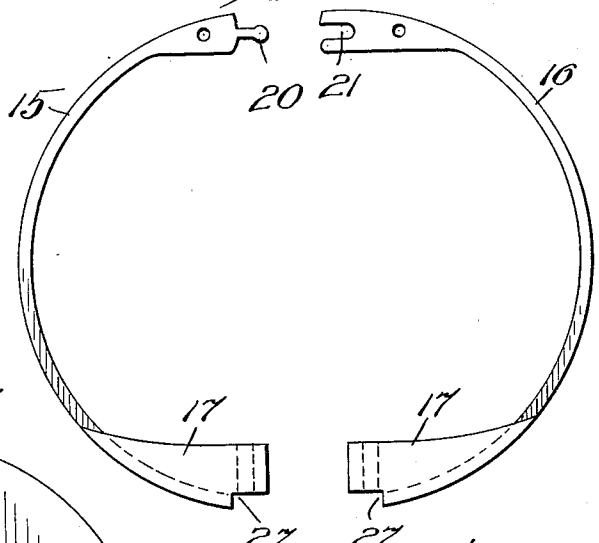


Fig. 11.

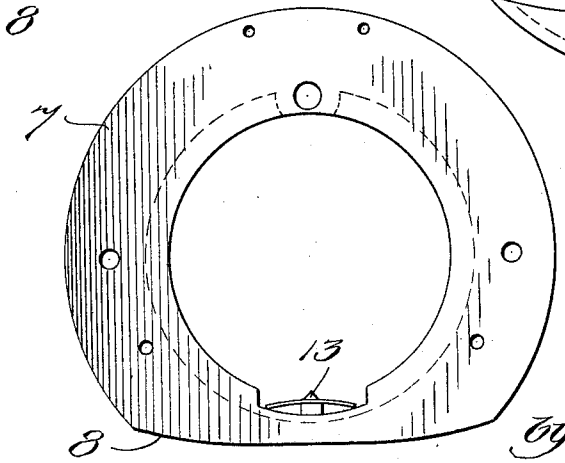
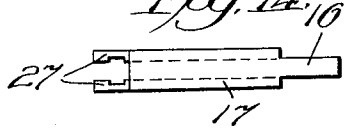


Fig. 14.



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Patented Mar. 8, 1932 1,848,997

UNITED STATES PATENT OFFICE

WILLIAM F. DOENGES, OF SAN ANTONIO, TEXAS

SCREENED COMBINATION LOCK

Application filed October 9, 1929. Serial No. 398,551.

In combination locks as now made, each tumbler has an opening which, when aligned with the other tumbler openings, permits the cooperating lock element to drop into the same. These openings can readily be made visible from the outside of the doors by means of certain forms of electric rays, thus making it possible for a burglar easily to open the doors.

The object of the present invention is to produce a combination lock having tumbler openings which cannot be rendered visible in the manner just described.

In carrying out my invention I provide means whereby the tumbler openings are normally closed and are opened only when all of the tumblers are brought into unlocking positions, preferably by the cooperating lock element. Therefore, viewed in one of its aspects, the present invention may be said to have for its object to produce a novel tumbler for a combination lock having a tumbler opening that is normally closed and opens only at the time the conditions are proper for the entry of the cooperating lock element into all of the tumbler openings.

Ordinarily tumblers are made with adjustable combination-changing centers. A further object of the present invention is simplifying and improving the mounting of the center member in the tumbler and the adjustment of the center member in the tumbler to change the combination.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is an elevation of a fragment of the inner side of a door provided with one of my improved lock devices, the cover for the lock device and the parts inwardly from the tumblers being omitted; Fig. 2 is a section on line 2—2 of Fig. 1, the tumblers being shown in elevation; Fig. 3 is a side view, on an enlarged scale, of one of the tumblers, the cooperating lock element being shown in position to drop into the tumbler opening when free to do so; Fig. 4 is an edge view of one of the tumblers; Fig. 5 is a bottom plan view of a fragment of the tumbler shown in Fig. 3, on a still larger scale; Fig. 6 is a central section through one of the tumblers on a plane at right angles to the axis of rotation of the same, the tumbler opening being closed; Figs. 7 and 8 are views similar to Fig. 6 showing the tumbler opening about to be opened and fully opened, respectively; Fig. 9 is a section on line 9—9 of Fig. 6; Figs. 10 and 11 are respectively an edge view and a side view of the body portion of one of the tumblers, with the combination-changing center removed; Fig. 12 is a side view of the two swinging arms or wings adapted to embrace the tumbler, separated from the tumbler and from each other; and Figs. 13 and 14 are respectively side and bottom edge views of one of said arms or wings.

Referring to Figs. 1 and 2 of the drawings, 1 represents a door on the inner side of which is mounted a combination lock casing 2 and on the outer side of which is a dial 3. A spindle 4 extends from the dial into the casing. A lock element 5 extends through a wall of the casing near the bottom of the latter and is pivoted thereto as indicated at 6. All of these parts may be of any usual or suitable construction as my invention is not concerned with the details thereof. In the casing and fixed on the spindle are my improved tumblers, of which any desired number may be employed; four tumblers being shown.

Since the tumblers are all alike I shall describe only one in detail. As is usual, the tumbler comprises an outer ring member and a central combination-changing member. The ring member 7 is U-shaped in cross section, the open side of the trough being at the periphery. The greater portion of the flanges of the ring is cut away on one side to which I shall refer as the bottom side, as indicated at 8, and best shown in Fig. 11. The combination-changing member 9 is, as usual, a disc fitting into the ring and provided with a radial mark or pointer 10 adapted to cooperate with suitable graduations, not shown, on the ring. In the periphery of the disc are one

hundred holes 11, spaced at equal distances apart. On the ring is a pinion 12 whose teeth engage in the holes in the disc whereby, when the pinion is turned, the disc will turn in the ring. On the ring, diametrically opposite the pinion, is a catch in the form of a spring-pressed pin 13 having a conical end adapted to enter the hole in the disc that happens to register with the same. This catch yieldingly holds the disc in any of the one hundred angular working positions of the latter, but permits the disc to be turned by means of a suitable key, not shown, adapted to be fitted into a central, noncircular opening in the pinion.

It will be seen that when the flattened or mutilated peripheral part of the tumbler ring or body is brought opposite the lock element 5, (Fig. 1), the outer end of the lock element may drop down while the inner end rises. It may therefore be said that this flattened part constitutes the tumbler opening. I provide means, however, for normally completing the circular contour of the tumbler body or ring so that no tumbler opening is visible. To do this, I provide two semicircular arms or wings 15 and 16, of the same radius as the body member, that rest in the trough of the body member and have at one end flanges 17 corresponding in size and shape to the portions cut away from the flanges of the body member. The opposite ends of the arms or wings are pinned to the body member for swinging movements, as indicated at 18 and 19. At the pivotal end of one wing is a tongue 20 projecting into a pocket or recess 21 in the adjacent end of the other wing. Consequently, when one wing moves, the other must have a corresponding movement. When the wings are swung toward each other as far as they will go, the flanged ends abut against each other, thereby completing the circular contour of the body member. When the wings are swung outwardly, or spread apart, space is provided between the flanged ends to receive the adjacent end of the lock element 5.

Since the wings should be in the positions closing the tumbler opening excepting only when all of the tumblers are set in the unlocking positions, I have provided means whereby the lock element 5 causes the wings to be tripped at the proper time and thus move out of the way of the lock element. In the arrangement shown, there are two pivoted triggers 22, 22 in the trough of the tumbler body, one near the free end of each wing. Each trigger has near the pivot a lateral projection 23 which is engaged by a spring 24. The parts are so proportioned that each spring will hold its trigger in either of two extreme positions, and will snap it from one such position to the other when the trigger is moved slightly past center. In the trough of each wing, that is, between the flanges, is a swinging dog 25, one arm of which engages with the inner side of the corresponding trigger and the other arm of which extends to within a short distance of the free end of the wing. The latter arm is engaged in a notch in the side of a small block 26 slidably mounted in the free end of the wing for movements radially of the tumbler. These blocks may each have one face flush with the end face of the wing on which it is mounted. The periphery of the wings is cut away for a short radial depth in the zone of the blocks, as indicated at 27, so that when the blocks are opposite the lock element 5, this element may push them in a short distance before encountering an unyielding obstruction.

As long as any part of the periphery of the tumbler, excepting the movable blocks, is in contact with the lock element 5, the lock element is held against swinging into its release position. However, when the blocks register with the lock element, as indicated in Fig. 6, and the latter is otherwise free to do so, the lock element will push in the blocks, thus turning the dogs 25 which in turn move the triggers, as indicated in Fig. 7. The parts are so proportioned that this inward movement of the dogs forces the triggers past center; whereupon the springs, acting through the triggers, throw the wings out and spread apart their free ends, as shown in Fig. 8, permitting the lock element to drop into the tumbler opening and assume its release position.

After the wings have been spread apart they will remain there until pushed back again. I have therefore placed in the casing for the tumblers a long stationary roller 28 lying parallel with the axis of rotation of the tumblers and in contact with the periphery thereof. This roller is placed at the top of the tumblers so as to be diametrically opposite the tumbler openings when the tumblers are set in release positions. Consequently the roller will not interfere with the spreading movements of the tumbler wings in the manner heretofore described; but, when the tumblers are afterwards turned to undo the combination, the roller rides over one wing of each tumbler and forces it and the other wing which is interlocked therewith, into position to close the tumbler opening. The springs then hold the wings in their closed positions until the tumblers are again set to unlock the door.

It will of course be understood that the lock element cannot cause the wings on one tumbler to be tripped and the tumbler opening opened until all of the tumblers have been set in the unlocking positions. As long as any tumbler has its blocks out of exact registration with the end of the lock element the latter will be bearing against an unyielding portion of the periphery of the tumbler and will remain in its locked position; and therefore the blocks in all of the tumblers must be aligned before any effective tumbler opening is produced.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:—

1. A combination lock tumbler having a tumbler opening, a closing element for said opening mounted on said tumbler in the path of a cooperating lock element for inward and lateral movements and adapted completely to close said opening, and means to move said element laterally out of the path of said lock element when pressed inwardly by the lock element.

2. In combination, a rotatable combination lock tumbler member, a pair of curved oppositely-disposed arms embracing said member, pivots connecting two of the meeting ends of the arms to said member, an interlock between the latter ends of the arms to compel the arms to swing in unison with each other, a two-position snap trigger mounted on said member on the inner side of each arm to swing that arm outwardly, and means adapted to be actuated by a co-operating lock element to move said triggers past center in one direction and cause the triggers to spread the arms, the parts being so proportioned and arranged that a tumbler opening is provided between the free ends of the arms when they are spread apart.

3. In a combination lock, a rotatable member having a peripheral tumbler opening, movable means mounted on said member to close the tumbler opening, said means including parts adapted to be actuated by a cooperating lock element to cause the tumbler opening to be uncovered, and a stationary element in position to engage said means and force them into closing position when said member is turned after the said lock element has been withdrawn.

4. In a combination lock, a rotatable tumbler having a large central opening, a combination changing member fitting in said opening, said member having peripheral depressions alternating with elevations, and a pinion mounted on said tumbler so as to be freely rotatable through several turns and having teeth adapted to engage with said elevations to rotate said member when the pinion is turned.

5. In a combination lock, a rotatable tumbler having a large central opening, a combination changing member fitting in said opening, said member having peripheral depressions alternating with elevations, a pinion on said tumbler having teeth adapted to engage with said elevations to rotate said member when the pinion is turned, and a catch carried by said tumbler and yieldingly held in the depression that happens to be opposite the catch.

6. A combination lock comprising a tumbler having a tumbler opening, a cooperating lock element adapted to enter said tumbler opening when said opening and lock element are in alinement, means for normally closing the tumbler opening, and means controlled by the closing means for moving said closing means out of the tumbler opening when said lock element is in alinement with said opening to permit the lock element to engage said closing means and to enter the opening to release the lock.

7. A combination lock comprising a tumbler having a tumbler opening, a cooperating lock element adapted to enter said tumbler opening when said opening and lock element are in alinement, means normally closing the tumbler opening, means controlled by the closing means for moving said closing means out of the tumbler opening when said lock element is in alinement with said opening to permit the lock element to engage said closing means and to enter the opening to release the lock, and means for moving said closing means back to its normal position within the opening after the lock element has been removed from the tumbler opening.

In testimony whereof, I sign this specification.

WILLIAM F. DOENGES.