Sept. 18, 1934. H. C. CURTIS 1,973,800

SNAP SWITCH OPERATING MECHANISM

Filed Sept. 14, 1933

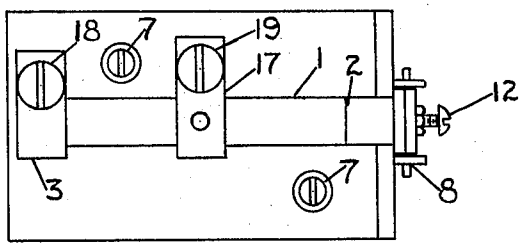

FIG. 1.

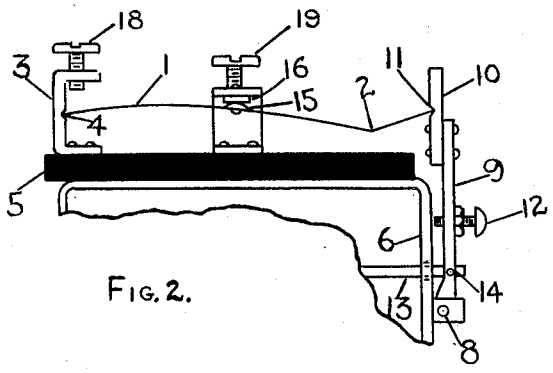

FIG. 2.

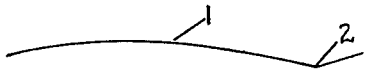

FIG. 3.

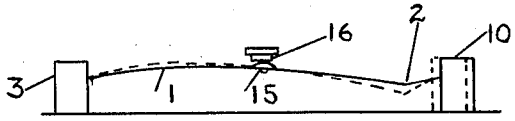

FIG 4

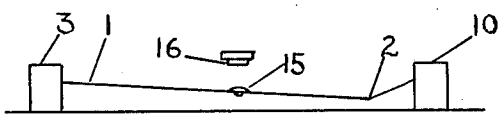

FIG. 5.

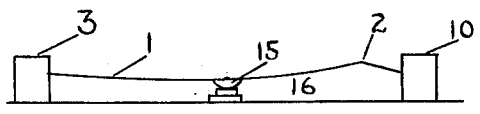

FIG. 6.

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Patented Sept. 18, 1934 1,973,800

UNITED STATES PATENT OFFICE

1,973,800

SNAP SWITCH OPERATING MECHANISM

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Application September 14, 1933, Serial No. 689,346

4 Claims. (Cl. 200—67)

This invention relates to quick make and break switches for electric circuits and is particularly applicable to switches which handle relatively small currents and which it is desired to operate by a small force through a reciprocatory movement of small extent.

Many of the snap switch mechanisms known heretofore have the objection that when the operating element which actuates them is moved slowly through its range of motion, they hesitate or dwell in a position intermediate between the two extreme operating positions. If the actuating element moves very slowly this may cause an arc to be maintained, resulting in burning of the contacts. This disadvantage has been overcome by providing additional links or latches, which require additional force for their operation due to the introduction of additional friction. Furthermore in overcoming the friction of rest of many pivotal bearings the pressure between the contacts just prior to their separation is often decreased to such a degree as to cause them to overheat and this leads to their rapid destruction. The present invention obviates the aforementioned and other disadvantages.

An object of the invention is to provide a switch mechanism of the character indicated having a minimum number of parts.

Another object is to provide a switch mechanism requiring a small operating force.

Another object is to provide a switch mechanism having a minimum friction.

Another object is to provide a switch mechanism which moves from one extreme position to the other without any tendency to hesitate in an intermediate position.

Another object is to provide a switch mechanism in which the pressure between the circuit closing contacts is maintained at substantially its normal value until they are separated by the action of the switch operator.

Other objects and advantages will hereinafter appear.

The accompanying drawing by way of illustration incorporates one embodiment of my invention, it being understood that the scope of the invention is not limited thereby but only by the appended claims.

In the drawing,

Figure 1 is a side elevation of a switch embodying my invention.

Fig. 2 is a plan view of the switch illustrated in Fig. 1.

Fig. 3 is a detail drawing of the spring employed in Fig. 1.

Figs. 4 and 5 are diagrammatical views of the mechanism in the closed and open positions, respectively, and

Fig. 6 is a modification of the contact mechanism shown in Fig. 1.

Referring to Figs. 1, 2 and 3, a spring of elastic sheet material 1 is shaped so that when at rest and without external forces imposed thereon, it has a long radius curvature in the direction of its major dimension at right angles to the faces thereof and extending over the major part of its length. Near one end the spring is given a return bend as at 2, said latter bend being sharp. The spring is supported on one end by a bracket 3 having a groove 4 to accommodate one knife edge-like end of the spring. The bracket 3 is fastened in any suitable way on an insulating base 5 which, in turn, is fastened to a supporting structure 6 by means of screws 7. The supporting structure 6 has also fastened thereon a bearing 8 on which is hingedly mounted a lever 9 carrying an extension 10, the latter being provided with a groove 11 in which rests the other knife edge-like end of the spring 1. The lever 9 is provided with an adjusting screw 12 by means of which its rotation towards the bracket 6 may be limited. An actuator element 13 is pivotally connected at 14 to the lever 9,—the movement of said actuator being thereby transmitted to the extension 10.

Intermediate of its ends the spring 1 carries on one of its faces a contact point 15 which engages with a cooperating contact point 16 fastened to a bracket 17 which, in turn, is fastened to the base plate 5.

Normally the contacts 15 and 16 engage, a circuit thereby being closed from the bracket 3 to the bracket 17, the former being provided for that purpose with a terminal screw 18 and the latter with a terminal screw 19. If the actuator moves to the left, it exerts a lateral pressure on the spring which causes it to bow as shown by the dotted line in Fig. 4, the spring partially pivoting about the fixed contact point 16 and the contact 15 also sliding on contact 16. The contact pressure is thereby increased. At the same time, a downward component is exerted by the extension 10 upon the right hand end of the spring, said component pushing the right hand end downward as indicated, thus tending to decrease the angle at the bend 2. When a certain downward pressure is reached, it overcomes the upward thrust between the contacts and the spring is snapped into the position shown in Fig. 5 and the contacts are suddenly separated with

a snap motion. If, through the action of the actuator 13, the extension 10 is moved to the right, the spring elongates until the downward thrust on the right hand side is not any more sufficient to hold it in the deformed position illustrated in Fig. 5 and the spring snaps back again thereby closing the circuit and assuming the position shown in Figs. 1 and 4.

Instead of moving the abutment 10 it would also be possible to move both abutments as is obvious. It will also be apparent that the spring and stationary contact may be reversed as indicated in Fig. 6.

The sensitivity of the device may be adjusted by obvious adjustments of the relative abutments 3 and 10 or by vertical adjustments of the contact 16.

The device herein illustrated and described is easily manufactured and due to the almost complete elimination of friction is very sensitive in operation. The actuating element may be, for instance, a bimetallic strip responsive to temperature, a pressure responsive device or any other of a great variety of devices responding to small variations of the actuating force.

What I claim as new and desire to secure by Letters Patent is:

1. A snap motion oscillating mechanism comprising, in combination, a strip of resilient material which, when unrestrained, is curved in opposite directions at right angle to the faces thereof and in a plane in the direction of its major dimension, one of said curvatures being of relatively large radius and extending over the major portion of the length of said strip and the other curvature having a short radius, pivotal abutments for the ends of said strip, an intermediate abutment located opposite one face of said strip and means to move one of said first mentioned abutments towards and away from another of said first mentioned abutments to thereby put a lateral strain on said strip and cause the middle portion of the face of said strip to move into and out of engagement with said intermediate abutment with a snap motion.

2. A snap motion oscillating mechanism comprising, in combination, a strip of resilient material which, when unrestrained, is curved in opposite directions at right angle to the faces thereof and in a plane in the direction of its major dimension, one of said curvatures being of relatively large radius and extending over the major portion of the length of said strip and the other curvature having a short radius, pivotal abutments for the ends of said strip, an intermediate abutment located opposite one face of said strip and means to vary the distance between said first mentioned abutments and to put a lateral strain on said strip, varying as a result of the variations of said distance, to thereby cause the middle portion of the face of said strip to move into and out of engagement with said intermediate abutment with a snap motion.

3. A snap motion oscillating mechanism comprising, in combination, a strip of resilient material which, when unrestrained, is curved in opposite directions at right angle to the faces thereof and in a plane in the direction of its major dimension, one of said curvatures being of relatively large radius and extending over the major portion of the length of said strip and the other curvature having a short radius, pivotal abutments for the ends of said strip, an intermediate abutment located opposite one face of said strip, an actuator for moving at least one of said first mentioned abutments towards and away from the other of said first mentioned abutments and to put a lateral strain on said strip, varying as a result of the variations of said distance, to thereby cause the middle portion of the face of said strip to move into and out of engagement with said intermediate abutment with a snap motion.

4. A snap switch comprising, in combination, a strip of resilient conducting material which when unrestrained is curved in opposite directions at right angle to the faces thereof and in a plane in the direction of its major dimension, one of said curvatures being of relatively large radius and extending over the major portion of the length of said strip and the other curvature having a short radius, pivotal abutments for the ends of said strips, at least one of said abutments forming one terminal of an electric circuit, an intermediate abutment located opposite one face of said strip and forming another terminal of said circuit and means to vary the distance between said first mentioned abutments and to put a lateral strain on said strip, varying as a result of the variations of said distance, to thereby cause the middle portion of the face of said strip to move into and out of engagement with said intermediate abutment with a snap motion and open and close the circuit between said terminals.

HERBERT C. CURTIS.