June 12, 1951 E. C. RANEY 2,556,216

SNAP SWITCH MECHANISM

Filed Jan. 17, 1948

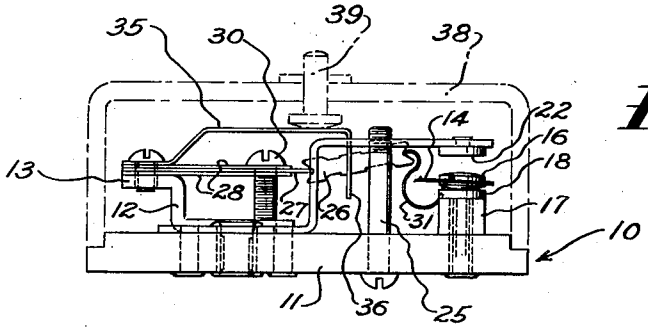


Fig. 1

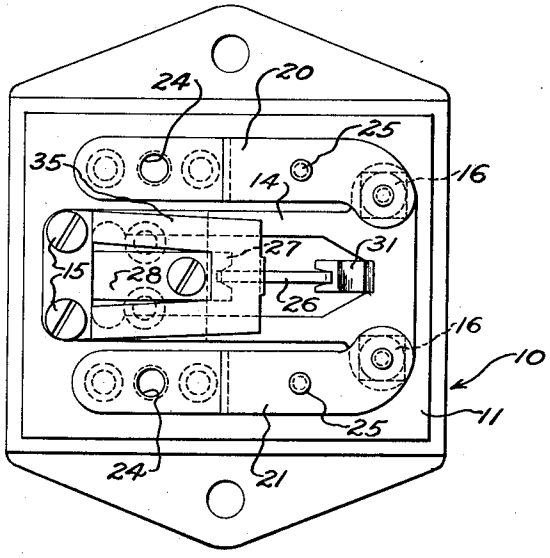


Fig. 2

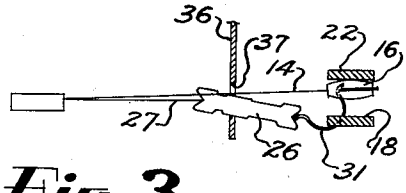


Fig. 3

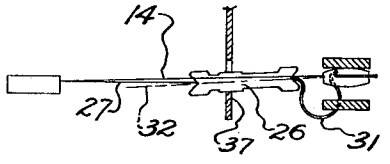


Fig. 4

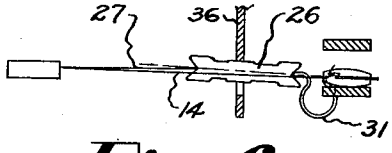


Fig. 6

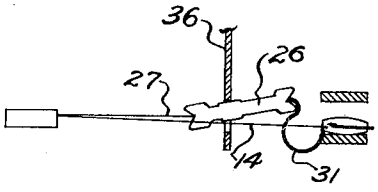


Fig. 5

INVENTOR.
ESTEL C. RANEY

BY Fay, Goldrick & Fay

ATTORNEYS

Patented June 12, 1951 2,556,216

UNITED STATES PATENT OFFICE

2,556,216

SNAP SWITCH MECHANISM

Estel C. Raney, Delaware, Ohio, assignor to Ranco, Incorporated, Columbus, Ohio, a corporation of Ohio

Application January 17, 1948, Serial No. 2,822

2 Claims. (Cl. 200—67)

1

The present invention relates to a snap switch mechanism and more particularly to a double throw snap switch in which the movable contact is moved with a snap action in opposite directions.

An object of the invention is to provide a double throw snap acting switch which will maintain a positive contact pressure until the instant that the contact is moved with a snap action from either contact to the opposite contact.

Another object of the invention is to provide a snap acting switch which requires a minimum of pressure to actuate the mechanism and at the same time provides positive contact pressure as the switch actuating member is gradually moved from one switch actuating position to the other.

Other objects and advantages of the invention will be apparent from the following description of a preferred form of the invention, reference being made to the accompanying drawings wherein:

Fig. 1 is a side view in elevation of a double throw snap acting switch, parts thereof being broken away for the sake of clarity;

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

Fig. 3 is a diagrammatic illustration of the switch parts when the switch is in one position;

Fig. 4 is a view similar to Fig. 3 but showing certain parts of the switch in another position;

Fig. 5 is a view similar to Fig. 3, but showing the switch members in the opposite position; and

Fig. 6 is a view similar to Fig. 4 but showing the switch members in the opposite position.

The present switching mechanism may be operated by any suitable actuating means such as by a thermostat or manually operated means, but for the purposes of illustrating the invention I have shown a manually operated switching mechanism indicated generally at 10. The mechanism 10 comprises a base member 11 which is preferably formed of a suitable dielectric material. A rigid bracket 12 is riveted to the base 11 and this bracket includes a platform portion 13 which is spaced from and extends parallel to the upper surface of base 11. The ends of a U shaped strip 14 are attached to the platform 13 by screws 15 and the yoked end of the strip has attached thereto a pair of contact members 16. The strip 14 is preferably formed of a flexible, resilient material which is also a good electric conductor, such as beryllium copper, for example.

Two fixed contact posts 17, only one of which appears in the drawings, is riveted to the base 11 and carry contact surfaces 18 which are engaged by the contacts 16, respectively. Suitable means, not shown, may be provided for connecting lead wires to the contact post 17. Two brackets 20 and 21 are attached at one end to

2

opposite sides of the base 11 and the opposite ends of these brackets extend above the base 11 and each carry a contact 22 which are disposed in alignment with the upper surfaces of the respective contacts 16. The brackets 20 and 21 are riveted to the base and they are also provided with threaded openings 24 for receiving terminal screws, not shown. The positions of the contacts 22 relative to the base 11 may be adjusted by screws 25 which are threaded into openings in the brackets 20 and 21 so that by turning the respective screws 25 the brackets will be moved toward or away from the base 11 respectively. It will be seen that the free end of the strip 14 may be shifted between the two sets of fixed contacts 18 and 22 for making and breaking two circuits through the switch.

The strip 14 is adapted to be shifted from one set of contacts to the other with a snap action by a toggle mechanism which comprises a toggle member 26 and a compression spring 31. One end of the toggle member 26 is pivoted on one end of a fixed plate 27 by a V bearing structure. The opposite end of the plate 27 is anchored to the platform 13 of bracket 12 and the plate 27 is reinforced by strips 28 disposed on opposite sides thereof. The plate 27 and strips 28 are preferably of resilient material normally flexed upwardly and the position of the pivot end of plate 27 is fixed by the head of a screw 30, which screw extends through an opening through the plate and strips and which is threaded into the base 11. The head of the screw 30 engages the upper plate 28 and thereby positions the end of plate 27 to which the toggle member 26 is pivoted. By adjusting the screw 30 the position of the pivot point for the toggle member 26 can be accurately fixed, and this point is adjusted to lie midway between the center line positions of strip 14 when the strip is in the positions to engage contacts 16 with contacts 18 and 22, respectively, as seen in Figs. 4 and 5.

As may be seen clearly in Fig. 2, the toggle member 26 is disposed to be in alignment with the opening between the legs of the strip 14, and the C-shaped compression spring 31 is interposed between the free end of the toggle member 26 and the yoke of the strip 14. As is shown in the drawings, the connections at the ends of the opening are V and knife edged to minimize friction. It will be seen by comparing Figs. 3, 4 and 5 that the toggle member 26 and spring 31 form a toggle joint movable from one side to the other of a dead center position, which position is indicated by the line 32 in Fig. 4. When the toggle member 26 is in the lowered position as seen in Fig. 3, the spring 31 will urge the member 14 upwardly so that contacts 16 will engage contacts 22. When the

toggle member 26 is in its dead center position, as shown in Fig. 4, there will continue to be an upward component of force exerted on strip 14 by the spring 31 so that although the toggle member is at its dead center position there will be a positive contact pressure maintained by spring 31. The instant that member 26 passes through its dead center position the free end of the toggle member will be snapped above the center line of strip 14 and cause the strip 14 to be forced downwardly by spring 31 with a snap movement, as is illustrated in Fig. 5. The same type of snap movement will occur in the opposite direction with the toggle member 26 passing through its dead center while the spring applies a downward force on strip 14, as may be seen in Fig. 6.

In order to obtain the rapid snap movement of the strip 14 by the toggle comprising the member 26 and spring 31 it is essential that the toggle member be free to move after it has passed its dead center position. To provide for this free movement the switch is adapted to be actuated by a member 35 which is connected to the toggle member 26 by a lost motion connection. The actuating member 35 consists of a U-shaped spring member having the ends of its legs anchored to the platform 13 of bracket 12. The outer end of the bracket has a downturned tongue 36 provided with a slot 37 therein through which the member 26 extends. The slot 37 is somewhat longer than the depth of the toggle member 26 so that as the toggle member is moved through dead center it will be free to travel from one end of the slot to the other, thereby permitting a snap movement of the free end of the toggle member to the opposite side of the center line of strip 14 and thereby impart a snap movement to the strip 14. In the present embodiment the actuating member 35 is normally biased upwardly to normally maintain the switch mechanism in the position shown in Fig. 5. The actuating member may be depressed by any suitable type of actuating device, and in Fig. 1 there is indicated a cover 38 having a push button 39 reciprocable therein and engageable with the actuating member 35.

The snap switch just described is particularly suitable for double throw switches because it provides positive contact pressure up to the instant of snap movement of the movable contact carrier in opposite directions. It will be understood that the mechanism is suitable for single throw switches, in which case either one of the contacts 16 or 22 could be eliminated and suitable stop members substituted therefor.

The snap mechanism enables relatively light weight parts to be utilized, thereby reducing the power necessary to actuate the switching mechanism so that the mechanism could be operated by sensitive thermal responsive elements to provide close response to temperature conditions.

Although I have described but one form of the invention it is to be understood that other forms might be adopted, all falling within the scope of the claims which follow.

I claim:

1. A double throw snap acting switch mechanism comprising an elongated strip anchored at one end and having a contact at the opposite end, a pair of spaced stops between which said opposite end of said strip is adapted to shift, a toggle member extending in the same general direction as said strip, means pivotally supporting one end of said toggle member intermediate the ends of said strip, the other end of said toggle member being swingable from one side to the other of the center line of said strip, said strip being adapted to move from one side to the other of the axis of the toggle member pivot as said opposite end shifts between said stops, a compression spring having one end connected to the swingable end of said toggle member and the opposite end connected with said strip adjacent to said opposite end, and an actuating means for moving said toggle member about its pivot, said means having a lost motion connection with said toggle member whereby said swingable end of the toggle member has limited free swinging movement from one side of the center line of said strip to the other, said spring adapted to react between said toggle member and strip to urge said opposite end of said strip to one or the other of said stops and said swingable end of said toggle member to its limit of movement opposite to the stop engaged by said strip.

2. A double throw snap acting switch mechanism comprising an elongated strip anchored at one end and having a contact at the opposite end, a pair of spaced stops between which said opposite end of said strip is adapted to shift, a toggle member extending in the same general direction as said strip, means pivotally supporting one end of said toggle member approximately midway between the ends of said strip, the other end of said toggle member being swingable from one side to the other of the center line of said strip, said strip being adapted to move from one side to the other of the axis of the toggle member pivot as said opposite end shifts between said stops, a compression spring having one end connected to the swingable end of said toggle member and the opposite end connected with said strip adjacent to said opposite end of said strip, and an actuating means for moving said toggle member about its pivot, said means having a lost motion connection with said toggle member whereby said swingable end of the toggle member has limited free swinging movement from one side of the center line of said strip to the other, said spring adapted to react between said toggle member and strip to urge said opposite end of said strip to one or the other of said stops and said swingable end of said toggle member to its limit of movement opposite to the stop engaged by said strip.

ESTEL C. RANEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,995,877	Woodworth	Mar. 26, 1935
2,135,864	Weber	Nov. 8, 1938
2,170,748	Eaton	Aug. 22, 1939
2,228,523	Johnson	Jan. 14, 1941
2,428,172	Miller	Sept. 30, 1947
2,429,074	Rugh	Oct. 14, 1947

FOREIGN PATENTS

Number	Country	Date
551,021	Great Britain	Feb. 4, 1943