July 31, 1923. 1,463,551

V. S. HARDEY

SWITCH

Filed April 3, 1922

Fig. 1.

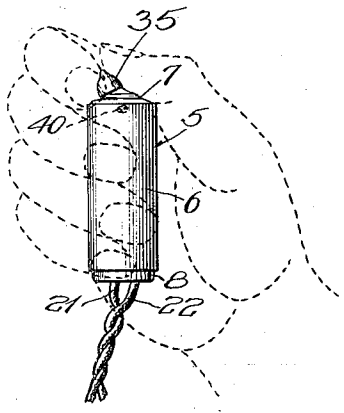


Fig. 2.

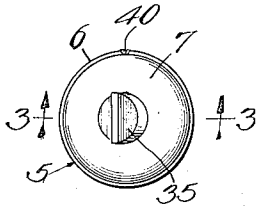


Fig. 3.

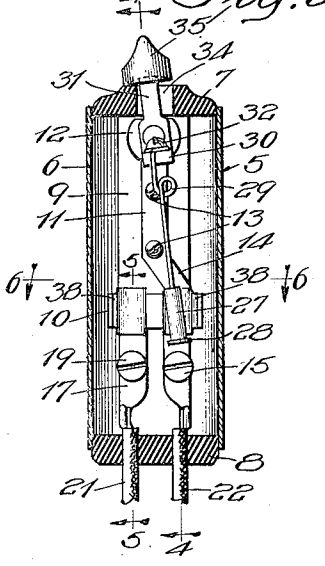


Fig. 4.

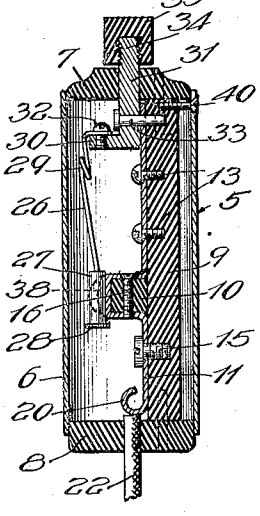


Fig. 5.

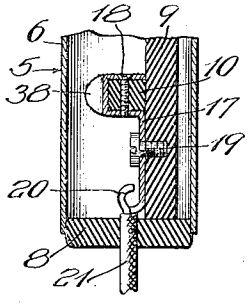
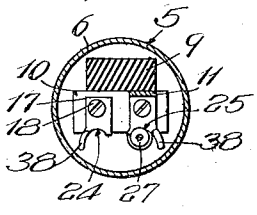


Fig. 6.



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UNITED STATES PATENT OFFICE.

VIRGIL S. HARDEY, OF CHICAGO, ILLINOIS.

SWITCH.

Application filed April 3, 1922. Serial No. 549,217.

To all whom it may concern:

Be it known that I, VIRGIL S. HARDEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to switches and more particularly to an improved switch especially adapted for use in setting electric meters and the like.

As is well known in the art, in setting an electricity measuring instrument, it is necessary to "inch" or move the pointer by small degrees or increments to the desired setting such as for example the zero reading. To secure a quick setting without over-running the point to which the pointer is being brought, quick opening and closing of the circuit through the instrument is necessary. Distraction of the operator's attention from the instrument or from the standard of reference or comparison where such standard is employed must be avoided and the means for opening and closing the circuit must be adapted for quick, convenient and positive operation. A switch that cannot be grasped and quickly and positively operated, or one which must be re-positioned or re-grasped between every opening and closing of the circuit is not satisfactory for this purpose. Neither is a switch in which the movement of the operating member is relatively great. I find that this movement must be relatively small and exceedingly quick to obtain satisfactory results.

An object of my invention is the provision of a novel, improved and simple switch that may be conveniently handled, and positively and quickly manipulated to inch a meter.

Another object of my invention is the provision of a simple and improved construction in which economy of material, low cost of production and improved functioning are obtained.

A further object is the provision of a switch, the assembly and relation between the parts of which is an improvement over the assembly and relation between the parts of the switches of the prior art.

A still further object is the provision of a switch that may be conveniently handled and manipulated with a minimum of distraction of the operator's attention.

Further objects and advantages of the invention will appear from the following detailed description and the claims, taken with an inspection of the accompanying drawings, in which:

Figure 1 is an elevational view of a switch embodying my invention showing the manner of handling and manipulating the same;

Fig. 2 is an enlarged top plan view of the switch;

Fig. 3 is a vertical sectional view through the switch casing on the line 3—3 of Fig. 2, the switch parts within the casing being shown in elevation;

Fig. 4 is a vertical sectional view taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary section taken on the line 5—5 of Fig. 3; and

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 3.

The embodiment of the invention selected for illustration comprises a casing 5 which contains the switch mechanism. The casing 5 comprises a cylindrical shell 6, the opposite ends of which are closed by end pieces 7 and 8. The casing 5 is preferably dimensioned and formed to be conveniently grasped in the palm of the hand as shown in Figure 1. The end pieces 7 and 8 which are formed of insulation, are secured in any suitable manner or formed integral with the opposite ends of a bar of insulation 9. The bar 9 is provided with a bridge piece 10, also of insulation. This bridge piece 10 is secured to the inner face of the bar 9 between the end pieces 7 and 8.

A terminal piece 11 having an enlarged aperture portion 12 at its upper end is secured above the bridge piece 10 to the inner face of the bar 9 by screws 13. As it approaches the bridge piece 10, the terminal piece 11 is off-set, as shown at 14, and upon reaching the bridge piece, extends out along the upper, down along the outer, and in along the lower face of the bridge 10 and back to the inner face of the bar 9, where it is secured by a screw 15. That portion of the terminal piece 11 extending around the bridge 10 is secured to the bridge by a screw 16. A terminal piece 17, the upper end of which extends along the upper, outer and lower faces of the bridge 10 and secured thereto by a screw 18, extends at its

lower end along the inner face of the bar 9 and is secured to the bar 9 below the bridge 10, by a screw 19. A pair of insulated conductors 21 and 22 between the ends of which the circuit is made and broken, as will be made apparent as this description proceeds, extend into the casing 5 through the end piece 8. The insulation is removed from the inner ends of the conductors 21 and 22 and they are soldered or otherwise secured to the lower ends of the terminal pieces 11 and 17, respectively, in proper electrical connection therewith, the lower ends of the terminal pieces being hooked or bent up at 20 in the device shown, to facilitate such connection. In the device shown, the conductors 21 and 22 are led in through separate openings through the end piece 8. They may be led in through a single opening in which an additional sleeve of insulation may be inserted if so desired.

Those portions of the terminal pieces 11 and 17 which extend along the outer face of the bridge 10 are provided with longitudinally extending depressions 24 and 25, respectively. These depressions form relatively fixed contact surfaces for cooperation with a relatively movable contact mounted upon a spring or yieldable arm 26 as shown. The relatively movable contact comprises a sleeve 27 having a radial flange 28 at its lower end and secured as by soldering or in any other desired manner upon one end of the arm 26, which in this instance, comprises a suitable wire, preferably spring wire, looped within its length, as at 29, and secured at its upper end to the outwardly extending arm 30 of an angle piece 31, as by means of a screw 32. A pin 33 headed at its outer end extends through the upwardly extending portion of the angle piece 31, through the aperture in the enlarged upper end 12 of the terminal piece 11 and into and is secured in the bar of insulation 9. The angle piece 31 and terminal piece 11 are thereby electrically connected and the angle piece pivoted to be swung about the pin 33. The upwardly extending arm of the angle piece 31 extends through a transversely elongated opening 34 and is threaded at its outer end to receive a button or finger piece 35 of insulation.

In testing a meter, the necessary circuit connections are made and the switch device is then grasped in the palm of the hand with the button or finger piece 35 between the thumb and forefinger, as shown in Figure 1. The finger piece 35 is then actuated to swing the angle piece 31, wire 26, and movable contact 27 carried thereby, in a clockwise direction about the pivot 33 to close the circuit through the switch. This actuation of the angle piece 31 moves the contact 27 from the depressed contact surface 25 into engagement with the depressed contact surface 24, and thereby completes the circuit from the conductor 22 through the terminal piece 11, angle piece 31, spring arm or wire 26, contact 27, and terminal 17, to the conductor 21. The operation of the switch is simple, positive and convenient, and the tester's attention is not distracted from the action of the mechanism from which the accuracy of the meter is computed. At the desired moment and without removing his attention from said mechanism, the finger piece 35 is actuated by a slight movement of the thumb or forefinger as the case may be, to swing the movable contact 27 from engagement with the contact surface 25 and back into the longitudinal depression of the terminal piece 17.

The resiliency of the arm 26 and the relative length of the arm between the pivot 33 and finger piece 35, and between the pivot 33 and contact 27 effects a quick movement of the contact 27. The movable switch arm is preferably biased so that an exceptionally quick and positive opening will be secured. The outer edges of the terminals 11 and 17 are struck up as shown at 38, adjacent the depressed contact portions 24 and 25, to insure proper positioning of the movable contact upon movement from one terminal piece to the other. In assembling the device the bar 9, end pieces 7 and 8, and switch parts carried thereby, are assembled into a unit, which unit is then inserted into the sleeve 6. The sleeve is secured in place by a set screw 40, the shank of which extends through a slot in one end of the sleeve and threads into the rear surface of the block 9.

It will be apparent from the above description, that I have provided an efficient and convenient switch which embodies marked mechanical and operating features. The device is capable of manufacture with a minimum number of operations and may be assembled easily.

Although the device has been described as particularly adapted for use in testing meters and the like, it will be understood that it may be used in various other relations, and in connection with various other electrical circuits than those so employed. Furthermore, I do not intend to limit the invention to the details of the particular embodiment which I have selected to show and describe. It is to be noted that the grooves in the contacts 24 and 25 offer a resistance to the movement of the contact 27. This resistance tends under the initial motion of the operating arm to put the spring 26 under stress in two directions first in the general line of motion from one contact to the other, and second, in a direction substantially at right angles to said line of motion. The result is that the spring is put under sufficient stress to cause the contact 27 to start to ride out of the groove. After it is

once started out of the groove the motion thereafter proceeds with a snap action to the end of the stroke. In addition, it is to be noted that the operating arm 31 is relatively short as compared with the spring arm. The result of this is to aid or accentuate the snap action.

I claim:

1. In a switch for inching a meter, switch mechanism, a projecting finger piece shaped and positioned to be grasped between the thumb and forefinger of the hand and actuated thereby to operate said switch mechanism, and a casing enclosing the switch mechanism to extend through and be gripped in the palm of the hand with said finger piece grasped between the thumb and forefinger.

2. In a switch for inching a meter, switch mechanism, a projecting finger piece shaped and positioned to be grasped between the thumb and forefinger of the hand and to operate said switch mechanism with relatively slight movement and a casing enclosing the switch mechanism to be grasped and held in the hand with said finger piece grasped between the thumb and forefinger.

3. In a switch for inching a meter, a casing formed to be grasped and held in the hand, a stationary contact, a movable contact, an arm of relatively great length for moving the movable contact, and an operating arm of relatively short length shaped and positioned to be grasped between the thumb and forefinger of the operator.

4. In a switch for inching a meter, a casing formed to be grasped and held in the hand, a stationary contact, a movable contact, an arm for moving the movable contact, an operating arm, said first arm being connected with said operating arm to be thrown by the movement of said operating arm.

5. In a switch for inching a meter, a casing formed to be grasped and held in the hand, a stationary contact, a movable contact, a spring arm of relatively great length for moving the movable contact, an operating arm of relatively short length shaped and positioned to be grasped between the thumb and forefinger of the operator, said first arm being connected with said operating arm to be thrown by the movement thereof.

6. In combination, a casing, end pieces for said casing, a block of insulation between said end pieces, a bridge piece carried by said block, a conducting strip arranged along said block and around said bridge piece, a second conducting strip arranged around said bridge piece and secured to said block, a switch arm pivoted in electrical engagement with one of said conducting strips, said arm having a contact portion adapted for engagement with cooperating portions of said strips, and means projecting from the casing for manipulating said arm to open and close the switch.

7. In combination, a casing, end pieces for said casing, a block of insulation between said end pieces, a pair of conducting pieces carried by said block, a switch arm pivoted in electrical connection with one of said conducting pieces, and means projecting from the casing for swinging said arm into and out of engagement with the other of said conducting pieces to open and close the circuit through the switch.

8. In combination, a casing formed to be conveniently grasped in the hand, end pieces for said casing, a block of insulation between said end pieces, a bridge piece carried by said block, conducting strips arranged along said block and formed adjacent said bridge piece to receive a movable contact and hold the same against displacement, an angle piece pivoted to one of said conducting strips, said angle piece having an arm projecting through an elongated opening in one of said end pieces and provided with a finger piece for manipulating the switch, a resilient arm attached to said angle piece, said arm having a contact for cooperation with the portions of the conducting strips formed to receive the same, the other end piece being formed to permit leading in a pair of conductors for connection with said conducting strips.

9. In combination, a movable contact, a pair of stationary contacts having means for hindering the motion of the movable contact from one stationary contact to the other, a rocking lever for moving the movable contact, said rocking lever comprising a spring and a casing enclosing said contact and formed to be conveniently grasped in the hand.

10. In combination, a movable contact, a pair of stationary contacts having means for preventing uniform motion of the movable contact, and a spring arm for moving the movable contact and a casing enclosing said contact and adapted to be conveniently grasped in the hand.

In witness whereof, I hereunto subscribe my name this 25 day of March, 1922.

VIRGIL S. HARDEY.