G. W. LAWRENCE.

ELECTRIC SWITCH.

APPLICATION FILED JULY 30, 1915.

1,185,690.

Patented June 6, 1916.

Fig. 1

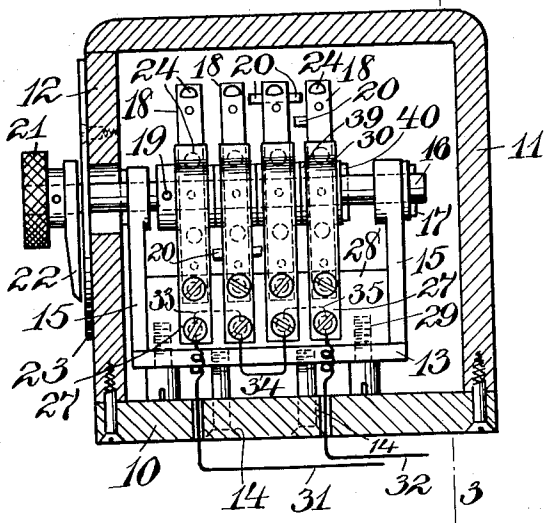


Fig. 2

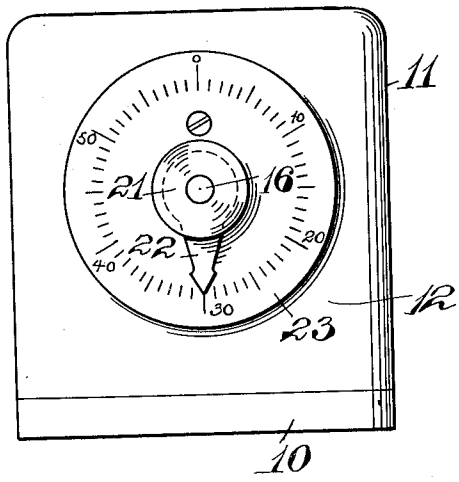


Fig. 5

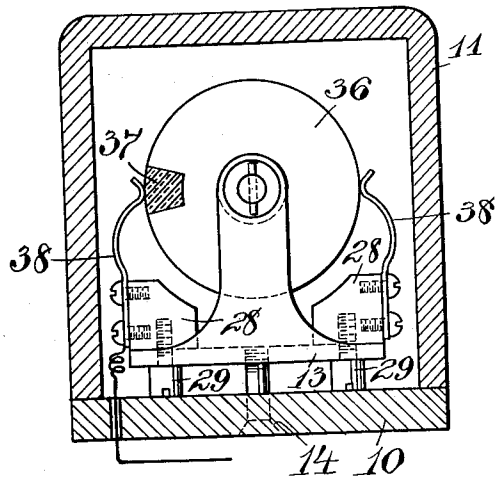


Fig. 3

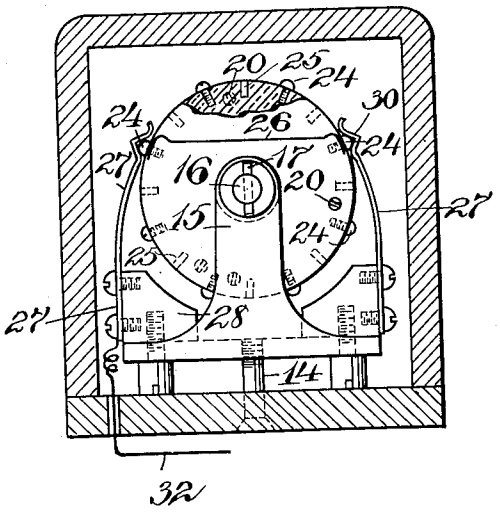
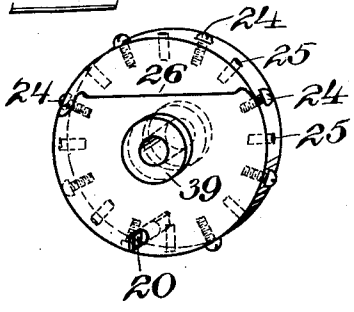


Fig. 4



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GEORGE W. LAWRENCE, OF CRANFORD, NEW JERSEY.

ELECTRIC SWITCH.

1,185,690. Specification of Letters Patent. Patented June 6, 1916.

Application filed July 30, 1915. Serial No. 42,691.

To all whom it may concern:

Be it known that I, GEORGE W. LAWRENCE, a citizen of the United States, and a resident of Cranford, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

This invention relates to an improved electric switch and is designed to be used in many situations where it can be employed, but is particularly adapted for switchboards, for illuminating circuits, for the sparking circuits of automobiles, and for other uses in connection with internal combustion engines, and can be used with alarm circuits, and there are many other situations in which it can be advantageously employed. The switch is designed so as to eliminate the necessity of a key for unlocking a switch or for placing it in circuit, the invention being designed to provide a series of contact arms which are connected in series through conductors placed on disks between said arms, it being necessary, however, in order to complete the circuit, to have such disks in certain relative rotative positions. To manipulate the switch a handle is provided for operating a shaft, which in turn operates the disks by reason of said disks being rotated by the shaft, the disks having coacting means on their opposed faces for rotating them together. I also prefer to provide a scale plate and index to indicate the combination so that any one knowing the combination can place the disks in position to either connect or disconnect the contact arms and thus make or break the circuit.

The invention further provides a device in which the combination can be changed without much loss of time and without much labor, and one in which the disks when they are successively placed in position are held yieldingly in such position by their electrical contact.

The invention is susceptible to changes, and modified forms of parts can be used, the drawing illustrating a preferred form of my invention.

One modification illustrated in the drawing is shown in section in Figure 1, the operating part of the disk being illustrated in elevation. Fig. 2 is a face view of the switch shown in Fig. 1. Fig. 3 is a section on line 3—3 in Fig. 1, showing one of the disks broken away at the top. Fig. 4 is a perspective view of the disks illustrated in Figs. 1 and 3, and Fig. 5 is a view similar to Fig. 3 but illustrating a modified form of contact disk.

I prefer to make the device so that it is inclosed in a suitable casing, in the form shown the casing consisting of a bottom plate 10, a suitable cover 11 and a front wall 12, but the form of casing is not essential. A base 13 is suitably secured to the bottom plate 10 as by means of the screws 14. The base 13 has projecting bearings 15 which receive the shaft 16, the shaft being held against withdrawal by suitable means such as a pin 17. Mounted on the shaft are disks 18. In the form shown in Figs. 1, 3 and 4, these disks being adapted for use with an open circuit, they are therefore made of suitable insulating material, such as fiber, hard rubber or any of the numerous compositions of which such articles are made. One of the disks, in the drawing it is the one adjacent to the switch bearing, is connected to the shaft so that it turns therewith, the disk being secured, in the form illustrated, by the pin 19. Each of the other disks is preferably arranged so that it is loosely mounted on the shaft and is not affected by its rotation.

Each of the disks on their opposed faces is provided with projections 20 which are arranged at substantially the same distance from the center so that they abut as the shaft continues to revolve, and when they are all in contact the shaft turns all the disks together. When, however, the shaft is rotated in the reverse direction, the disks, except the one fastened to the shaft, are not rotated, and it will be evident with reversals of rotation that the disks can readily be brought to relative rotative positions, and it is necessary for the operator to know the successive directions to the right and left that must be given to bring these disks to their required position.

To manipulate the shaft I provide a handle 21 and a suitable index hand 22, and a scale 23 can be employed to indicate to a person knowing the combination what the positions of the disks are and to control the rotation of the shaft to bring the disks to their proper rotative positions. Other means beside the projections 20 can be used for causing the rotation of the disks in unison. The disks are provided with projections or contact points 24, these being

usually placed on the periphery, and additional openings 25 may be provided for the changing of the contact points 24 and are usually screw-threaded, or may be used for the insertion of additional screws or contacts. I provide an electrical connection such as a wire 26 which connects separated contacts electrically. On the base 13 I mount contact arms 27, these being preferably arranged on the opposite sides of each disk, the pairs of arms being insulated from each other, this being usually done by fastening the arms to insulating strips 28 which, in turn, are fastened to the base 13 by screws 29. The contact arms are preferably provided with recessed or corrugated portions 30 which are adapted to receive the separated contact points 24 and yieldingly hold each disk in successive positions, these contacts, however, giving way at a pressure on the handle 21 of the shaft.

The circuit wires 31 and 32, which can be connected to any circuit that the switch is adapted to control, are fastened to separated contact arms, in Fig. 1 of the drawing these wires being connected to the end contact arms on the same side of the base 13. The contact arm to which the wire 31 is secured is not electrically connected to its adjacent arm, but the contact arm opposite to it on the other side is connected to its next adjacent arm, as at 33. A wire 34 forms an electrical connection between the two adjacent arms on the near side of the structure shown in Fig. 1, and the wire 35 forms an electrical connection between the contact arms on the other side so that the pairs of arms are alternately connected on opposite sides of the device so that when the disks are brought to a position where all their wires 26 are in a position to connect the opposed contact arms 27 the circuit through the switch is complete. It will be readily seen that if any of the disks are in a position where the contacts 24 connected by the electrical connection 26 are not connecting the contact arms bearing on it, the circuit is not completed.

The combination can readily be changed by either shifting the position of one or all of the projections 20 or changing the position of the connection 26 to connect different projections 24, as will be evident. I prefer to arrange the connection 26 so that it forms a segment with the periphery of each of the disks and thus permits the contact arms and their engaging portions 30 to be of the same height and permits the use of the contact arms on opposite sides of the disks.

It will be evident from this description that any one knowing the combination can manipulate the handle 21 until all the disks have their projections 20 in contact with each other and they are all rotating in unison. In the form shown, when the disk farthest away from the handle is in a position to have its electrical connection 26 connect the contact arms 27 flanking the disk, the handle is reversed until all three disks are turned in the reverse direction until the second disk from the end is in its proper position, the handle is once more turned in the original direction until the third disk from the end is in its position, and then the handle is again reversed until the disk fastened to the shaft is in its proper position and then the circuit through the switch is complete and all the contact arms and the electrical connections on the disks are connected.

In Fig. 5 I show a modification in which the disk 36 is made of material that will conduct electricity and which has a block or blocks 37 of insulating material, this structure providing an open circuit when the disks are in their proper positions, at least one of the contact arms 38 bearing on the insulating part 37. The disks 18 are preferably held apart by suitable coils 39 mounted on them, the disks being freely pivoted on the shaft and being held in place by an end fixture such as the pin 40. With this construction it is possible to easily destroy the combination sufficiently to close the circuit, which circuit can be one that embraces the hood of an automobile or any other similar structure, so that when said hood is opened a proper alarm will be sounded, and this device can be used as an extension of the shaft shown in the structure illustrated in Fig. 1 so that any manipulation of the switch will sound an alarm. The uses, however, to which this device is adapted are various, and it will be evident to any one skilled in the art how to apply the above described switch in any circuit where it is desirable or necessary. The switch is compact, is inexpensive to manufacture and is easily manipulated.

Having thus described my invention, I claim:

1. An electric switch comprising a series of rotative disks, means for moving the disks to occupy predetermined relative rotative positions, separated electrically connected contact points movably arranged on each disk, contact arms flanking each disk and in the path of the contact points, circuit wires connected to the end arms, and electrical connections between adjacent arms whereby all the contact points and the arms can be placed in circuit.

2. An electric switch comprising opposed contact arms insulated from each other, circuit wires attached to separated arms, electrical connections between adjacent arms on alternate opposite sides, disks between said contact arms, each disk being rotatable independently of the others, means

on the opposed faces of said disks to cause them to rotate in unison, and movable portions on said disks for conducting electricity so as to electrically connect the arms, and means for placing said disks in predetermined relative rotative positions, whereby all the arms and the disks are in circuit.

3. An electric switch comprising a base, insulating strips on the base, spring contact arms arranged into pairs on opposite sides of the base, circuit wires connecting separated arms, electrical connections between adjacent arms on alternate opposite sides, a bearing on said base, a shaft in the bearing, a disk fixed to the shaft and rotating between a pair of opposed arms, disks arranged so as to have a relative rotation on said shaft, the disks having projections on their opposed faces to engage each other so as to cause the disks to rotate in unison, contact projections on said disks, the contact arms having recesses to receive said contact projections to yieldingly hold the disks in position, and an electrical connection on each disk for connecting separated projections.

4. An electric switch comprising disks having separated points that are electrically connected, said points projecting radially from the disks, and recessed spring contact arms resting on the periphery of the disks to engage the points to both form electrical connection and to hold the disks in position.

5. In an electric switch, a disk having a series of rounded projections on its periphery, an electrical connection between two of the projections, and an electrically conductive spring arm bearing on said disk and having a recess to yieldingly engage the projections to hold the disk in position.

6. In an electric switch, disks having screw-threaded openings in their peripheries, screw-threaded contact points adapted to be placed into selected openings in the disks and being adapted to be shifted from selected openings to other selected openings, means for electrically connecting said contact points, transverse projections on said disks adapted to engage each other when the disks are in predetermined relative positions, and spring contact arms on both sides of the disks, the contact arms having recesses to receive the contact points on the disks and to thus yieldingly hold the disks in position, the contact arms being of electrically conductive material so as to complete the circuit when in engagement with the contact projections that are electrically connected.

In testimony that I claim the foregoing, I have hereto set my hand, this 28th day of July, 1915.

GEORGE W. LAWRENCE.