

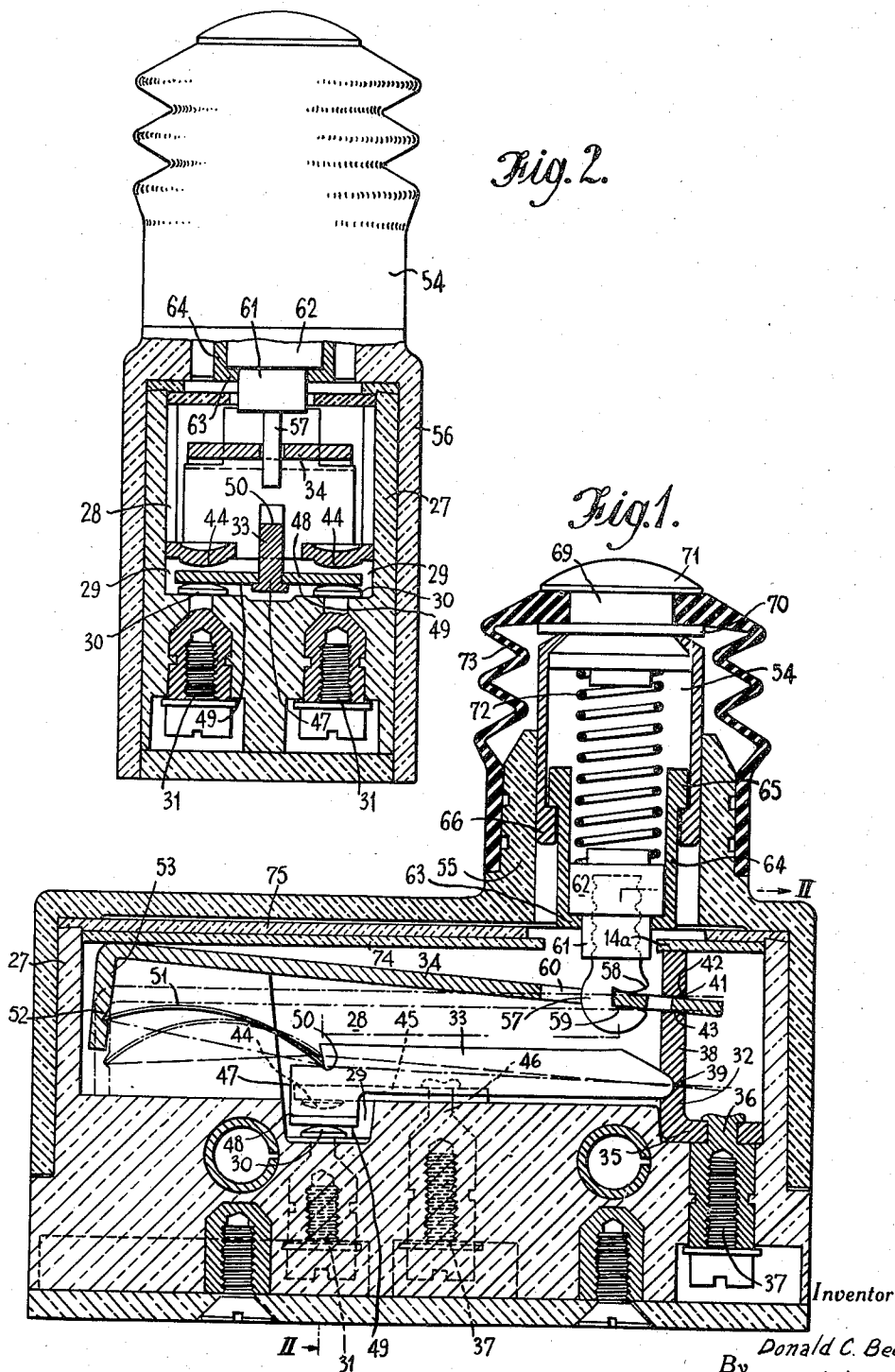
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SNAP-ACTION ELECTRIC SWITCHES

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SNAP-ACTION ELECTRIC SWITCHES

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The present invention relates to snap-action electric switches of the type comprising a leaf-spring member resiliently exerting thrust upon a movable contact and arranged to effect closure or opening of an electric circuit in a rapid manner when an operating member is actuated to cause the thrust-exerting member to snap over its dead-centre position from one extreme to the other.

Switches of this general kind are well-known in which the leaf spring is directly connected to a movable contact that engages one or more fixed contacts in the body of the switch when the spring snaps over from one position to the other.

In contradistinction to such arrangements, the present invention consists in a switch of this general kind in which the movable contact or contacts is or are not directly connected to the thrust-exerting member but to a contact-carrying member, itself moved by the movement of the thrust-exerting member in consequence upon actuation by an operating member.

According to one feature of the invention, there is provided a snap-action electric switch comprising a rockable contact-carrying member, a leaf spring maintained under longitudinal compression with one end engaging or attached to said contact-carrying member and the other end engaging or attached to an actuating member movable in a direction transverse to the line of thrust exerted by said spring, stops for limiting the extent of rocking of said contact-carrying member, at least one of said stops constituting a fixed contact cooperating with a contact carried by the contact-carrying member, means for moving the actuating member through a limited distance such that the line of thrust of the spring can be moved over-centre with respect to the rocking axis of the contact-carrying member when the latter is in its extreme limiting positions as defined by said stops, the consequent rocking of the contact-carrying member being limited by the stops to such a small movement that the spring will continue to maintain a thrust upon the contact-carrying member after the contact has been made.

According to another feature of the invention, there is provided a snap-action electric switch operated by a leaf-spring, comprising an operating member arranged to act upon an actuating member that is adapted to operate as a movement- and force-multiplying lever for tensioning a leaf spring to which it is connected at one end, the other end of the spring rocking a contact-carrying member about a fulcrum so that when the spring snaps over through an over-centre position, a contact carried by the said contact-carrying member snaps over from one position to another to make or break an electric circuit in cooperating with a fixed contact or contacts associated with the body of the switch.

Viewed from another aspect, the invention provides a snap-action electric switch in which a leaf spring resiliently exerting thrust upon a fulcrumed contact-carrying member is snapped over from one extreme position to another by an actuating member moved by an opera-

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ing member exerting pressure on it at one point, in which the movable contact is located between the fulcrum point and the point of applied pressure, or adjacent the fulcrum point.

From yet another aspect, the invention provides a snap-action electric switch comprising a leaf spring arranged to snap a contact-carrying member from one extreme position to another as a result of an actuating movement applied to the spring, the end of the spring associated with the contact-carrying member being free of restraint so that it is free to move in a direction of thrust against the contact-carrying member.

One important advantage accruing from the invention is that the switch may be constructed as a so-called "micro-switch" that is, a switch in which a comparatively small actuating movement brings about a high contact pressure.

In order that the invention may be more readily understood and appreciated, reference will now be made to the accompanying drawings which show two specific embodiments thereof and in which:

Fig. 1 shows a longitudinal central section through a second embodiment, and

Fig. 2 shows an end view partly in section through the line II—II of Fig. 1.

In the drawings there is shown a switch having a body that comprises a block of insulating material 27 which has a relatively deep rectangular recess 28 provided with a substantially rectangular pocket 29 near one end. In the pocket 29 there is provided a pair of lower fixed contacts 30 having suitable terminals 31, the contacts being insulated each from the other. Each contact comprises a stud having an upper surface of domed configuration, preferably coated with or made from silver.

Towards the other end of the block 27 there is provided a metal angle bracket 32 to act as a fulcrum for both a metal rocker arm 33 and an actuating member 34 which is also of metal. The angle bracket has a base 35 suitably apertured at 36 so that it may be fixed by means of a fixing screw and terminal 37 into a block 27, and a side flange 28. The side flange 38 is provided with a dimple or notch 39 forming a fulcrum rest for the rocker arm 33, the appropriate end of which is radiused at 40 whereby the arm 33 may pivot in a vertical plane in the angle bracket 32. The flange 38 is also provided with an upper aperture 41 formed with radiused top and bottom faces 42, 43 respectively so that the actuating member 34 may pivot therein.

Upper fixed contacts are provided at 44 secured to metal plates 45 attached to the base of recess 28 by screw terminals 46 so that the contacts 44 overhang the pocket 29 and lie respectively above contacts 30.

The rocker arm 33 is in the form of a vertically-disposed web and carries or forms part of the moving contact 47 of the switch having upper and lower faces 48, 49 respectively adapted to bridge the upper fixed contacts 44 and the lower fixed contacts 30 at its upper and lower limits of movement. The upper fixed contacts 44 have a domed configuration similar to that of the lower contacts 30. The faces 48 and 49 of contact 47 are preferably silvered, and the rocker arm 33 has a notch 50 at its forward end forming a locating means for one end of a leaf spring 51, the opposite end of which is accommodated in a notch 52 located in a leg 53 depending from one end of the actuating member 34.

In the normal rest position of the members 33 and 34, shown in full lines in Fig. 2, the faces 49 of the rocker arm contact member 47 bridges the two lower fixed contacts 30 and in the other position of the members shown dotted, the upper faces 48 of the contact member 47 bridges the upper fixed contacts 46.

To effect operation of the switch there is provided a

composite pressel indicated generally at 54 adapted to be vertically moved under spring pressure within an extension 55 of a cover member 56 fitted over the block 27 of insulating material. The pressel 54 has a pressure member 57 in the form of a tongue slotted at 58 to engage over an edge 59 of a cut-out portion 60 in the actuating member 34 so that the member 58 and the actuating member 34 always move together. The tongue 58 is secured within a rod of material 61 which is surrounded by a collar 62 adapted to bear, in its lowermost position, on an inwardly-directed flange 63 of a tube 64 which is flanged outwardly at its upper portion at 65. The flange 65 in turn bears on a flange 66 of a further tube 67, the upper portion of which is turned over a frusto-conical portion 68 of an actuating button 69 which is also provided with a retaining flange 70. The button 69 terminates in a cap 71 and a spring 72 is provided between the button 69 and the collar 62 of the pressure member. A protective collapsible rubber cowl 73 is provided the lower part of which fits over the extension 55 and the upper part of which fits into the space between the cap 71 and the flange 70 as shown.

A plate 74 is fitted in the upper part of the recess 28, the part 74a thereof acting as a stop to limit overtravel of the pressel by limiting the downward movement of flange 63 thereof. Between the plate 74 and the cover member 76 a further rubber protective sheet 75 is provided. The cowl 73 and sheet 75 prevent ingress of moisture or water to the interior of the switch.

It will be seen that pressure on the button 71 effects downward movement of the member 61 to move the actuating member 34 in a downward direction to flick the moving contact 47 against the upper fixed contacts 44 as shown in dotted lines, under action of spring 53. Upon release of pressure on the button 71, the button 71 returns to its normal upper position and the actuating member 34 returns to its upper or normal position to cause the moving contact 47 to return to bridge the lower fixed contacts 30 as shown in full lines.

Although the pressure member of the accompanying drawings has been shown secured to the operating member 34, it will be understood that, if desired, it may only bear on the upper surface thereof.

It will be seen that, a small movement applied by pressure member 58 of the pressel 54 is multiplied by a second-order lever constituted by the actuating member 34 and to which the leaf spring 51 is attached, so that the actuating movement of the spring, transferred to the rocker arm 33 carrying the moving contact 49, is large compared with the movement of the pressel. The large movement of the spring therefore brings about a high contact pressure for a small actuating movement.

Switches according to the described embodiment of the invention have been satisfactorily manufactured within the following dimensions.

Height overall 2.000 inches.

Length overall 2.079±.005 inches.

Width overall 0.800 inch.

I claim:

1. A snap-action electric switch comprising at least one fixed contact secured in said switch, a flat rigid moving-contact-carrying member, pivot means pivoting said moving-contact-carrying member for movement towards and away from said fixed contact and also for rotary movement about said pivot means in a plane transverse to the central plane of said flat rigid member, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring.

2. A snap-action electric switch comprising at least one fixed contact secured in said switch, a rigid moving-contact-carrying member comprising a thin web of material having a transversely arranged cross-piece to carry the moving contacts and said web tapering to a rounded end forming the pivot point for said moving-contact-carrying member, a supporting bracket in said switch, a dimple in said supporting bracket, said rounded end of said web locating in said dimple, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring, towards and away from said fixed contact.

3. A snap-action electric switch comprising two pairs of spaced fixed contacts secured in said switch, a rigid moving-contact-carrying member comprising a thin web of material having a transversely arranged cross-piece to carry the moving contacts and said web tapering to a rounded end forming the pivot point for said moving-contact-carrying member, a supporting bracket in said switch, a dimple in said supporting bracket, said rounded end of said web locating in said dimple, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring between said pairs of fixed contacts.

4. A snap-action electric switch comprising at least one fixed contact secured in said switch, a flat rigid moving-contact-carrying member carrying contacts on at least one face thereof, means pivoting said moving-contact-carrying member towards and away from said fixed contact, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, a pressure member in said switch, a slotted end portion on said pressure member, and a slot in said actuating member, said slotted end of said pressure member locating in said slot in said actuating member.

5. A snap-action electric switch comprising two pairs of spaced fixed contacts secured in said switch, a flat rigid moving-contact-carrying member carrying contacts on both opposed faces thereof, means pivoting said moving-contact-carrying member between said pairs of fixed contacts, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, a pressure member in said switch, a slotted end portion on said pressure member, and a slot in said actuating member, said slotted end of said pressure member locating in said slot in said actuating member.

6. A snap-action electric switch comprising at least one fixed contact secured in said switch, a rigid moving-contact-carrying member comprising a thin web of material having a transversely arranged cross-piece to carry the moving contacts and said web tapering to a rounded end forming the pivot point for said moving-contact-carrying member, a supporting bracket in said switch, a dimple in said supporting bracket, said rounded end of said web locating in said dimple, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying

member remote from their said pivots, a pressure member in said switch, a slotted end portion on said pressure member, and a slot in said actuating member, said slotted end of said pressure member locating in said slot in said actuating member.

7. A snap-action electric switch comprising two pairs of spaced fixed contacts secured in said switch, a rigid moving-contact-carrying member comprising a thin web of material having a transversely arranged cross-piece to carry the moving contacts and said web tapering to a rounded end forming the pivot point for said moving-contact-carrying member, a supporting bracket in said switch, a dimple in said supporting bracket, said rounded end of said web locating in said dimple, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, a pressure member in said switch, a slotted end portion on said pressure member, and a slot in said actuating member, said slotted end of said pressure member locating in said slot in said actuating member.

8. A snap-action electric switch comprising a switch body, a cover for said body, a moisture-excluding gasket between said cover and said body, at least one fixed contact secured in said switch, a flat rigid moving-contact-carrying member carrying contacts on at least one face thereof, pivot means pivoting said moving-contact-carrying member for movement towards and away from said fixed contact and also for rotary movement about said pivot means in a plane transverse to the central plane of said member, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring.

9. A snap-action electric switch comprising a switch body, a cover for said body, a moisture-excluding gasket between said cover and said body, two pairs of spaced fixed contacts secured in said switch, a flat rigid moving-contact-carrying member carrying contacts on both opposed faces thereof, pivot means pivoting said moving-contact-carrying member for movement between said pairs of fixed contacts and also for rotary movement about said pivot means in a plane transverse to the central plane of said member, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring between said pairs of fixed contacts.

10. A snap-action electric switch comprising a switch body, a cover for said body, a moisture-excluding gasket between said cover and said body, two pairs of spaced fixed contacts secured in said switch, a rigid moving-contact-carrying member, means pivoting said moving-contact-carrying member for movement between said pairs of fixed contacts and also for rotary movement about said pivot in a plane transverse to the central longitudinal axis of said member, a rigid actuating member, a fixed pivot point in said switch for said actuating mem-

ber, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring between said pairs of fixed contacts, an outwardly extending projection from said cover, said plunger member extending through said projection, and a rubber cowl connected to the outer end of said plunger and to the outer part of said projection.

11. A snap-action electric switch comprising a switch body, a cover for said body, a moisture-excluding gasket between said cover and said body, two pairs of spaced fixed contacts secured in said switch, a rigid moving-contact-carrying member comprising a thin web of material having a transversely arranged cross-piece to carry the moving contacts and said web tapering to a rounded end forming the pivot point for said moving-contact-carrying member, a supporting bracket in said switch, a dimple in said supporting bracket, said rounded end of said web locating in said dimple, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring between said pairs of fixed contacts, an outwardly extending projection from said cover, said plunger member extending through said projection, and a rubber cowl connected to the outer end of said plunger and to the outer part of said projection.

12. A snap-action electric switch comprising two pairs of spaced fixed contacts secured in said switch, a flat rigid moving-contact-carrying member, pivot means pivoting said moving-contact-carrying member for movement between said pairs of fixed contacts and also for rotary movement about said pivot means in a plane transverse to the central plane of said flat rigid member, a rigid actuating member, a fixed pivot point in said switch for said actuating member, a leaf-spring maintained under longitudinal compression connected between points on said actuating member and said moving-contact-carrying member remote from their said pivots, and a pressure member located for pressure upon said actuating member to move said moving-contact-carrying member through said spring.

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