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ELECTRIC COMBINATION SWITCH

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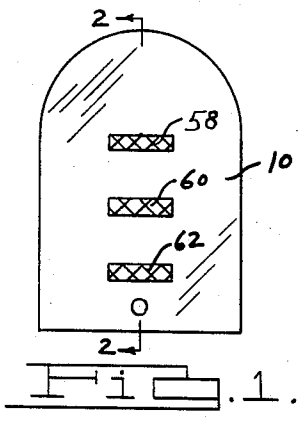


Fig. 1.

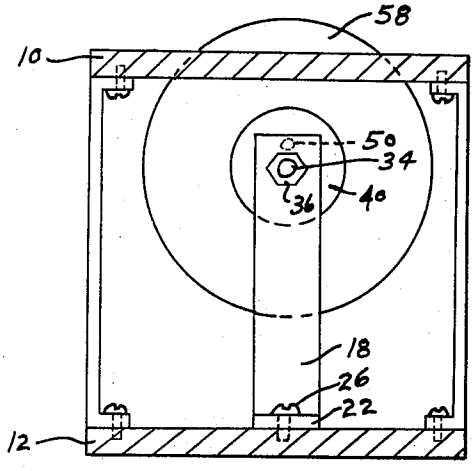


Fig. 3.

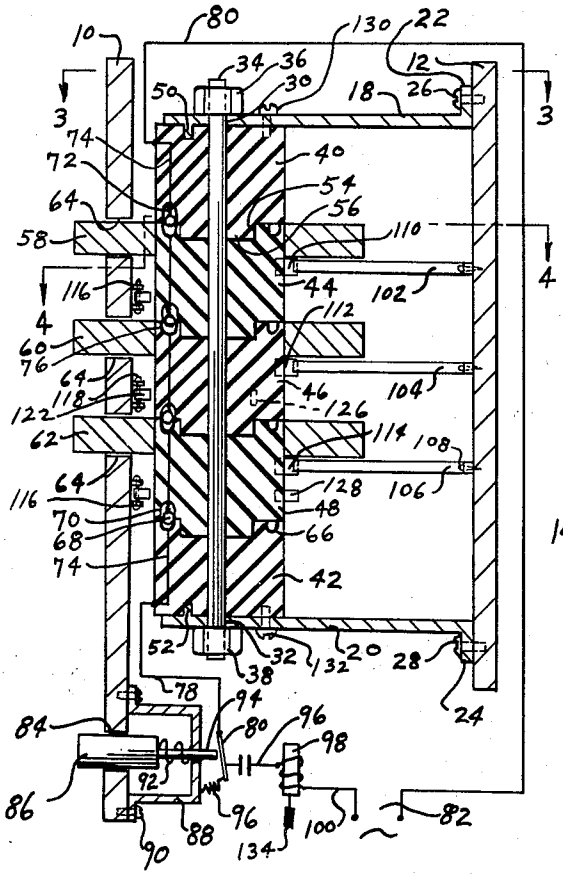


Fig. 2.

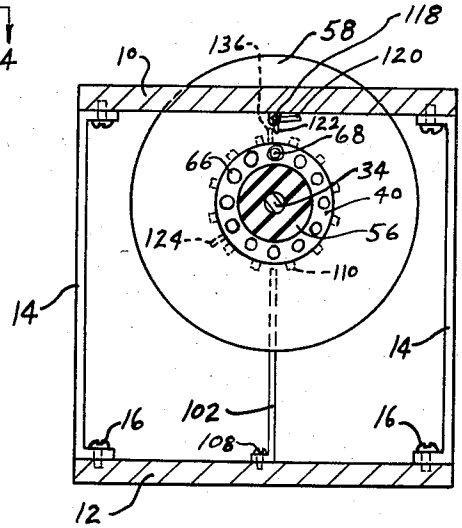


Fig. 4.

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ELECTRIC COMBINATION SWITCH

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7 Claims. (Cl. 200—43)

This invention relates to an electric combination switch, and, more particularly, to a device of this class which is especially adapted for use in lock structures generally.

It is the primary object of this invention to provide a combination device for operating electro-magnetic locks, and which is adaptable for use on an automobile, on safes, on business machines, on house doors, and the like.

It is another object of this invention to provide a combination mechanism for operating electro-magnetic locks in which the combination may readily be changed.

It is still another object of this invention to provide an electric combination device which is relatively simple and compact in construction, economical of manufacture, highly efficient in operation, and which may be manually operated.

It is a further object of this invention to provide an electric combination device for operating electro-magnetic locks which is formed with dials that may be readily added or subtracted, to increase or decrease the number of combinations available.

It is a still further object of this invention to provide an electric combination device for operating electro-magnetic locks which comprises a plurality of rotatable dials which are set relative to one another by counting the number of clicks which occur when the dials are moved.

It is a further object of this invention to provide a device of this class which comprises a plurality of dials which are rotatably mounted on a shaft between two stationary dials, with said dials having a conductor therethrough which complete a circuit to actuate a solenoid when the conductors are aligned according to the combination of movements of the dials from a predetermined starting point.

Other objects, features and advantages of this invention will be apparent from the following detailed description and appended claims, reference being had to the accompanying drawings forming a part of the specifications wherein like reference numerals designate corresponding parts of the several views.

In the drawings:

Fig. 1 is a front elevational view of an illustrative embodiment of the invention;

Fig. 2 is an elevational view, partly in section, of the structure illustrated in Fig. 1, taken along the line 2—2 thereof;

Fig. 3 is a horizontal view, partly in section, of the structure illustrated in Fig. 2, taken along the line 3—3 thereof; and,

Fig. 4 is a horizontal view, partly in section, of the structure illustrated in Fig. 2, taken along the line 4—4 thereof.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and

of being practiced or carried out in various ways. Also, it is to be understood, that the phraseology and terminology employed herein is for the purpose of description and not limitation.

In the drawing, a preferred embodiment of the invention is shown which comprises a front supporting plate 10 and a back supporting plate 12 which is spaced apart from the front plate. The plates 10 and 12 are fixedly secured together by suitable bracing members 14 which are secured to the plates by suitable fastening means, as by the screws 16. The back plate 12 is provided with an upper forwardly extending supporting structure 18, and a lower forwardly extending supporting structure or arm 20 which are spaced apart and are provided with flange portions 22 and 24, respectively, and metal screws 26 and 28 for holding said supporting structures on the plate 12.

The forward ends of the arms 18 and 20 are provided with suitable apertures 30 and 32, respectively, through which is mounted a vertically disposed shaft 34 which is held securely in place by means of the nuts 36 and 38. The shaft 34 is adapted to have mounted thereon, between the arms 18 and 20, an upper and lower stationary rotor 40 and 42, respectively, and, a plurality of rotatable rotors 44, 46, and 48. The rotors 40, 42, 44, 46 and 48 are made from any suitable dielectric material. The stationary rotors 40 and 42 are held in place against the arms 18 and 20 by means of the projections 50 and 52 which are adapted to engage suitable apertures in the outer faces of said rotors to prevent rotation thereof. The aforesaid rotors are interlocked with each other by having one adjacent rotor provided with a depression as 54 in which the other adjacent rotor's projection or hub 56 is adapted to seat and rotate.

The rotatable rotors 44, 46 and 48, are provided with rings or dials 58, 60 and 62, respectively, which are suitably fixed on said rotors, as by a press fit. As shown in Fig. 2, the front plate 10 is provided with a plurality of horizontal slots as 64 through which the dials protrude. The edges of the dials 58, 60 and 62 may be knurled or roughened to provide for easier rotation thereof. The upper faces of the rotors 42, 44, 46 and 48 are provided with a plurality of circularly disposed depressions or notches 66 which are adapted to be operatively engaged by a detent or spring biased contact metal ball 68 which is nested in a groove 70 in the rotor immediately above. A spring 72 is mounted in each groove 70 and is adapted to bias the ball 68 into a releasable engagement with the notches 66. One end of the springs 72, is connected to a conductor 74 which passes completely through the rotor. One of the notches 66 is provided with a metal contact 76 which is connected to the conductor elements 74, in the rotors 42, 44, 46 and 48.

The conductors 74 in the stationary rotors 40 and 42 are connected to suitable conductor lines 78 and 80, with the conductor line 80 being adapted to be connected to a suitable power source 82, and with the conductor 78 being connected to a switch movable part 80. As shown in Fig. 2, the front plate 10 is provided with an aperture 84 through which is mounted a push button 86. A U-shaped bracket 88 is mounted on the rear side of the plate 10 by the screws 90, and is adapted to have mounted between it and the plate 10 a spring 92 adapted to bias the push button 86 normally outwardly. The push button 86 is provided with an extension of a non-conducting material, as 94, which is mounted to be engageable with the movable switch part 80. The stationary switch part 96, which is the mating part for switch part 80, is suitably connected to a solenoid 98 and thence by the conductor 100 to the source of power 82.

Fixedly mounted on the front side of the rear plate 12 are a number of forwardly extending arms 102, 104 and

106 which have their forward ends disposed beneath the dials 58, 60 and 62, respectively, and which are held on the plate 12 by any suitable means, as by the screws 108. The rotors 44, 46 and 48 are each provided with a plurality of outwardly extending projections 110, 112 and 114, respectively, which are disposed on the periphery of said rotors, and which are adapted to abut the arms 102, 104 and 106. The arms 102, 104 and 106 are preferably formed from a suitable flexible material, as spring metal, and are adapted to engage the projections 110, 112 and 114, when the rotors are turned, and ride over said projections, causing an audible click or snap when such action occurs. The projections 110, 112 and 114 are disposed intermediate the depressions or notches 66, and, the arms 102, 104 and 106 are aligned with each other. The projections 110, 112 and 114 may be integrally formed with the rotors 44, 46 and 48, respectively, or, they may be formed separately and embedded in said rotors by any suitable means.

As shown in Figs. 2 and 4, a stop mechanism is disposed on the front plate 10, adjacent each of the rotors 44, 46 and 48. Each of these stop mechanisms comprises a pair of spaced apart arms 116 which are fixed on the front wall 10 by any suitable means, as by welding. A pivot pin 118 is mounted in said arms 116 and pivotally mounted on said pin is an L-shaped member having the arms 120 and 122. The arm 120 is adapted to abut the front wall 110, and, the arm 122 is adapted to operatively engage a stop member, as 124, 126 and 128, on the rotors 44, 46 and 48, respectively. The stop members 124, 126 and 128 are disposed on their respective rotors at different positions relative to the conductors 74, and, they may be formed integral with the rotors, or, they may be formed separately and be embedded in said rotors by any suitable means.

As aforementioned, the stationary rotors 40 and 42 are held stationary relative to the arms 18 and 20, respectively, by means of the projections 50 and 52. However, the rotors 40 and 42 may be further secured to the arms 18 and 20, by means of suitable screws, as the screws 130 and 132.

In use, the illustrative embodiment may be mounted on a house door, on a business machine, an automobile, and other like uses for operating an electro-magnetic lock. The front wall 10 and the back wall 12 would be suitably mounted on the object which is to be protected by the present device. If the electric combination device were mounted on a house door for operating an electro-magnetic lock, the front plate 10 would be mounted in the plane of the outer surface of the door, and, an operator would be presented with the view shown in Fig. 1. The numeral 134 indicates a bolt of a lock for the door, with the bolt being adapted to be actuated into the locked and unlocked position by a solenoid 98 which operates in the usual manner. In order to actuate the solenoid 98, the control circuit must first be completed by rotating the rotors 44, 46 and 48 into a predetermined position so as to align the conductors 74 in each of said rotors with the rest of the solenoid circuit.

The alignment of the rotors would be accomplished as follows. As viewed in Fig. 1, the dials 58, 60 and 62 would be rotated to the left until the stop projections 124, 126 and 128 engaged the arms 122 of their respective stop mechanisms on the front plate 10. As shown in Fig. 4, the numeral 136 indicates the position that the stop projection 124 would assume when this occurs, and, the other stop projections 124 and 126 would also assume a similar position. It will be seen, that when the stop projections 124, 126 and 128 abut the stop mechanism arms 122, the integral arms 120 will be rotated into engagement with the front wall 10 and the dials 58, 60 and 62 will be stopped. It will also be seen that if the dials 58, 60, and 62 are then rotated to the right, as viewed in Fig. 1, or, counterclockwise as viewed in Fig. 4, that the stop projections 124, 126 and 128 will merely ride over the arms 122, since the entire L-shaped stop members will pivot around the pivot pins 118, thus permitting the rotors to be moved indefinitely to the right, as viewed in Fig. 1, but limiting the movement of the rotors to the left.

With the dials 58, 60 and 62 moved to the extreme left, as viewed in Fig. 1, and as aforementioned, the conductors 74 in the rotors 44, 46 and 48 will not be aligned, since they will be disposed on relatively different positions on these rotors. If the stop projections 124, 126 and 128 are disposed relative to the conductors 74 in the rotors 44, 46 and 48, so as to stop the rotors a certain number of notches 66 out of alignment with the stationary rotors 40 and 42, then the number of notches 66 that the rotors 44, 46 and 48 have to be moved to align the conductors 74 in all the rotors, both stationary and rotary, will be the combination for that setting of the rotors. For example, if the combination for the switch is number 538, then the rotor 44 will be turned to the right, as viewed in Fig. 1, 5 notches measured by the number of clicks caused by the arm 102 riding over five of the projections 110. The turning of rotor 44 for five clicks to the right, as described, will align the conductor 74 in rotor 44 with the conductor 74 in the stationary rotor 40. The rotor 46 would then be moved three clicks to the right, as viewed in Fig. 1, and, this action would align the conductor 74 in this rotor with the rotors 40 and 44. Similarly, rotor 48 would be moved eight clicks to the right, as viewed in Fig. 1, and, this action would align the conductor 74 in this rotor with the rotors 40, 44, 46 and 42.

When the conductors 74 in all the rotors have been aligned in accordance with the combination, or number of predetermined clicks, the push button 86 is pushed inwardly by the operator. The extended part 94 on the rearward end of the push button 86 contacts the movable switch part 80 and moves it into operable engagement with the stationary switch part 96. This action completes the circuit from the power source 82, through conductor line 80, conductors 74, conductor 78, switch parts 80 and 96, and thence back to the power source 82 by the conductor 100. The completed circuit operates the solenoid 98 which in turn moves the bolt 134 in the desired manner. It will be understood, that the conductors 74 in each of the rotors 40, 42, 44, 46 and 48 are electrically connected by the spring members 72, the detent balls 68 and the conductor sockets 70.

It will be seen, that the combination of clicks may be changed, as desired, by shifting the stationary rotors 40 and 42 relative to the rotary rotors, or, by changing the location of the stop projections 124, 126 and 128 on the rotary rotors 44, 46 and 48.

It will be seen, that the present invention provides a novel electric combination switch adapted for operating a lock which is adapted to be operated by counting the number of clicks the dials make when they are turned, and, which is adapted to be operated in the dark without the benefit of any light.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a switch of the class described: a front wall; a back wall spaced apart from said front wall; means securing said walls together; a pair of arms mounted on said back wall and extending forwardly therefrom toward said front wall; a shaft mounted between said arms; a first rotor mounted on said shaft adjacent one of said arms; a second rotor mounted on said shaft adjacent the other of said arms; means for releasably

fixing said first and second rotors on the adjacent arm; a conductor mounted in each of said first and second rotors; circuit means connecting the conductors in said first and second rotors to a power source and to a device to be controlled by said switch; a plurality of rotatable rotors mounted on said shaft between said first and second rotors; a conductor in each of said rotatable rotors; each of said rotatable rotors being made from a dielectric material and being provided with a dial adapted to extend through said front wall; means for limiting the rotation of said rotatable rotors in one direction; and, means for aligning the conductors in said rotatable rotors with the conductors in said first and second rotors, when said rotatable rotors are turned in the other direction, whereby the circuit for operating the solenoid will be completed.

2. The invention as set forth in claim 1, wherein: said means for aligning the conductors in said rotatable rotors with the conductors in said first and second rotors comprises, a plurality of annularly disposed notches on the upper faces of said rotatable rotors and said second rotor; one of the notches in said upper faces of said rotatable rotors and said second rotor having a metal element therein which is connected to the upper end of the conductor in said rotors; a resiliently biased conductive element mounted in the lower face of said first rotor and said rotatable rotors, which is connected to the conductor in said first rotor and rotatable rotors and adapted to releasably engage the notches on the upper faces of said rotatable rotors and said second rotor; and means for arranging the resiliently biased conductive elements in engagement with the metal elements in said notches to align the conductors in said rotors for completing the circuit for the solenoid.

3. The invention as set forth in claim 2, wherein: said means for arranging the resiliently biased conductive elements comprises: a plurality of outwardly extending projections on each of said rotatable rotors which are disposed between the notches on each rotor; and, an arm for each rotor adapted to be engaged by said projections and being capable of riding over said projections and making a clicking noise during such action.

4. In a switch of the class described, a supporting structure; a shaft carried by said supporting structure; a first adjustable stationary rotor mounted on one end of said shaft, and, a second adjustable stationary rotor mounted on the other end of said shaft; a plurality of rotatable rotors mounted on said shaft between said stationary rotors; a conductor in each of said rotors; a dial carried on each of said rotatable rotors for manual rotation thereof; said rotors being made from a dielectric material; a circuit means connected to said stationary rotor conductors for connecting the conductors in the rotors to a device to be controlled by said switch; means for connecting the conductors in said rotatable rotors with the conductors in said stationary rotors for completing said circuit means when the rotatable rotors are turned to a predetermined setting; and, means for creating an audible signal when the rotatable rotors are moved, whereby the operator may adjust the rotatable rotors to said predetermined setting.

5. The invention as set forth in claim 4, wherein: said means for connecting the conductors in said rotatable rotors with the conductors in said stationary rotors comprises a detent means in each of said rotatable rotors and a detent means in said first stationary rotor.

6. The invention as set forth in claim 4, wherein: said means for creating an audible signal comprises a plurality of outwardly extending projections on the periphery of each of said rotatable rotors; and, a flexible arm mounted adjacent each of said rotatable rotors which is adapted to engage and ride over said projections successively, thereby creating a clicking signal, whereby the number of clicks may be counted and serve to position said rotatable rotors in said predetermined setting.

7. In a switch of the class described, a supporting structure; a shaft carried by said supporting structure; a first stationary rotor mounted on one end of said shaft, and, a second stationary rotor mounted on the other end of said shaft; a plurality of rotatable rotors mounted on said shaft between said stationary rotors; a conductor in each of said rotors; a dial carried on each of said rotatable rotors for manual rotation thereof; said rotors being made from a dielectric material; a circuit means connected to said stationary rotor conductors for connecting the conductors in the rotors to a device to be controlled by said switch; means for connecting the conductors in said rotatable rotors with the conductors in said stationary rotors for completing said circuit means when the rotatable rotors are turned to a predetermined setting; means for creating an audible signal when the rotatable rotors are moved, whereby the operator may adjust the rotatable rotors to said predetermined setting; said means for creating an audible signal comprising a plurality of outwardly extending projections on the periphery of each of said rotatable rotors, and a flexible arm mounted adjacent each of said rotatable rotors which is adapted to engage and ride over said projections successively, thereby creating a clicking signal, whereby the number of clicks may be counted and serve to position said rotatable rotors in said predetermined setting; and, a stop means to limit the rotation of said rotatable rotors in one direction but not in the other direction to provide a starting position to which the rotatable rotors may first be moved and from which position the number of clicks are counted for setting the rotatable rotors to complete a circuit therethrough.

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