May 1, 1945. N. C. FETTER 2,374,986

ELECTRIC SWITCH CONSTRUCTION

Filed Feb. 23, 1943

Fig. 1

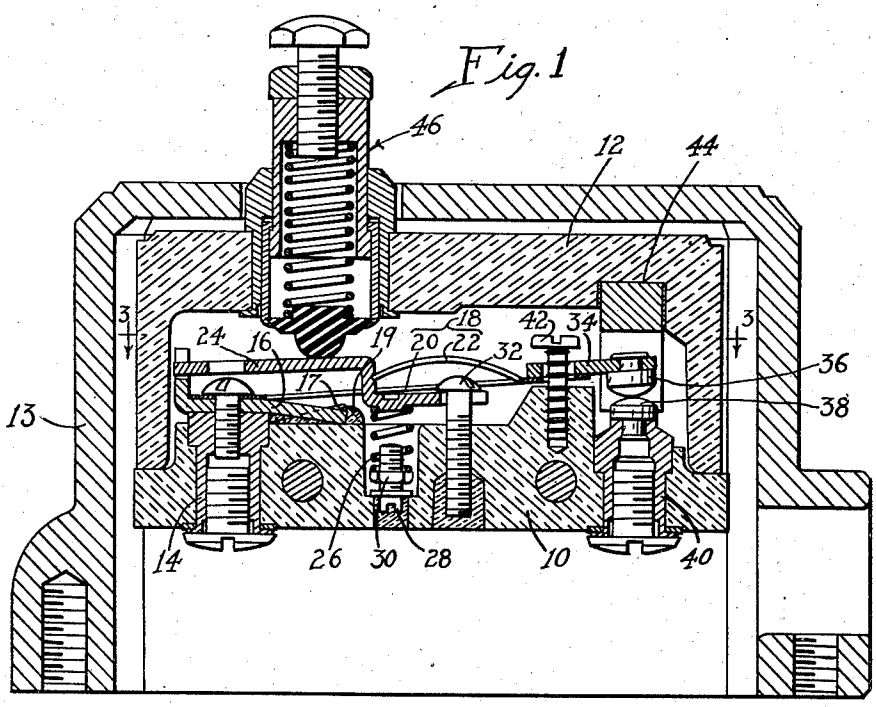


Fig. 2

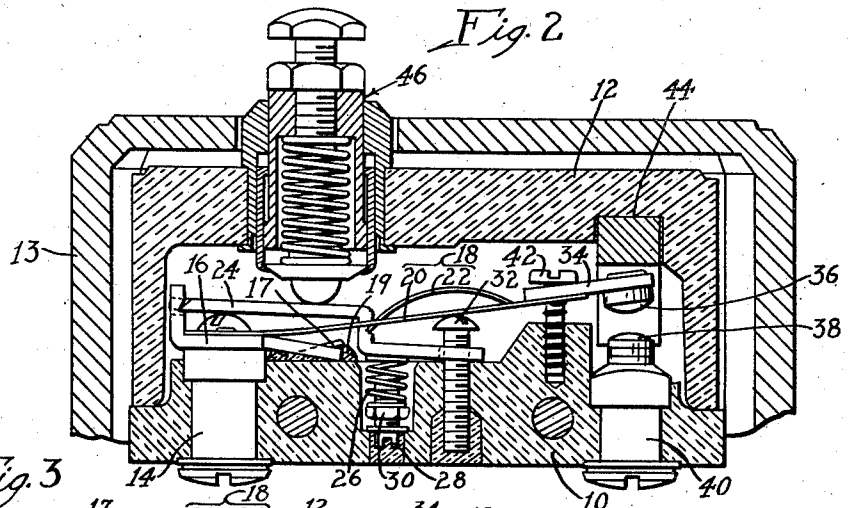
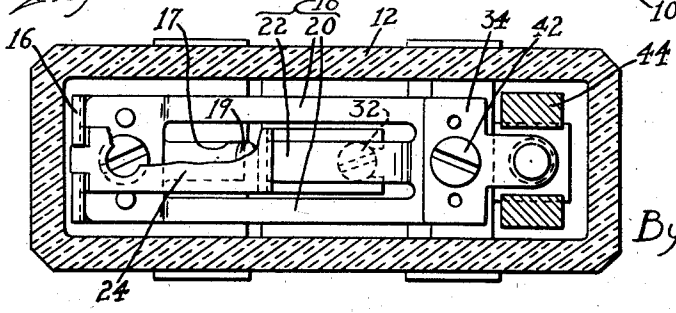


Fig. 3



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2,374,986

ELECTRIC SWITCH CONSTRUCTION

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4 Claims. (Cl. 200—67)

The present invention relates to snap acting electric switches. My invention constitutes an improvement upon certain prior constructions, such, for example, as that of Eaton Patent 2,170,748.

Objects of the invention include the provision of an improved compact electric switch that is simple and economical in construction, easily assembled, and reliable and precise in operation. The preferred embodiment includes a pivoted actuator lever and a plurality of thin leaf springs together constituting a spring snap mechanism in which a biasing effect imposed on the actuator lever by said springs is overcome by still another spring. Other objects and advantages will be apparent from the description, and from the drawing, in which:

Fig. 1 is a sectional elevation of an electric switch embodying my invention,

Fig. 2 is a similar view showing the switch in operated position; and,

Fig. 3 is a partial section on line 3—3 of Fig. 1.

An electric switch is contained in a case of molded, arc resisting, insulating material comprising a base 10 and cover 12 cemented together, which case in turn is contained in a protective metal housing 13. Riveted into the insulating base 10 is a metal insert 14 which constitutes one terminal of the switch and serves also as a mounting for a T-shaped anchor member 16. Riveted in cantilever fashion to anchor 16 is a thin leaf spring member 18 comprising a pair of tension legs 20, which together constitute the follower link of the snap mechanism, and also a short central tongue 22 which constitutes a compression arm and serves as the intermediate link of the snap mechanism. This compression member 22 is normally flat but is confined to a bowed shape so that it furnishes the resilience for giving the snap action to the switch mechanism. A rigid actuator link or arm 24 is pivoted on the anchor 16 and has a shoulder 24*a* intermediate its ends to support the bowed thin leaf compression member 22 the shoulder providing a free end 24*b* offset from the plane of the pivoted end. This rigid arm 24 constitutes the actuator link of the snap mechanism. The pivotal axis of the actuating link 24 is located so high on the upturned end of the anchor 16 that the line of action of the force exerted on the actuator link 24 by the bowed compression spring 22 always falls below this pivotal axis. Consequently, this compressive force of the bowed spring 22 always tends to produce a clockwise rotation of the pivoted arm or actuating link 24; that is, tends to move the free end of the member 24 down. A coil spring 26 opposes this tendency of the lever 24 and holds it normally in its uppermost position shown in Fig. 1. This coil spring 26 acts against the offset portion 24*b* and is supported adjustably on a screw 28 and nut 30 which fit into a cavity mold in the base 10. The upward motion of the pivoted actuator arm 24 is limited by an adjustable screw 32 which passes through the offset portion 24*b*. The adjustments of these two screws 28 and 32 are sealed with cement.

The thin leaf tension and compression members 20 and 22 carry at their outer, connected end a contact support 34 that in turn carries an electric contact 36 that engages and disengages a stationary electric contact 38 supported in an insert 40 riveted into the insulator base 10. The upward motion of the contact carrying end of the springs 20 and 22 is limited by an adjustable screw 42 carried in the base and passing through the contact support 34. A magnet 44 straddles the contacts 36 and 38 to assist in extinguishing the electric arc formed when the contacts separate. The T-shaped anchor 16 has the leg of its T lying in a slot 17 in the molded insulating base 10, where it may be held by cement 19. This construction prevents rotation of the anchor 16 on its supporting insert 14 and so holds the snap spring supported by the anchor in proper alignment. A resilient overtravel plunger mechanism 46 is carried by the cover 12 and is adapted to transmit a driving force down against the actuating lever 24 to operate it against the restoring force of its return spring 26.

When an operating force is applied to the actuating plunger 46, it drives the pivoted actuating lever 24 down, and so carries the supporting point of the bowed compression spring 22 below the tension centerline of the thin leaf tension springs 20. Thereupon the compression spring 22 drives the contact carrying end of these springs 20 and 22 upward with a snap action to separate the contacts 36 and 38, and open the electric circuit. Upon release of the actuating force, the return spring 26 moves the pivoted actuating lever 24 up to its normal position so as to reclose the contacts 36 and 38 with a snap action.

I claim:

1. In combination in an electric switch construction of the class described, an insulating base, a T-shaped anchor fastened on said base, the leg of said T fitting between abutments on said base for holding said anchor in alignment

therewith, a snap-acting contact carrier comprising a thin leaf spring mounted at one of its ends on said anchor and taking its alignment therefrom, a short compression spring for holding said thin leaf spring in tension and for cooperating therewith in producing a snap action of said contact carrier, an actuating lever for supporting one end of said compression spring and for moving it to induce said snap action, said actuating lever being hinged on said anchor and taking its alignment therefrom, and aligned cooperating contacts on said base and contact carrier.

2. The combination in an electric snap switch construction of the class described, an insulating base, an anchor secured to said base, a rigid actuator link hinged to said anchor, follower and intermediate links formed of thin leaf spring strips connected together at a point that is free to move together constituting a compression spring and a tension spring, one of said thin leaf links being supported on said pivoted actuator link at a point removed from its pivot to be carried by said pivoted actuator link back and forth across the line of action of the other thin leaf link for inducing a snap motion of said mechanism, the pivotal axis of said actuator link being located sufficiently to one side of the lines of action of said thin leaf links that the force exerted by said thin leaf links on said actuator-link always tends to rotate said actuator link in the same direction about its pivot axis, means acting on said actuator link between its pivot point and the point of support of said thin leaf spring thereon to move said actuator link in the same aforesaid direction across said line of action, resilient means opposing said movement for moving said actuator link back across said line of action, means acting on said resilient means for adjusting the action thereof against said actuator link, stop means acting on said actuator link for preselecting the limit of the last mentioned movement and stop means acting on said links adjustable to preselect the limit of movement of said spring strips at their point of connection.

3. The combination in an electric snap switch construction of the class described of an insulating base, an anchor secured to said base, a pivoted, rigid, actuator link pivoted to said anchor, said actuator link having an end portion disposed in one plane remote from said base, another end portion disposed in a plane in closer proximity to said base, and an intermediate shoulder connecting the end portions, follower and intermediate links formed of thin leaf spring strips connected together at a point that is free to move and constituting a compression spring and a tension spring, one of said thin leaf links being pivotally supported on the shoulder of said actuator link to be carried thereby back and forth across the line of action of the other thin leaf link to induce a snap motion of said mechanism, the pivotal axis of said actuator link being located sufficiently to one side of the lines of action of said thin leaf links that the force exerted by said thin leaf links on said actuator link always tends to rotate said actuator link in the same direction about its pivot axis, stop means on said base positioned to engage the second mentioned end portion of said actuator link adjustable to limit the travel of the actuator link in one direction to a preselected degree, and stop means on said base positioned to engage said thin leaf links adjacent their point of connection adjustable to limit the travel of said thin leaf spring strips in the opposite direction to a preselected degree, said base being shaped to limit travel of said actuator link in a second direction at a fixed point in its travel.

4. In combination in an electric snap switch construction of the class described, an insulating base, a rigid actuator arm pivoted at one end on said base, a follower arm, and an intermediate link, said three members acting together so that: said actuator is stressed thereby in compression, said follower is stressed in tension and said intermediate link is stressed in compression; said three members together constituting a spring snap mechanism, the support for said actuator arm being sufficiently to one side of the lines of action of said intermediate link that the force imposed on said actuator arm by said intermediate link tends to swing said arm on its pivot only to that one side, separate spring means for urging said actuator in the opposite direction, means for driving said arm in the first direction for operating said switch, stop means on said base positioned to engage said actuator arm, adjustable to limit its travel to a preselected degree under the influence of said separate spring means, and stop means on said base positioned to engage said follower, adjustable to limit travel of said snap mechanism in the opposite direction to a preselected degree.

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