July 1, 1952 D. MORRISON 2,602,127

SNAP SWITCH

Filed Nov. 30, 1950

Fig. 1.

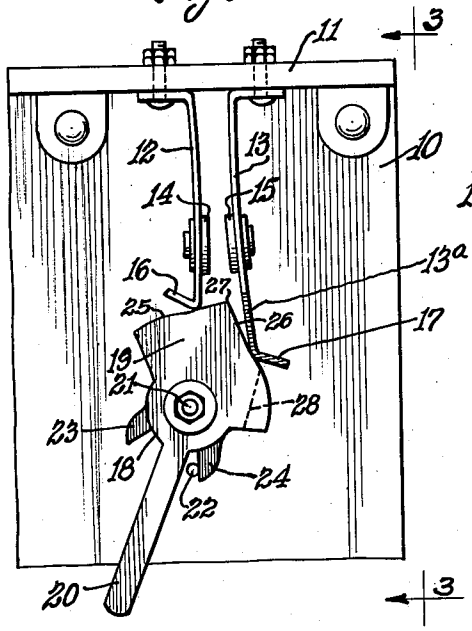


Fig. 2.

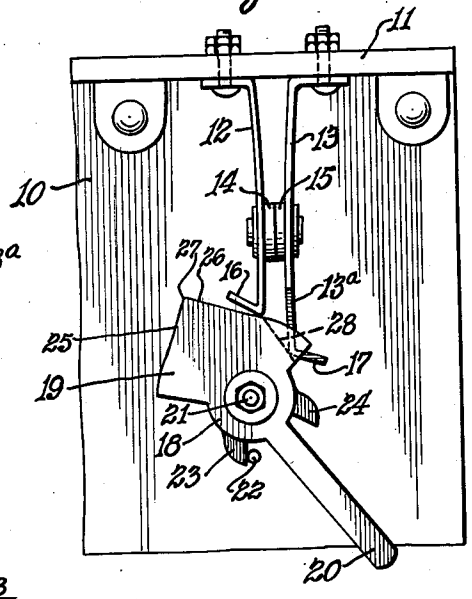
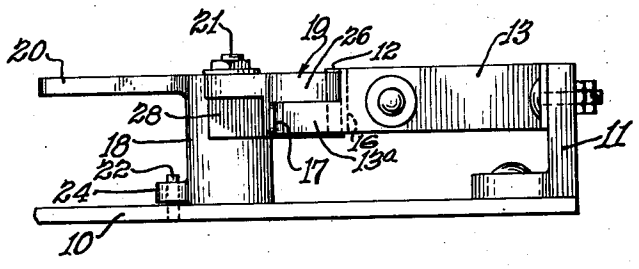


Fig. 3.



INVENTOR
David Morrison
BY Fraud J. Schraeder Jr.
Attorney

Patented July 1, 1952 2,602,127

UNITED STATES PATENT OFFICE

2,602,127

SNAP SWITCH

David Morrison, Manitowoc, Wis., assignor to Paragon Electric Company, Two Rivers, Wis., a corporation of Wisconsin

Application November 30, 1950, Serial No. 198,264

5 Claims. (Cl. 200—68)

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In electrically controlled timing systems, it is necessary that the circuit-controlling switches both open and close with a snap action, in order to achieve accurate timing.

The present invention has for its purpose to create a switch means that will function effectively in the aforesaid manner and yet be very simple in construction.

As it is common to make the relatively movable members or arms of small switches in the form of spring blades, it is a further purpose of this invention to utilize the resiliency of such blades to bring about snap movements of the blades relatively to each other, both in closing and in opening such switches.

The present invention may therefore be said to have for an object the creation of a simple and novel actuator to cause energy stored in the spring blades of a switch to be utilized in instantaneously opening and closing the same.

In the preferred manner of carrying out my invention, using a pair of cooperating spring blades anchored at corresponding ends and having their other ends free, I provide a rocking cam engaging with the free ends of the blades; the cam serving to cause one blade to snap away from and then snap into engagement with the other blade when the cam is rocked from one limit to the other and back again.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claims, but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a plan view of a switch means embodying my invention, the switch being open; Fig. 2 is a view similar to Fig. 1, showing the switch closed; and Fig. 3 is a view looking from line 3—3 in Fig. 1.

In the drawing I have illustrated a simple embodiment of my invention disassociated from any control system or apparatus and, for the sake of brevity, the detailed description will be confined to this embodiment.

Referring to the drawing, 10 is a suitable flat base along one edge of which rises a ledge 11 of insulating material. 12 and 13 are two parallel spring blades, arranged on edge and anchored at corresponding ends to member 11, with their other ends free; the blades overlying and being parallel to the base. The blades are provided on their inner sides with cooperating con-

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tact pieces, 14 and 15, respectively, and are under an initial stress tending constantly to hold the contact pieces in engagement with each other.

The free end of one blade projects beyond the corresponding end of the other blade. This may be done in various ways, all of which may be said, in a sense, to make one blade longer than the other. In the arrangement shown, blade 13 is actually longer than blade 12, because both are attached to the ledge 11. The upper half of blade 13, for some distance from the free end, is cut away, leaving there only a finger-like portion 13a.

Blade 12 has its free end bent outwardly and backward to form a flange or lip 16. The free end of the blade 13 is also bent outwardly, but at an obtuse angle, to create a flange or lip 17 that is more or less parallel to element 16.

Mounted on the base beyond the free ends of the spring blades, is the switch actuator. This actuator consists of a vertical, cylindrical block 18 of insulating material provided at its upper end with a cam 19 and with a radial operating arm 20. Member 18 surrounds and is movable angularly about a post 21 rising from the base; the extent of movement being limited, for example, by a pin 22 fixed to the base 10 and positioned between two ears, 23 and 24 on and spaced apart angularly of member 18.

The main portion of cam 19 is an approximately triangular part having vertical edge faces, 25 and 26, that form with each other an angle in the neighborhood of ninety degrees and meet at the apex 27. The cam is about as thick as the width of the blades. The edge 26 is undercut, as at 28, toward the base of the triangle, for a distance of somewhat more than one half the thickness of the cam.

The cam lies between the plane of the upper edges of the blades and the plane containing the lower edges; and, when at one limit of its movement as shown in Fig. 1, the apex thereof extends well forward into the space between the switch blades. At this time the blades are spread apart, so that the contacts are held out of engagement with each other. If the arm 20 be now swung in the counter-clockwise direction, edge 25 of the cam will push the free end of blade 12 toward the left until the apex reaches that blade. Continued movement of the cam brings edge or slope 26 of the cam into engagement with the end of blade 12. The movement of the cam up to this point has resulted in stressing blade 12 so that, as soon as this blade touches

edge 26, its stored energy is released to drive the cam farther in the direction in which it was going; this action being instantaneous. During the first part of the movement of the cam, blade 13 simply rides on slope or edge 26. However, by the time that blade 12 has snapped back, finger portion 13a of blade 13 has come opposite the undercut part 28 on the cam, and blade 13 is no longer under constraint and a quick closing of the switch occurs.

To cause the switch to close, therefore, the cam is moved by its arm until it is carried a little past center, whereupon the energy stored in blade 12 drives the cam to the limit of its movement and at the same time snaps over against blade 13; the switch now being closed as shown in Fig. 2 and being maintained in that condition until an outside force is again applied to turn the cam back.

To open the switch again, the switch arm is swung in the clockwise direction from the closed switch position in Fig. 2. The apex of the cam being now on the outer side of blade 12, this movement causes both switch blades to be deflected toward the right until the cam is a little past center. Then, blade 13 being held back by the cam, blade 12 snaps against slope 25 of the cam and drives the cam to the limit of its stroke in the clockwise direction, namely, into the position occupied in Fig. 1.

The parts may be so proportioned that, when the switch is closed, there is a little lost motion between the cam and the blades; thus insuring that the initial stress in the blades may be exerted in full to hold the switch closed. However, if desired, either or both blades may at all times be in contact with the cam.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact details thus illustrated and described but intend to cover all forms and arrangements that come within the definitions of my invention constituting the appended claims.

I claim:

1. A snap switch having two cooperating contacts movable relatively to each other to open and close the switch, a spring blade on which one of said contacts is mounted, said blade being anchored at one end and having its other end free, said blade being under an initial stress tending constantly to hold its contact in engagement with the other contact, and an actuator beyond the free end of the blade having a triangular element lying in the plane in which the blade moves in opening and closing the switch, said triangular element being mounted for rocking movements about a stationary axis intersecting the same, a portion at the apex of said element overlapping the blade, and means to move the actuator back and forth to cause the blade to be deflected until it reaches said apex and snaps from one side of said element to the other upon each backward or forward movement.

2. A snap switch having a supporting member, two parallel spring blades anchored at corresponding ends on said member while having their other ends free, cooperating contacts on said blades, the blades being initially stressed so as yieldingly to hold the contacts in engagement with each other, a cam beyond and engaging with the free ends of both blades, mounted on said member to rock, about a stationary axis that intersects the same, in a plane transverse to the

planes of the individual blades and intersecting the blades, said cam having an element with sloping sides meeting at an angle and which in one position of the cam lies between the blades and spreads them apart whereas, in another position of the cam, said element lies on the outer side of one of the blades and leaves the blades free with their contacts engaging each other.

3. A snap switch having a supporting member, two parallel spring blades anchored at corresponding ends on said member while having their other ends free, cooperating contacts on said blades, the blades being initially stressed so as yieldingly to hold the contacts in engagement with each other, a cam beyond and in engagement with the free ends of both blades, a stationary pivot pin extending from said member into the cam to allow the latter to rock in a plane transverse to the planes of the individual blades and intersecting the blades, said cam having an element with sloping sides meeting at an angle and which in one position of the cam lies between and in contact with both of the blades, whereas, in a second position of the cam, said element lies on the outer side of one of the blades and clear of the other blade, the angular width of said part of the cam that enters the space between the blades being sufficiently great to spread the blades apart and open the switch upon such entry.

4. A snap switch having two parallel spring blades anchored at corresponding ends while their other ends are free, one blade being longer than the other so that its free end projects beyond the free end of the other, cooperating contacts on the blades, the blades being initially stressed to cause them to press the contacts together, a cam mounted directly on a stationary pivot beyond the ends of the blades to rock in the plane of movement of the blades in opening and closing the switch, said cam bearing against the inner side of the longer blade near the free end of the latter and having a triangular element the apex of which lies on the outer side of the short blade, near the free end of the latter when the switch is closed, and means to rock said cam between the switch-closed position and a switch-open position wherein the apex lies between the blades; the shape of the cam being such that the blades are free to close the switch in the first of said positions of the cam and are held in spread relation to each other by the cam in the other cam position.

5. A snap switch having two parallel spring blades anchored at corresponding ends while their other ends are free, one blade being longer than the other so that its free end projects beyond the free end of the other, cooperating contacts on the blades, the blades being initially stressed to cause them to press the contacts together, a cam mounted directly on a stationary pivot beyond the ends of the blades to rock in the plane of movement of the blades in opening and closing the switch, said cam having a triangular element the apex of which lies on the outer side of the short blade, near the free end of the latter, when the switch is closed, means to rock said cam between the switch-closed position and a switch-open position wherein said apex lies between the blades, said triangular element engaging the inner sides of both blades in the switch-open position to spread the blades apart and the cam face dropping

away beyond the triangular element on the side toward the long blade to allow the latter to follow after the short blade, until the short blade reaches said apex, during a switch opening movement of the cam.

DAVID MORRISON.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
748,638	McQuown	Jan. 5, 1904
1,102,639	Benjamin	July 7, 1914
2,215,414	Wilcox	Sept. 17, 1940
2,481 141	Morrison	Sept. 6, 1949
2,528,841	Morrison	Nov. 7, 1950