Jan. 15, 1935. O. J. CARLSON 1,987,925

COMBINATION LOCK

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Fig. 1.

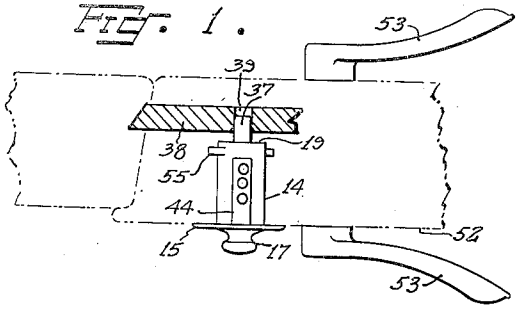


Fig. 2.

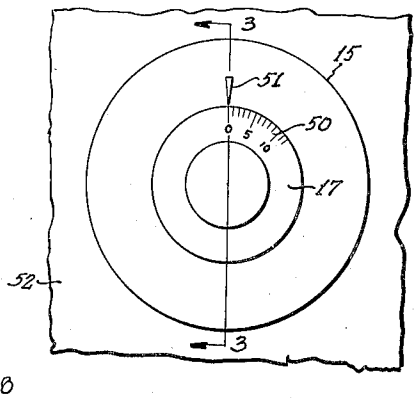


Fig. 3.

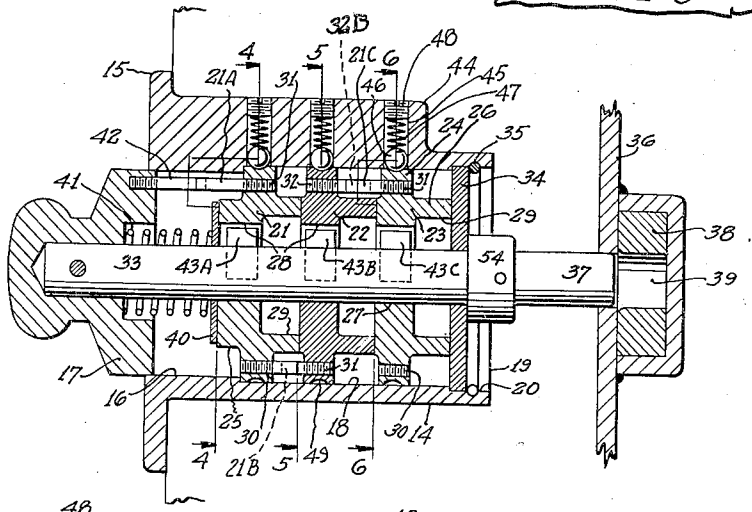


Fig. 4.

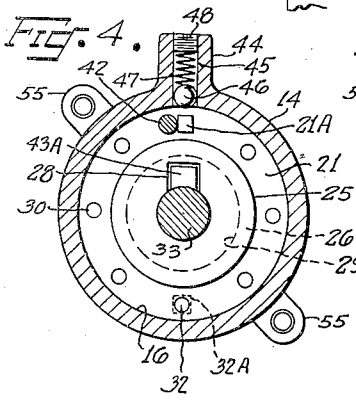


Fig. 5.

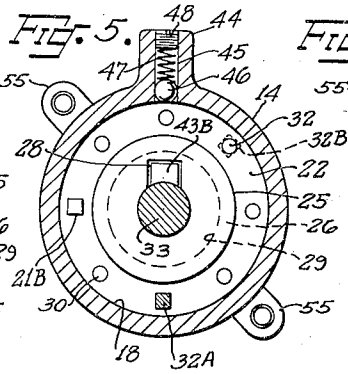
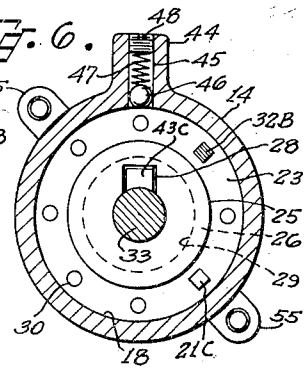


Fig. 6.



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Fig. 7.

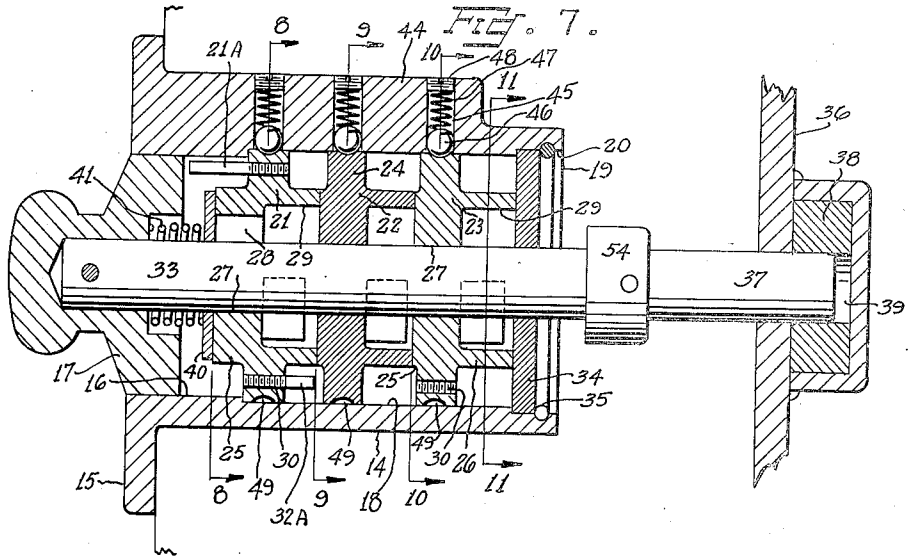


Fig. 8.

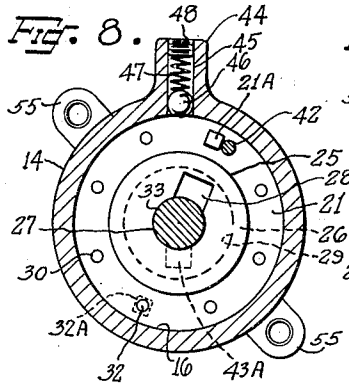


Fig. 9.

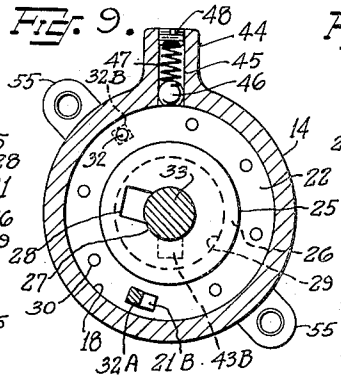


Fig. 10.

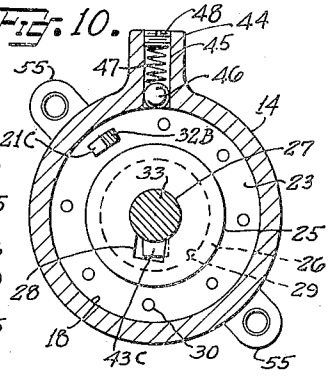


Fig. 11.

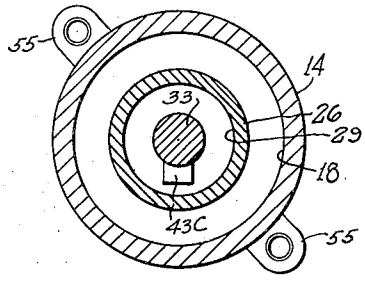
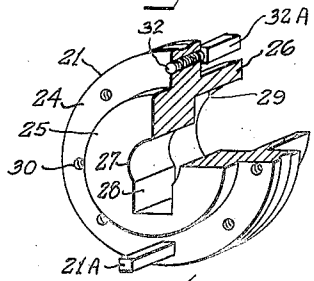


Fig. 12.



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UNITED STATES PATENT OFFICE

1,987,925

COMBINATION LOCK

Oscar J. Carlson, Minneapolis, Minn., assignor to Theodore Hegdahl, Denver, Colo.

Application June 13, 1933, Serial No. 675,591

2 Claims. (Cl. 70—53)

This invention relates generally to locks, and particularly to a combination lock.

The main object of this invention is to produce an exceedingly simple and efficient form of combination lock providing a relatively great number of possible combinations for a limited number of parts requiring only a minimum degree of accuracy in their manufacture.

The second object is to construct a combination lock whose combination cannot be learned by the "feel" method employed by expert lock openers.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawings in which:

Fig. 1 is a plan of the device showing same applied to the door of an automobile.

Fig. 2 is a front elevation of the lock.

Fig. 3 is a longitudinal section through the lock showing the parts in an unlocked position with the operating pins placed in an imaginary position in the line of section.

Fig. 4 is a section taken along the line 4—4 in Fig. 3.

Fig. 5 is a section taken along the line 5—5 in Fig. 3.

Fig. 6 is a section taken along the line 6—6 in Fig. 3.

Fig. 7 is a sectional view similar to Fig. 3 except that it shows the parts in a locked position.

Fig. 8 is a section taken along the line 8—8 in Fig. 7.

Fig. 9 is a section taken alone the line 9—9 in Fig. 7.

Fig. 10 is a section taken along the line 10—10 in Fig. 7.

Fig. 11 is a section taken along the line 11—11 in Fig. 7.

Fig. 12 is a perspective view of the first lock disk with a portion broken away in section.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, the device itself consists of a cylindrical barrel 14 one end of which is provided with a flange 15. The flanged end 15 is provided with a cylindrical opening 16 in which is slidably and rotatably mounted a dial knob 17. The central portion of the barrel 14 is provided with a bore 18 which is slightly larger in diameter than is the opening 16. The end 19 is provided with a grooved counterbore 20.

Within the bore 18 is placed a series of lock disks which will be referred to as the first disk 21, second disk 22 and third disk 23. Each of these disks has an enlarged central cylindrical portion 24 from one side of which projects a hub 25 and from the other side of which projects an annular ring 26. The hub 25 has a cylindrical opening 27 formed therethrough along its axis, which opening is provided with a keyway 28. The ring 26 has a cylindrical recess 29 formed therein which is concentric with the member 24.

Equi-distant from the axis of the member 24 and parallel therewith are formed the threaded openings 30, certain ones of which are occupied by screws 31 and 32. The screws 31 in the disks 21, 22 and 23 are provided with elongated square heads 21—A, 21—B and 21—C respectively, and these are on the sides of the disks 21, 22 and 23 facing the dial knob 17. The screws 32 are provided with similar square elongated heads of which the head 32—A projects from the disk 21 and the head 32—B projects from the disk 22. Both of these last mentioned heads face toward the end 19.

Pinned or otherwise secured within the dial knob 17 is a shaft 33 which passes through the opening 27, through the retaining disk 34 which is held within the bore 20 by means of a snap ring 35, and also through the guiding plate 36 in order that the end 37 of the shaft 33 may constitute a bolt for the latch 38 whose opening 39 registers with the bolt 37 when the latch 38 is in a locking position (as shown in Fig. 1).

Against the hub 25 of the first disk 21 is placed a washer 40 between which and the counterbored end of the dial knob 17 is placed a compression spring 41. The dial knob 17 is also provided with a dial pin 42 which is always in the cylindrical path of the head 21—A, and can be brought into engagement therewith regardless of the longitudinal position of the dial knob 17.

The shaft 33 is also provided with three lugs 43—A, 43—B and 43—C which occupy the keyways 28 while the bolt 37 is in a retracted or unlocked position.

Projecting from the barrel 14 is a boss 44 which is provided with radial openings 45, each of which contains a ball 46 which is urged toward its respective disk 21, 22 or 23 by means of a spring 47 which is held in place by a screw 48. It is desirable to provide each disk 21, 22 and 23 with a groove 49 to receive the ball 46.

The dial knob 17 is provided with numbered graduations 50 and the flange 15 with an indicator point 51.

Although the device is susceptible to use in

any of the ways in which similar devices are now used, its operation may be explained in connection with an ordinary automobile car door 52 whose latch 38 is manually operated by means of the handles 53.

When the car is in use the lock parts are in the position shown in Fig. 3—that is, with the bolt 37 in a retracted position in which the collar 54, which is pinned to the shaft 33, bears against the disk 34; but when it is desired to lock the automobile the operator merely pushes the knob 17 into the recess 16 against the action of the spring 41, causing the bolt 37 to enter the opening 39 in the latch 38.

In order to keep the bolt 37 in this locked position it is necessary to rotate same, and since the lugs 43—A, 43—B and 43—C have emerged from their respective keyways 28 they are free to rotate within the recesses 29 without imparting motion to their respective disks 21, 22 or 23. If, however, such rotation is imparted by means of the dial knob 17 then the lugs 43—A, 43—B and 43—C may be brought out of register with their respective keyways 28 and the bolt 37 will not be retracted by the spring 41.

It will be assumed that the parts have been moved to the position shown in Fig. 7 and it is now necessary to unlock same, the operator, who is possessed of the combination, which combination is based upon the particular openings 30 which are occupied by the heads 21—A, 21—B and 21—C and 32—A, 32—B and 32—C, now turns the dial 17 a number of times to the right, the net result of which is to bring the pin 42 into engagement with the head 21—A whereby the disk 21 may be rotated by the dial knob 17. A further movement of the knob 17 will cause the head 32—B to engage the head 21—C making it possible for the disk 22 to move the disk 23 until the keyway 28 in the disk 23 is properly positioned.

The knob 17 is then moved in a reverse direction to a known combination until the pin 42 engages the opposite side of the head 21—A and reverses the direction of the disk 21 and ultimately the direction of the disk 22 until its keyway 28 is properly positioned. The direction of the rotation of the knob 17 is again reversed to the third and final setting of the combination which brings all of the keyways 28 into alignment with the lugs 43—A, 43—B and 43—C and permits the bolt 37 to be retracted by the spring 41.

It will be noted that the function of the balls 46 is merely to prevent the rotation of the various disks under the turning movement of the shaft 33, or for any other reason except the positive driving action of the disks 21, 22 and 23.

It can readily be seen that the possible number of combinations obtainable by this construction is exceedingly great and that since the actions which occur within the lock during the manipulation of the knob 17 are not of a character which will permit same to be felt or heard it is clear that the unauthorized opening of this lock would be extremely difficult, if not impossible, other than accidental.

The particular manner of fastening this lock in position in order to prevent its unauthorized removal will depend largely upon the particular requirements, but for the purpose of illustration there are shown lugs 55 formed on the outside of the barrel 14 by means of which the lock may be held in position from the interior of the door 52.

It will be understood that the details of construction of this device will vary greatly depending upon the conditions under which it is used and it is not my intention to be bound to these details but intend that the scope of this invention shall be limited only by the appended claims.

I claim:

1. A lock comprising a series of spaced rotatable lock disks each of which has a central opening provided with a keyway, each of said disks having selectively positioned heads projecting from the opposite sides thereof whereby rotation of one disk can cause a lesser rotation of an adjacent disk, a shaft passing through said central opening having lugs projecting therefrom normally occupying said keyways, and a spring-urged dial knob attached to said shaft whereby said shaft may be rotated or caused to slide through said disks, the end of said shaft opposite said knob constituting a locking bolt.

2. A combination lock comprising a plurality of frictionally held rotatable disks mounted on a shaft in spaced relationship, each disk having a keyway in the shaft-engaging portion thereof, said shaft having lugs projecting radially therefrom and normally occupying said keyways, a spring for urging said shaft to hold said lugs within said keyways, a dial knob for imparting rotary motion to the first disk and sliding motion to said shaft, projections on the opposite sides of the first and second disks for transmitting a rotary motion between same, and projections extending from the adjacent sides of the second and third disks for transmitting lesser rotary motion therebetween, the end of said shaft opposite said knob constituting the bolt member of the lock.

OSCAR J. CARLSON.