

Oct. 10, 1933.

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1,929,545

SNAP SWITCH AND ACTUATOR

Original Filed Sept. 2, 1931

Fig. 1.

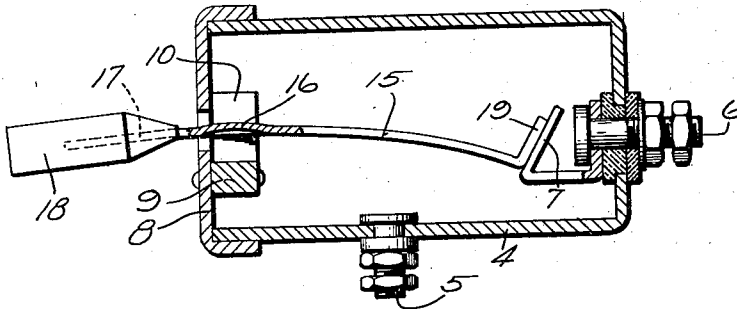


Fig. 2.

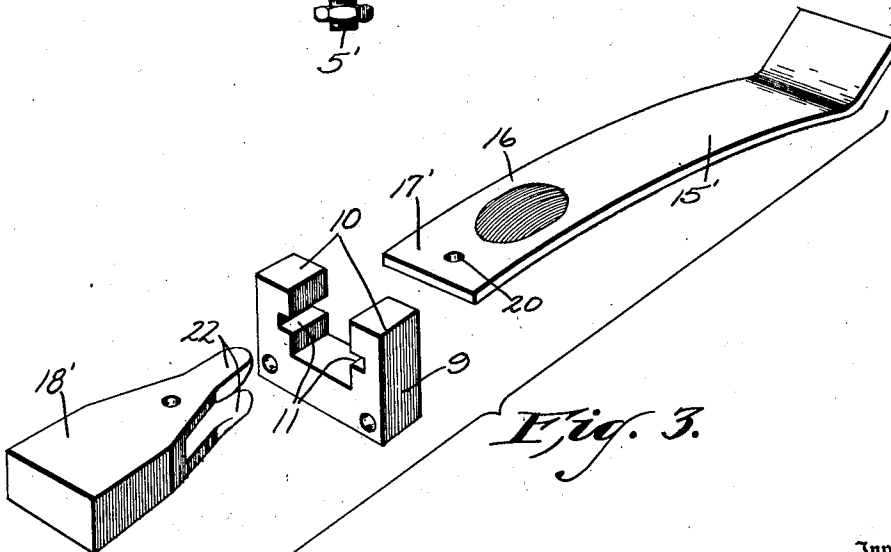
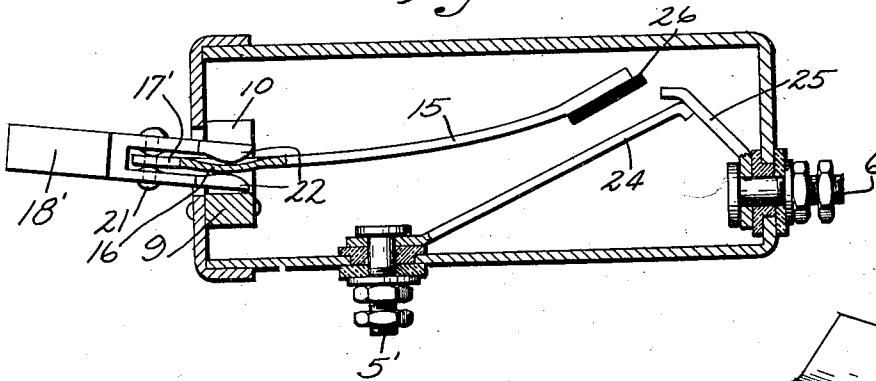


Fig. 3.

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1,929,545

SNAP SWITCH AND ACTUATOR

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Continuation of application Serial No. 560,773,
September 2, 1931. This application September
21, 1932. Serial No. 634,105

20 Claims. (Cl. 200—67)

This invention relates to improvements in snap switches and actuators.

It is the object of the invention to provide an improved simple and inexpensive form of snap switch wherein a spring actuator having an integral portion distorted by embossing is so mounted that its distorted portion may be reversed to project at one side or the other of the actuator and thereby to deflect the entire actuator in one direction or the other with a snap action.

It is a further object of the invention to provide a construction in which a relatively large movement of the switch contact at the end of the spring actuator may be effected by a relatively small movement in the reversal of the distorted portion of the actuator.

It is a further object of the invention to provide a spring actuator in which an integral distorted portion of relatively greater flexibility than the rest of the actuator spring can be reversed from one side of the spring to the other by a manipulation of one end of the spring itself, thereby causing the other end of the spring to move in the same direction as the direction in which the manipulated end of the spring is moved. It is unnecessary, in the use of the device embodying my invention, to apply pressure directly to the distorted area of the actuator, the flexibility of such area being such that it can be reversed by manipulation of undistorted portions of the actuator.

It is my further purpose to provide a device in which an actuator having a distorted area is mounted in a support which is laterally adjacent the distorted area and preferably centered with reference thereto.

It is my further object to provide an embodiment of the invention in which an actuating handle is mounted directly on the spring actuator for movement independently of said actuator in directions to reverse the distorted integral portion of the actuator whereby its deflection is controlled.

This application is a continuation of application 560,773 filed September 2, 1931, wherein the drawing and description do not exactly correspond with devices previously made and tested by me.

In the drawing:

Figure 1 is an axial section through a switch device embodying the invention wherein one contact of the switch is an integral part of the actuator.

Figure 2 is a view similar to Figure 1 showing

a modified embodiment of the invention wherein the actuator is distinct from the switch contacts.

Figure 3 is an enlarged detail in perspective of three of the component parts employed in the Figure 2 assembly, as they appear slightly separated but otherwise in position for assembly.

Like parts are identified by the same reference characters throughout the several views.

As a convenient means for assembling the parts I have shown a switch case 4 to which, for many purposes, the terminal 5 may be directly connected. Terminal 6 is insulated from the case and provided interiorly thereof with a switch contact 7.

Carried by the cover portion 8 of the case for convenient assembly therein is the actuator mounting block 9 which is shown in detail in Figure 3 and, for the purposes of the Figure 1 disclosure, may be made of metal in order to connect the actuator electrically with terminal 5. This block has upwardly extending arms comprising spaced mounting means in the opposing surfaces of which are grooves 11 into which the marginal portions of the actuator are receivable for permanent mounting, being either retained therein by friction or by compression of the block 9 thereon or by any other suitable anchorage expedient.

The actuator 15 comprises a strip of spring material, preferably metal such as steel or spring bronze in which, laterally adjacent the points of anchorage and preferably projecting symmetrically therebeyond, is an elongated area 16 embossed out of the plane of the remainder of the strip. This area 16 comprises a reversible snap portion or snap member adapted to move the actuator 15 as will appear subsequently. The projection of the embossed portion 16 at one side or the other of the strip so distorts the strip that it will assume a curvature opposite to the direction in which the embossed portion projects. If the direction of projection of the embossed portion 16 is reversed either by deflecting the strip or by pressure on the embossed portion itself, the embossed portion will cross the plane of the strip with snap action and the strip will change its curvature accordingly and with a similarly decisive movement.

The deforming operation by which the elongated area 16 is pressed from the plane of the strip will render the said area more flexible than the remainder of the strip. The flexibility may also be controlled by other operations

such as those involved in tempering the spring. It is desirable, however, that the said area should be relatively flexible so that it may be thrown from one side to the other by manipulation of the spring itself.

In the Figure 1 construction the actuator is provided at 17 with an integral handle supporting extension upon which a convenient handle 18 is cast or otherwise attached. If the handle 18 is raised from the position in which it appears in Figure 1 it will act to change and reverse the curve resiliently assumed by the actuator. It will be noted that insofar as the actuator may tend to act as a lever fulcrumed on its mounting block 9 the pressure between its contact portion 19 and the fixed contact 7 will be increased pending the time when the embossed portion 16 is thrown downwardly to the underside of the actuator. Thereupon the curve of the actuator is reversed as shown in Figure 2, the actuator being always concave opposite to the position of the embossed area. In the upwardly concave position of the actuator, contact 19 will be snapped away from contact 7, thereby opening the circuit controlled by the switch.

In the construction shown in Figures 2 and 3 the handle support portion 17' of the actuator is shorter and is provided with an aperture at 20 upon which the handle 18' is loosely fulcrumed for a limited independent pivotal movement by a pin 21. Finger portions 22 of the handle extend along the upper and lower faces of the actuator between the arms 10 of the actuator mounting block 9 and are formed to lie in close proximity with the upper and lower faces of embossed portion 16 of the actuator. Thus in any manipulation of handle 18' pressure is simultaneously applied to the end of the actuator and directly to the embossed area of the actuator in a direction to reverse its curvature and hence to promote snap action.

In the Figure 2 construction terminal 5' as well as terminal 6 is insulated from the case. Terminal 5' has a spring contact 24 yieldably projecting within the case to a position for wiping engagement with the upwardly projecting contact 25 connected with terminal 6. In the upwardly curving position of actuator 15 the dielectric pad 26 at its end may be entirely free of the switch contacts but when the curvature of the actuator is reversed by the opposite deflection of its embossed area 16 the actuator will snap downwardly to a position corresponding to that shown in Figure 1, thereby forcing the spring contact 24 out of engagement with contact 25 and opening the switch circuit.

I claim:

1. In a device of the character described, a snap actuator comprising an elongated resilient strip having free ends and an area formed out of the plane of the strip and subject to distortion from one side of the strip to the other, said area being adapted to deflect the strip in a curve which is concave on the opposite side of the strip from that at which said area projects, a mounting device engaging said strip intermediate the ends thereof and laterally adjacent said area, deflecting means connected with one end of said strip and operative through the strip upon said area to reverse the distortion of said area, whereby to cause movement of the other end thereof and a contact carried by said other end.

2. In a device of the character described, the

combination of a resilient strip having an elongated area formed out of the plane of the strip and spaced from one of its side margins, and a mounting device engaging said strip solely at its marginal portion adjacent said area, whereby the ends of the strip are free for deflection in opposition to said area.

3. In a device of the character described, the combination with an actuator comprising a resilient strip having an area intermediate its margins and materially spaced from its ends formed out of the plane of the strip, a mounting for said strip engaging it solely in the region of said area, and means for reversing said area from one side of the strip to the other whereby to reverse the curvature assumed by said strip in opposition to the side at which said area projects, one end of said strip comprising an arm whereby the motion produced by the reversal of said area is multiplied.

4. In a device of the character described, the combination with an actuator comprising a resilient strip having free end portions, an area between said end portions formed out of the plane of the strip, a mounting for said strip engaging its margin solely adjacent the central portion of said area, and means for reversing said area from one side of the strip to the other whereby to reverse the curvature assumed by said strip in opposition to the side at which said area projects, said reversing means comprising one of said end portions of the strip projecting from said mounting means and comprising a lever through which motion is transmitted to the material in said area, whereby to be adapted by its deflection in one direction or the other to reverse the position of said embossed area, and to change abruptly the position of the other end of said strip, said other end being elongated to increase the extent of the motion derived from said area.

5. In a device of the character described, the combination with an actuator comprising a resilient strip having an elongated area intermediate its margins formed out of the plane of the strip, a mounting for said strip engaging its margins adjacent said area, and means for reversing said area from one side of the strip to the other whereby to reverse the curvature assumed by said strip in opposition to the side at which said area projects, said reversing means comprising a handle pivotally mounted and bifurcated to provide a pair of extensions including said strip therebetween, said extensions being positioned to press, upon oscillation of said handle, alternatively upon one or the other side of said area.

6. In a device of the character described, the combination with an actuator comprising a resilient strip having an elongated area intermediate its margins formed out of the plane of the strip, a mounting for said strip engaging its margins adjacent said area, and means for reversing said area from one side of the strip to the other whereby to reverse the curvature assumed by said strip in opposition to the side at which said area projects, said reversing means comprising an operating handle and fingers connected therewith for engagement directly with the opposed surfaces of said area for manipulation thereof with respect to said mounting means.

7. In a device of the character described, the combination with a spring actuator having ends comprising arms and an area intermediate its ends formed out of the plane of the strip where-

by to deflect said strip in a curve concave opposite to said area, of a mounting device having means engaging a side marginal portion of the strip laterally adjacent said area, a handle connected with one end of said actuator and a switch contact arranged to receive motion from the other end of the actuator.

8. In a device of the character described, the combination with a spring actuator having an area intermediate its ends formed out of the plane of the strip whereby to deflect said strip in a curve concave opposite to said area, of a mounting device having means engaging a portion of the strip adjacent said area, a handle connected with one end of said actuator, and a switch contact arranged to receive motion from the other end of the actuator, said handle being loosely connected with the actuator and provided with fingers engaging opposing surfaces of said area.

9. In a device of the character described, the combination with a spring actuator having an elongated area intermediate its sides and ends formed out of the plane of the strip whereby to deflect said strip in a curve concave opposite to said area, of a mounting device having means engaging side margins of the strip adjacent said area, a handle connected with one end of said actuator and a switch contact arranged to receive motion from the other end of the actuator, said contact being an integral part of the end of the actuator opposite said handle.

10. In a device of the character described, the combination with a spring actuator having an elongated area intermediate its sides and ends formed out of the plane of the strip whereby to deflect said strip in a curve concave opposite to said area, of a mounting device having means engaging side margins of the strip adjacent said area, a handle connected with one end of said actuator and a switch contact arranged to receive motion from the other end of the actuator, said contact being independent of and insulated from said actuator.

11. In a device of the character described, the combination with a case having an apertured portion, of a spring actuator comprising a strip projecting through said portion and provided intermediate its ends with an area formed out of the plane of the strip, a mounting block applied to said case adjacent said aperture and provided with means engaging the strip adjacent said area, a handle mounted on said strip exteriorly of the case, contact means within the case and means whereby said contact means is actuated from said strip in accordance with the deflection thereof in opposition to the side at which said area projects, said handle being adapted to reverse the direction toward which said area projects.

12. In a device of the character described, the combination with a spring actuator comprising an elongated strip having a mounting portion and a laterally adjacent snap portion in a different plane whereby to subject the strip to curvature, of a mounting block for said strip having a slotted portion comprising means marginally engaging said mounting portion of said strip and beyond which said strip projects.

13. In a device of the character described, the combination with spaced mounting means, of a spring member marginally engaged by said means and having a snap member intermediate said means and adapted to project from one face or the other thereof, whereby to subject

said member to forces distorting it in a curve opposite to the side at which said snap member projects, said spring member having free end portions projecting from said mounting means.

14. In a device of the character described, the combination with a spring actuator provided with a reversible snap member, of means supporting said actuator near said snap member for curvilinear distortion opposite to the position of said member, and means movable with respect to said support and including fingers oppositely engaged with said snap member for manipulation thereof with respect to said actuator.

15. In a device of the character described, a support, a snap actuator comprising a resilient strip engaged by said support and having an area laterally adjacent said support formed out of the plane of said strip and subject to distortion from one side of the member to the other, a handle operatively connected for the reversal of the direction of distortion of said area, an element with which an end of said strip is engageable when said area is distorted in one direction and against which the end of said strip bears when said handle is operated to change the direction of distortion of said area, said strip being adapted to snap free of said element upon such change.

16. In a device of the character described, a snap actuator comprising an elongated resilient strip having an intermediate area formed out of the plane of the strip and subject to distortion from one side of the strip to the other, said strip having a free end portion comprising an elongated arm, a handle mounted on the other end portion of said strip and operatively connected thereto for the transmission of motion through said strip to said area to change the distortion of said area from one side of the strip to the other, whereby to effect a snap movement of said free end portion, a mounting device marginally engaging said strip laterally adjacent said area, and a relatively fixed contact element engaged by said free end portion in one direction of distortion of said area and adapted to receive the increased pressure of said end portion during the manipulation of said handle to reverse the direction of such distortion.

17. In a device of the character described, the combination with a spring actuator comprising an elongated strip having an area near its center deformed out of the plane of the strip whereby to subject the strip to curvature, of a mounting block for said strip having spaced arms slotted to receive said strip and marginally engaged therewith at each side of said area, and beyond which arms said area projects substantially symmetrically.

18. In a device of the character described, a snap actuator comprising a resilient strip having a relatively flexible area deformed from the plane of the strip to project from one face thereof and adapted to be manipulated with a snap action to project from the other face of the strip, and mounting means engaging said strip laterally adjacent its relatively flexible deformed area, both ends of said strip being free to move with respect to said mounting means, whereby the manipulation of one end of said strip in the proper direction will transmit movement through the relatively less flexible material of said end to said area, whereby to reverse the direction of distortion of said area and thus to effect a snap movement of the other

end of the strip in the direction in which the manipulated end is moved.

19. In a device of the type described, the combination of a resilient strip having a relatively flexible area formed out of the plane of said strip interposed between its ends, and a mounting block marginally engaging said strip laterally adjacent said area, said area extending beyond said mounting block but only extending over a relatively small part of the total length of the strip, whereby a relatively small deflection of said flexible area from one side of the said strip to the other will cause a relatively large movement of the ends of the strip in a direction opposite to the direction of movement of said area.

20. In a device of the type described, the combination of an elongated resilient strip having a snap area intermediate the ends of the strip and convex with reference to the surface of a laterally adjacent portion of the strip, and a mounting means engaging the strip solely between the ends of said area, said area extending over a relatively small part of the total length of the strip beyond said mounting means, whereby a relatively small deflection of said snap area from one side of the strip to the other will cause a relatively large movement of the end of the strip in a direction opposite to the direction of movement of said area.

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