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F. J. TRAINOR
ELECTRIC SNAP SWITCH
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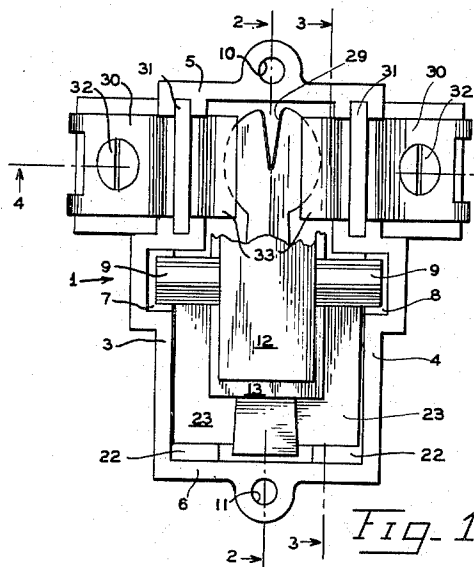


Fig. 1

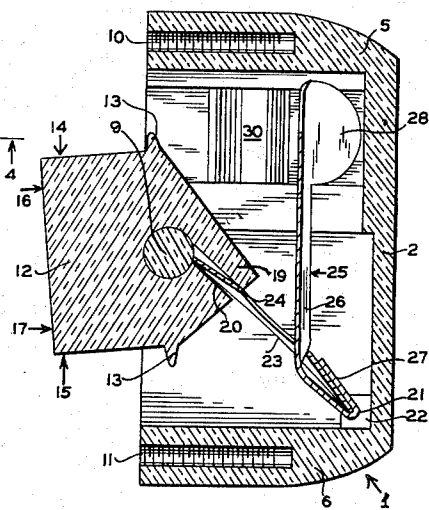


Fig. 2

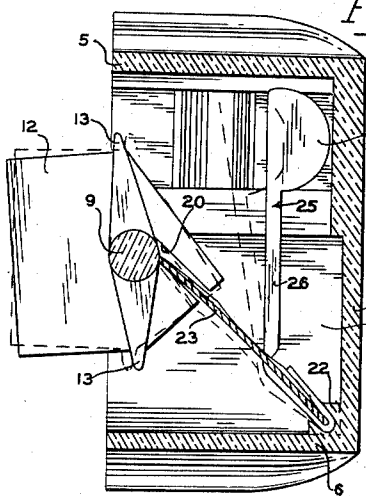


Fig. 3

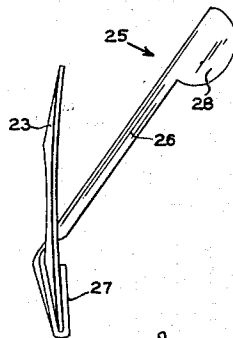


Fig. 5

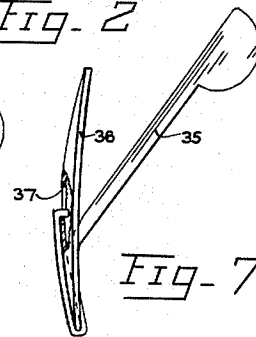


Fig. 7

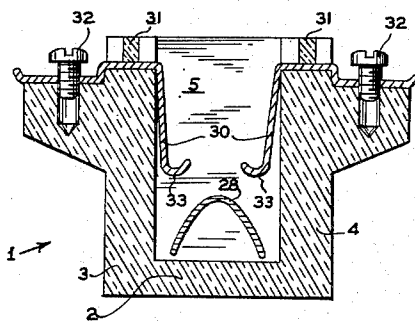


Fig. 4

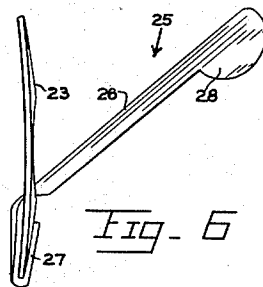


Fig. 6

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ELECTRIC SNAP SWITCH

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6 Claims. (Cl. 200—67)

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My invention relates to an electric snap switch. Electric snap switches commonly include a snap element mounted in such a way as to be in compression and be flexible into one or two positions of stable equilibrium. The parts of switches of this type must be carefully made and assembled because the proper operation of the switch requires the snap element to be maintained at a precise degree of distortion. A slight variation in the dimensions of the snap element or the snap-element mounting results in a considerable variation in the amount of compression on the snap element. Rough handling of the switch may easily impair its working efficiency. Furthermore, after a relatively short period of use, the snap element tends to enlarge the sockets of its mounting with a resultant decrease in compression on the snap element and decrease in the speed of operation of the switch contacts. Unless switch contacts open and close very quickly, arcing causes the contacts to become pitted and make poor electrical connection with each other. It is therefore the general object of my invention to provide a simple, rugged and reliable snap switch which is free from the objections to the switches now in common use.

It is another object to provide a switch having a snap element which inherently has two positions of stable equilibrium and which may be freely mounted in the switch housing.

It is a further object to provide a snap switch which is simple and economical to manufacture by reason of having very few parts, none of which need be made to close tolerances, and by reason of being easy to assemble without the need for special jigs and clamps.

It is a further object to provide a switch which is not affected by rough handling and long periods of continuous use.

It is a further object to provide a switch having a movable contact which automatically centers itself between two fixed contacts.

It is a further object to provide a switch having a neat and pleasing appearance made possible by my construction wherein a relatively slight displacement of a rocker handle is sufficient to actuate the switch.

Pursuant to these and other objects that will be apparent to those skilled in the art, I provide a housing of non-inflammable plastic material and having a bottom, sides and ends. A switch-actuating rocker is pivotally mounted on the sides of the housing with part of the rocker extending outside the housing for manual manipulation, and part of the rocker extending into the interior

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of the housing. A groove in the housing and a slot on the inner part of the rocker provide mountings for opposite edges of an apertured convexo-concave snap element of resilient material. Manual actuation of the rocker operates to flex the snap element from one to the other of its two positions of stable equilibrium. A movable contact arm is engaged at one end with the snap element by being hooked in the aperture and around a point on the periphery of the snap element, the other end of the arm being provided with a curved contact surface. Two fixed contacts are mounted on the sides of the housing and positioned so as to be bridged by the contact surface of the movable contact arm when the snap element is flexed to one of its positions of stable equilibrium. A cover plate, having an opening to accommodate the external part of the actuating rocker, closes the cavity in the housing and retains the switch parts in position.

Referring briefly to the drawings wherein I show a present-preferred embodiment of the invention:

Figure 1 is a top view of the switch with cover 25 removed.

Figure 2 is a longitudinal sectional view taken on the line 2—2 of Fig. 1.

Figure 3 is a longitudinal sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 1.

Figure 5 is an edged elevation of the convexo-concave snap element and inter-engaged movable contact arm. The snap element is in its position of stable equilibrium corresponding with closed circuit conditions.

Figure 6 is the same as Figure 5 except that the convexo-concave snap element is in its other position of stable equilibrium corresponding with open circuit conditions.

Figure 7 is an edge elevation of a snap element and another form of movable contact arm, part of the snap element being broken away to show the method of attaching the arm.

Referring now in greater detail to the drawings, a housing generally designated 1, of moulded non-inflammable plastic material has a bottom 2, sides 3 and 4 and ends 5 and 6. The upper portions of sides 3 and 4 are formed at 7 and 8 respectively to provide journals for rocker shaft 9. Shaft 9 is restrained in journals 7 and 8 by means of a cover plate (not shown) fastened at 10 and 11 to the ends 5 and 6 of the housing.

A switch-actuating rocker 12 of moulded plastic material is rigidly secured to rocker shaft

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9. The outer portion of the rocker 12 is acted upon manually in the operation of the switch. Protrusions 13 limit the arm of rotation of the rocker 12 by engaging the under side of the cover plate (not shown). Rocker 12 may be actuated either by applying pressure at 14 and 15 or at 16 and 17. It will be noted from a comparison of the solid and dotted lines of Figure 3 that a very slight angular displacement of the rocker 12 is sufficient to actuate the switch. By my construction only a slight clearance is needed between the rocker 12 and the cover or face plate. As a result, a neat and pleasing appearance is effected in a switch also having an intriguing mode of operation.

The inner portion 19 of the rocker 12 is provided with an angularly-disposed slot 20. Grooves 21 in protuberances 22 moulded in the interior corners of the housing 1, together with the slot 20, provide a setting or mounting for an apertured convexo-concave snap element 23 of resilient material. The snap element 23 is of square or rectangular outline and has a circular aperture 24, but it is to be understood that other shapes may be employed. It will be noted that the snap element 23 fits freely in the groove 21 and slot 20, that the snap element inherently has two positions of stable equilibrium and that the mounting or setting of the snap element is not relied upon to create two conditions of stable equilibrium by compressing the snap element.

I have found that while the snap element 23 may be supported along a predominant part of its outer periphery, an improved action is obtained by supporting it only at certain spaced points as shown. A smoother action is thus obtained by reason of the reversal in convexity of the snap element being first impressed at one end and consummated by a progressive wave motion. This occasions less strain in the snap element, a reduction in the actuating force required and quieter operation of the switch.

The two positions of the convexo-concave snap element 25 are shown to advantage in Figures 5 and 6. These are positions of stable equilibrium. When the peripheral edges are held stationary, a radial line on the snap element may shift about the point on the periphery through an angle in the order of 30 degrees as the element is snapped between the positions shown in Figures 5 and 6.

A movable contact arm, generally designated 25, has a shank 26, one end 27 of which is hooked through the aperture 24 of the snap element 23 and around a point on the periphery thereof. The other end of shank 26 is provided with a curved contact surface 28 having a V-shaped notch 29 cut therein to increase its flexibility.

The sides 3 and 4 of the housing 1 are moulded so as to accommodate a pair of fixed contacts 30. The contacts 30 hang over the sides 3 and 4 and are secured in place by plastic holding bars 31 set with their ends in slots in the housing. The outer terminal portion of the fixed contacts 30 are provided with the conventional means 32 for securing wires. The inner ends 33 of the fixed contacts 30 are curved and disposed in the housing so as to be engaged and bridged by the curved contact surface 28 of the movable contact arm 25 when the convexo-concave snap element 23 is in one of its positions of stable equilibrium.

I have found it desirable to provide for an automatic self-centering of the movable contact surface 28 between the fixed contact surfaces 23. This may be accomplished by loosely clamping the movable contact arm 25 to the apertured snap

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element so that a limited amount of lateral freedom only is provided.

An alternative form of movable contact arm 35 is illustrated in Figure 7. The arm 35 is secured to the snap element 36 by passing around a point on the periphery and then through the aperture 37. This form of contact arm is easy to manufacture and assemble.

Of course it is to be understood that this invention is not limited to the particular details as described above since many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What I claim is:

1. A snap switch comprising in combination, an elongated switch housing having a bottom, sides and ends, protrusions in the inner corners of one end of the housing provided with grooves, a pair of fixed contacts oppositely mounted with one on each of said sides, the outer ends of the fixed contacts extending from the housing and being provided with wire fastening means and the inner ends depending in the housing in spaced relationship, a switch-actuating rocker pivotally mounted on the sides with its axis transverse of the housing, the rocker having a portion extending from the housing for manual actuation and having a portion extending into the housing and provided with a slot, said slot and said grooves in the corner protrusions lying substantially in the same plane, a centrally-apertured convexo-concave snap element of resilient material mounted in and between said grooves and slot, and a movable contact arm one end of which is formed into a hook having parallel sides engaging therebetween a portion of the snap element extending from the aperture to the periphery thereof, the other end portion of the movable contact arm being provided with a bridging contact surface, manual actuation of the rocker being operative to flex the snap element from one to the other of its two positions of stable equilibrium and shift the interengaged movable contact arm between a position wherein its contact surface bridges the fixed contacts and an open circuit position.

2. A snap switch comprising in combination, an elongated switch housing having a bottom, sides and ends, grooved protrusions in the inner corners of one end of the housing, a pair of fixed contacts oppositely mounted on the lateral sides at the opposite end of the housing, a switch-actuating rocker pivotally mounted on the sides with its axis transverse of the housing, the rocker having a portion extending from the housing for manual actuation and having a slotted portion extending into the housing, an apertured convexo-concave snap element of resilient material mounted in and between said grooved protrusions and said slotted portion of the rocker, and a movable contact arm engaged at one end with the snap element by being hooked in the aperture and around a point on the periphery of the snap element, the other end of the arm being provided with a bridging contact surface, manual actuation of the rocker being operative to flex the snap element from one to the other of its two positions of stable equilibrium and shift the interengaged movable contact arm between a position bridging the fixed contacts and an open circuit position.

3. A snap switch comprising in combination, a switch housing and a switch-actuating rocker

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pivotally mounted thereon, the interior surface opposite to the rocker pivotal mounting of the housing being provided with a groove and the rocker being provided with a slot, an apertured convexo-concave snap element of resilient material mounted with one edge in said groove and the opposite edge portion in said slot, actuation of said rocker being operative to flex the snap element from one to the other of its two positions of stable equilibrium, a movable contact arm at one end embracing the snap element from the aperture to a point on the periphery thereof, the other end of the arm being provided with a contact surface, and fixed contacts on the housing positioned to be bridged by said movable contact surface when the snap element is in one of its positions of stable equilibrium.

4. In a snap switch, an apertured convexo-concave snap element of resilient material, a movable contact arm at one end loosely embracing the snap element from the aperture to a point on the periphery thereof, the other end of the arm being provided with a contact surface, and means for flexing the snap element from one to the other of its two positions of stable equilibrium.

5. A snap switch comprising in combination, a switch housing and a switch-actuating rocker pivotally mounted thereon, the interior of the housing being provided with a groove and the rocker being provided with a slot, an apertured convexo-concave snap element of resilient material mounted with one edge in said groove and the opposite edge portion in said slot, actuation of said rocker being operative to flex the snap element from one to the other of its two positions

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of stable equilibrium, a movable contact arm loosely engaged at one end with the snap element by being hooked in the aperture and around a point on the periphery of the snap element, the other end of the arm being provided with a curved contact surface, and fixed contacts on the housing positioned to be bridged by said contact surface when the snap element is in one of its positions of stable equilibrium, the contact arm having an automatic tendency to center itself between the fixed contacts by reason of its being loosely engaged with the snap element and having a curved contact surface.

6. In a snap switch, an apertured convexo-concave snap element of resilient material, a movable contact arm engaged at one end with the snap element by being hooked in the aperture and around a point on the periphery of the snap element, the other end of the arm being provided with a contact surface, and actuating means for flexing the snap element from one to the other of its two positions of stable equilibrium.

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