B. W. SWEET.

ELECTRIC SWITCH.

APPLICATION FILED MAR. 2, 1916.

1,326,619. Patented Dec. 30, 1919.

FIG. 1.

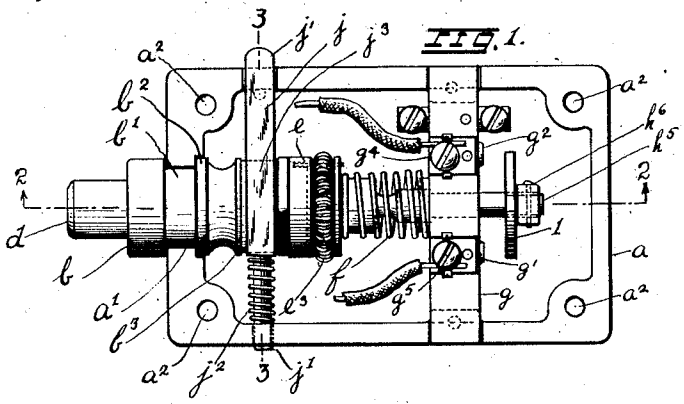


FIG. 2.

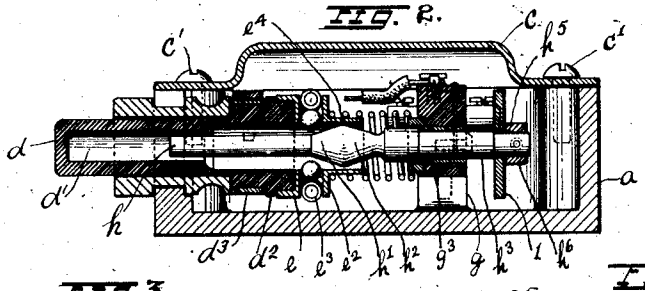


FIG. 3.

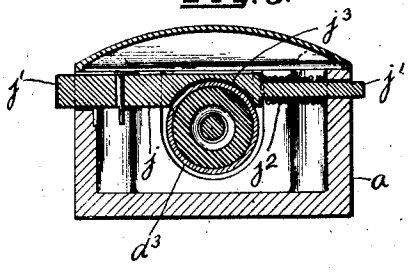


FIG. 4.

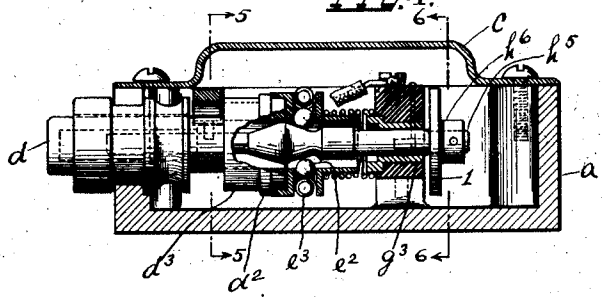


FIG. 5.

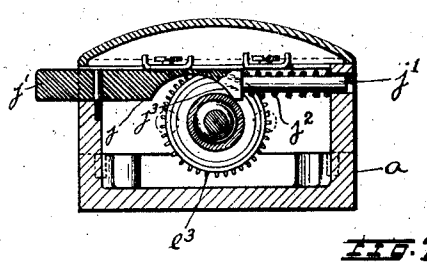


FIG. 6

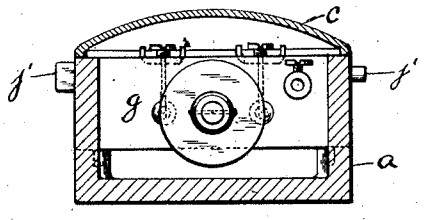


FIG. 7.

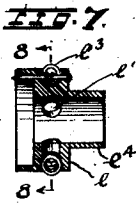
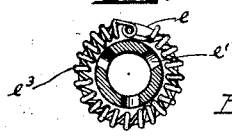


FIG. 8.



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ELECTRIC SWITCH.

1,326,619. Specification of Letters Patent. Patented Dec. 30, 1919.

Application filed March 2, 1916. Serial No. 81,701.

To all whom it may concern:

Be it known that I, BURTON W. SWEET, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to improvements in electrical switches, and has for its object the provision of a switching device which is efficient, durable and snappy in operation.

The essential features of my invention comprise a circuit controlling element and a plunger or push-button mechanism cooperating therewith.

The circuit controlling element carries a circuit closer which engages contacts in order to close electrical circuits for lighting systems, motors or the like.

The circuit controlling element or member is provided with two wedge shaped or conical surfaces which are adapted to be engaged by roller bearings associated with and controlled by the plunger mechanism. These bearings are mounted within a suitable case and are encircled by a spiral spring which is of proper tension to insure sufficient presure of the bearings against the tapering or conical surfaces of the circuit closing element to cause its movement.

When one of the conical surfaces is engaged by the roller bearings the circuit closing element is caused to move in one direction to close the switch contacts and when the other conical surface is engaged the element moves in the opposite direction and opens the switch contacts.

By the use of roller bearings the friction is reduced to a minimum and all chance of possible binding or sticking removed.

In addition to the plunger mechanism and the circuit controlling element I provide a latch which serves to hold the switch in a locked position when it is operated.

Other details of my invention will be pointed out in the detail description to follow.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a plan view of the assembled switch with the cover removed.

Fig. 2 is a side view in section on the line 2—2.

Fig. 3 is an end view in section on the line 3—3.

Fig. 4 is a side view partly in section.

Fig. 5 is an end view in section on the line 5—5.

Fig. 6 is an end view in section on the line 6—6.

Fig. 7 is a side view in section of the roller bearing case.

Fig. 8 is an end view in section of the roller bearing case.

Referring first to Figs. 1 and 2, the switch mechanism proper is shown mounted within the case a. This case is provided with a cover c, fastened to the case by means of the screws c'. When the cover is in place it serves to bind or hold in position the insulating terminal block g, the bushing b and the latch bar j. By removing the cover the entire mechanism can be lifted from the case.

The bushing b through which the plunger d passes is provided with a recessed portion b^1 which fits snugly within a cut-out portion of the case a. The case a is also provided with cut-away portions in which the block g fits, as indicated in Figs. 1 and 6.

The plunger d is of insulating material, fiber or preferably of hard rubber. As shown in Fig. 2, the reduced portion of this plunger passes through the bushing b and is provided with an enlarged portion at d^2. A section of this enlarged portion is surrounded by a metallic ring d^3 which is forced thereon. This metallic ring forms a bearing surface for the latch bar j. The end of the enlarged portion d^2 supports the case e which carries the roller bearings e^2. The details of this case are shown in Figs. 7 and 8. The plunger d is bored out as shown at d' so as to admit a portion of the circuit controlling element or member h. This member is provided at its central portion with two conical or wedge shaped surfaces h^1 and h^2. This circuit controlling member h is supported by the inner wall of the plunger d and the bushing g^3 which passes through the insulating terminal block g. This bushing g^3 is of metal so as to present a suitable bearing surface for the portion h^3 of the circuit controlling element. The opening in the case e and in the enlarged portion of the plunger d permits free movement of the cone portion of the element h.

The plunger d is kept in the position shown in Figs. 1 and 2 by means of the spring f. This spring encircles the portion e^4 of the case e and also the extended portion of the bushing g^3.

By referring particularly to Figs. 2, 4 and 8 it will be noted that the roller bearings e^2 fit within the openings e' made within the recessed portion of the case e. Surrounding these roller bearings is a spiral spring e^3 which serves to hold the bearings in place and to force them against the conical surfaces h' and h^2. The tension of this spring is such that when the bearings engage the conical surfaces the element h is forced in a direction depending upon which conical surface is engaged.

Attached to one end of the element h is a metallic disk or circuit closer i, preferably made of copper. This disk is fitted over the reduced portion h^5 after which a collar h^6 is forced on the reduced portion and riveted thereto to hold the washer i in place.

The disk i is fitted loosely upon the reduced portion h^5 so as to allow it to tilt slightly in all directions. This arrangement makes the disk self adjusting in relation to the contacts g^1 and g^2 in order to compensate for wearing of the parts.

When the plunger d is depressed the disk i engages and short circuits the two terminals g^1 and g^2 which are mounted upon the insulating terminal block. To allow connections to be made to these two terminals by the wires or conductors the screws and clips as shown at g^4 and g^5 are provided. These screws and clips are in electrical engagement or contact with their respective terminals g^2 and g^1.

Referring particularly to Figs. 3 and 5 the arrangement wherein the plunger is held in a locked position is shown. The latch bar j passes through the case a as shown. One end of this bar is provided with a rounded reduced portion j^1. Encircling this reduced portion is a spring j^2 which bears against the enlarged portion of the latch j and against the inner side of the case a. This spring serves to force the latch bar j outward so the end j^1 will project from the case a. This latch bar is cut away, as shown at j^3. The cut-away portion conforms to the surface of the ring d^3, which is forced over the enlarged portion of the plunger d. The portion j^3 is cut away in this manner to allow the ring d^3 to move back and forth under the latch bar j.

When the plunger d is in its outward or normal position, as shown in Figs. 1 and 2, the inner surface of the cut-away portion j^3 of the latch j rests upon the periphery of the ring d^3. When the plunger d is in its depressed position, as shown in Fig. 4, the enlarged portion of the latch j passes between the shoulder b^3 of the bushing b and the sleeve or ring d^3, as shown in Figs. 4 and 5.

The operation of the device is as follows:

In Figs. 1 and 2 the switch is shown in its normal position; in other words, the terminals g^1 and g^2 are not short circuited by the disk or washer i. In order to complete the circuit between g^1 and g^2, the plunger d is depressed. The depression of this plunger causes the separation of the ring d^3 and the shoulder b^3 of the bushing b, allowing the enlarged portion of the latch bar j to pass between the shoulder b^3 and the ring d^3. The latch j is forced in this position, due to the tension of the spring j^2, whereupon the latch bar assumes the position shown in Fig. 5.

The depression of the plunger d causes the case e carrying the roller bearings e^2 to ride upon the conical surface h' of the circuit controlling element h. As soon as these roller bearings pass over the ridge formed by the intersection of the two conical surfaces h^1 and h^2 then the roller bearings will engage the conical surface h^2. The pressure exerted by the spring e^3 causes the roller bearings to press against and force the circuit controlling element in the position shown in Fig. 4; namely, with the disk i engaging the two terminals g^1 and g^2.

It will be noted that the pressure exerted upon the two terminals g^1 and g^2 by the disk i is controlled entirely by the pressure of the roller bearings e^2 upon the conical surface h^2, due to the pressure exerted by the spring e^3. The plunger mechanism is controlled by exerting pressure upon the plunger d and simply forces the roller bearing case e to a certain position whereupon the circuit controlling element is quickly and automatically caused to assume the position shown in Fig. 4 with the disk i engaging the terminals g^1 and g^2.

In order to open the circuit or sever the connection between terminals g^1 and g^2, pressure is exerted upon the projecting end j^1 of the latch bar j thereby causing the cut-away portion j^3 to come in alinement with the surface of the ring d^3. As soon as the two surfaces come in alinement the plunger d and the roller bearing case e are restored to the positions shown in Figs. 1 and 2, due to the tension exerted by the spring f. During this restoration of the plunger, the roller bearings e^2 are forced over the conical surface h^2 until the conical surface h^1 is engaged whereupon the device h is forced into the position shown in Figs. 1 and 2 by means of the pressure exerted by the rollers e^2 upon the conical surface h^1. After the mechanism is fully restored to its normal position, the cut-away portion of the latch j rests upon the ring d^3.

From the foregoing description it will be seen that the circuit controlling element h is independent or automatic in its action. The operation of the plunger d and of the latch j by the operator simply causes the initial action of the circuit controlling device h after which by its independent movement quickly opens or closes the circuit between the terminals g^1 and g^2.

The roller bearings e^2 insure quick and positive action and with little wear. The circuit controlling element h is free to rotate within its bearings and the plunger d with its mechanism is also free to rotate thus allowing a natural and uniform wear on all of the coöperating parts.

It will be understood that either ball or suitable roller bearings may be interposed between the inclined faces of the cones and the concentric spring; said elements serving to relieve the spring from torsional or rotating strains, which would tend to break the spring if said elements were not provided. Also, the structure described may be modified in the details set forth, without departing from the spirit of my invention.

Having thus described my invention what I desire to secure by Letters Patent is:

1. In a device of the class described, the combination with a movable circuit closer provided with conical surfaces, of contacts adapted to be engaged by said circuit closer, depressible plunger mechanism provided with roller bearings, means for operating said plunger mechanism whereby said bearings engage one of said conical surfaces and causes said circuit closer to engage said contacts, a latch bar for holding said plunger mechanism in a depressed position, means for returning plunger mechanism to its normal position, means for operating said latch bar to cause the restoration of said plunger mechanism, said plunger mechanism in restoring causing said roller bearings to engage another of said conical surfaces thereby disengaging said circuit closer from said contacts, substantially as set forth.

2. In a device of the class described, the combination with a movable circuit closing element provided with two conical surfaces, of contacts adapted to be engaged by said circuit closing element, depressible plunger mechanism provided with roller bearings, means for depressing said plunger mechanism whereby said bearings engage one of said conical surfaces to move said circuit closer into engagement with said contacts, a latch bar for holding said plunger mechanism in its depressed position, restoring means for said plunger mechanism, means for operating said latch bar to render said restoring means effective whereby the plunger mechanism in returning to its normal position causes the roller bearings to engage the other of said conical surfaces to throw the circuit closer out of engagement with said contacts, substantially as set forth.

3. The combination of a movable circuit closing element, a movable plunger mechanism in which the circuit closing element is movably received, conical surfaces formed on the circuit closing element, spring pressed roller bearings mounted on and extending through the plunger mechanism and adapted to coact with the conical surfaces upon the movement of the plunger mechanism to cause the circuit closing element to be moved for making or breaking the circuit.

4. In a device of the class described, a longitudinally movable circuit closing bar having double conical surfaces, a movable plunger inclosing said surfaces, spring pressed roller bearings carried by said plunger and in position to ride upon said surfaces when the said plunger moves in either direction, a spring normally holding said plunger at the limit of its movement in one direction, and a latch bar to hold said plunger against the tension of said spring.

In testimony whereof I do now affix my signature in the presence of two witnesses.

BURTON W. SWEET.

Witnesses:
FRANK BUBUA,
ALBERT LYNN LAWRENCE.