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ACTUATING LEVER FOR A SWITCH

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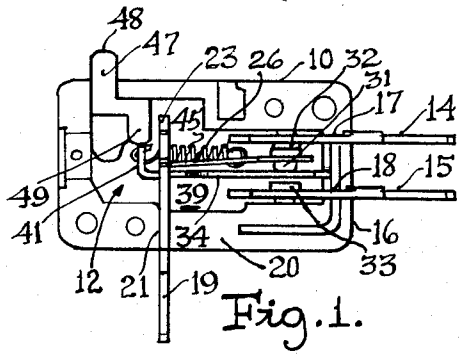


Fig. 1.

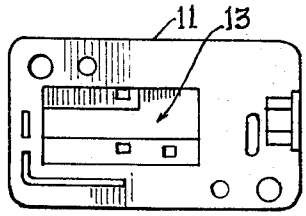


Fig. 2.

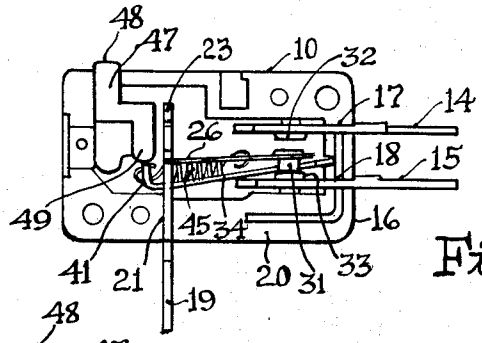


Fig. 3.

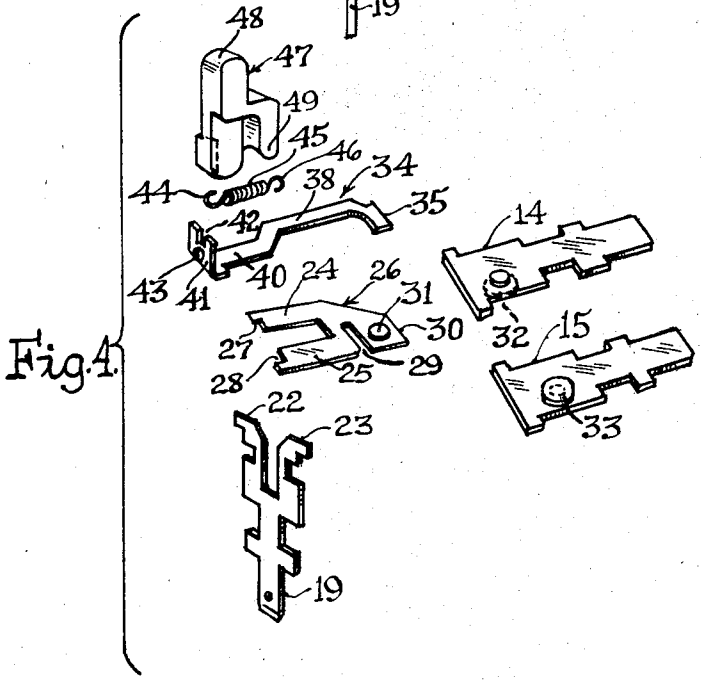


Fig. 4.

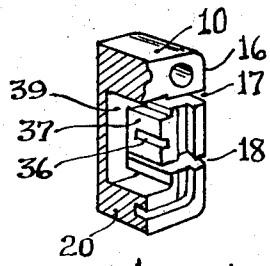


Fig. 5.

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ACTUATING LEVER FOR A SWITCH

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ABSTRACT OF THE DISCLOSURE

A snap-action switch which requires a relatively light actuation force for operating a coil spring over-centering mechanism which in turn pivots a movable switch blade between fixed circuit making contact points with the over-centering mechanism having an elongated actuating lever which normally extends substantially parallel to the switch blade and is pivoted in a like direction upon actuation of the switch.

Field of invention

A snap-action switch having a housing of non-conductive material which provides a cavity for housing an over-centering mechanism. The over-centering mechanism includes a fixed terminal providing pivot posts to which is pivotally connected a substantially flat switch blade, an elongated actuating lever has one end pivotally inserted in a seat provided by one wall of the housing and its opposite end connected by a coil spring to the switch blade. The actuating lever is of a length greater than the switch blade and in order to accommodate the pivotal movement of the free end of the switch blade the lever has its medial portion offset laterally out of its normal longitudinal plane. The lateral offset permits the actuating lever to be pivoted by a relatively light operating force by reason of the distance between its pivotal seat and its movable distal end.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

This ivention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a side elevational view of the improved snap-action switch with the cover removed;

FIG. 2 is a side elevational view of the side cover;

FIG. 3 is a side elevational view of our improved snap-action switch similar to FIG. 1, but showing the parts thereof in an actuated position;

FIG. 4 is a perspective view of the internal parts of the improved snap-action switch in a semi-exploded relation; and

FIG. 5 is a fragmentary detailed sectional view of one end of the switch housing.

Referring to FIG. 1, it is noted that the improved snap-action switch includes a case comprising two side sections **10** and **11**. Each of these side sections **10** and **11** are hollowed out to provide an internal cavity **12** and **13**, respectively, adapted to confront each other when the sections are mounted together to form a complete casing.

The switching mechanism includes a pair of spaced apart fixed contact-bearing terminals **14** and **15**, positionable in slots **17** and **18** formed in the end wall **16** of the side **10**, with the terminals being of a width equal to the depth of such slots so that when the side sections **10** and **11** are mounted together, the terminals **14** and **15** will be held in a fixed position relative to the switch casing.

A terminal pivot post **19** extends out of the bottom wall **20** of the casing **10** and it, too. is adapted to sit in a slot **21** formed in such bottom wall so that it is held in a fixed position within the casing when the sections **10** and **11** are assembled in mating relationship.

The end of the terminal post **19** which is positioned within the casing, is bifurcated to provide spaced apart pivot posts **22** and **23**. It should be noted that the opposite corresponding edges of each of the posts **22** and **23** are notched out so as to provide a pivot seat for respective matching ends of the arms **24** and **25** of the switch blade **26**. The free ends of the arms **24** and **25** of the switch blade **26** are provided with oppositely facing shoulders **27** and **28** which, when the blade **26** is mounted to the pivot post **19**, extend on opposite sides of the notched pivot seats formed in the posts **22** and **23** of the terminal post **19**.

The switch blade **26** has formed therein a slot **29** which extends from one longitudinal edge of the blade **26** in the direction of, and terminates at the longitudinal midline of the switch blade **26**. By this slot **29** a cantilevered type blade is formed having a resilient end **30** which carries thereon a contact **31** movable between fixed contacts **32** and **33** carried by the fixed contact-bearing terminals **14** and **15**. It should be noted that the contacts **32** and **33** are adapted to be in vertical alignment and off-center with respect to the longitudinal axis of each of their respective terminals **14** and **15**—this for a purpose hereinafter made apparent.

An actuator level **34** formed from a substantially flat elongated member provides a base **35** pivotally seated in a horizontally extending V groove **36** formed in the interior face **37** of the end wall **16** of the side section **10**. The medial portion of the elongated actuator lever **34** is provided with a lateral offset **38** adapted to extend in close spaced parallel relation to the rear wall **39** of the section **10**.

The remaining section **40** of the actuator lever **34** is of a width slightly less than and extends through the space between the posts **22** and **23** of the terminal pivot post **19**, as such posts **22** and **23** are positioned within the cavity **12** of the side section **10**.

The opposite free end of the actuator lever **34** is bent at right angles relative to the general longitudinal length of such lever and forms a vertically extending head **41**. The top edge of the head **41** is notched as at **42** and is provided with an aperture **43** both of which cooperate to receive a hooked end **44** of a coil spring **45**. The spring **45** extends through the pivot posts **22** and **23** of the terminal pivot post **19** as well as between the arms **27** and **28** of the switch blade **26** and has its opposite end **46** attached to the blade **26** through the slot **29** formed therein.

As shown in FIG. 1, the spring **45** as it extends between the switch blade **26** and the actuator lever **34**, urges the blade **26** in one direction toward its connection to the terminal pivot post **19** and simultaneously urges the actuating lever **34** in an opposite direction so that the base **35** thereof is pivotally seated in the V-shaped groove **36** provided by the side section **10** of the casing. By this arrangement the switch blade **26** is pivotally connected to the terminal post **19** while the actuator lever **34** is pivotally connected relative to the end wall **16** of the side section **10** of the switch casing.

A switch actuating button **47** is adapted to be slidably

contained within the cavities **12** and **13** provided by the side sections **10** and **11** of the switch casing. The switch actuating button **47** provides an exterior dome **48** as well as an interior bearing member **49**. The interior bearing member **49** is adapted to engage the edge of the enlarged head **41** of the actuating lever **34**, as shown in FIGS. 1 and 2. As an external force is applied to the dome **48** of the switch actuating button **47**, it will move in a guided vertical path as seen in FIGS. 1 and 2, causing a corresponding pivotal movement of the actuating lever **34** about its pivotal connection to the end wall **16** of the side section **10**. This pivotal movement of the actuating lever **34** carries with it a corresponding movement of the hooked end **44** of the coil spring **45**. As the coil spring **45** is moved into a lower plane, it passes through the over-centering line of the switch blade **26**, causing the same to move with a snap action between the fixed contact-bearing terminals **14** and **15**, into the position shown in FIG. 3. Upon removal of the external force to the actuating buttom **47**, the parts of the snap-action mechanism just identified will return to their original positions shown in FIG. 1, due to the tension created on the coil spring **45** and the positioning of the actuating lever **34** and the switch blade **26**.

By directing the actuating force onto the edge of the head **42** of the actuating lever **34** at a point farthest removed from its pivotal connection with the wall **16**, only a relatively light actuating force is necessary to effect the positive snap-action movement of the components of the switching mechanism to effect the switching operation thereof. By the specific arrangement of the components as hereinbefore described, an operating force of less than fourteen ounces (14 oz.) is sufficient to effect switching actuation of the snap-action switch.

The positive pivot points of both the switch blade **26** relative to the fixed terminal pivot post **19**, and the actuating lever **34** relative to the V groove **36**, permit a simple assembly of the switching components and reduce the acceptable error and tolerance of these parts relative to each other which is essential not only for the effective operation of the switch but also in the reduction of the operating force required to actuate the same.

The arrangement of parts accomplishes the stated objects of this invention without affecting the general geometrics of the components and without reduction of the current-carrying capacity of the switch blade **26**. The switch blade **26** can maintain its full current-carrying capacity by reason of its size, which need not be reduced because of the fact that the actuating lever **34** is provided with the offset portion **38** which normally lies on one side of and out of the path of movement of the switch blade **26** as it is caused to move between the fixed contact-bearing terminals **14** and **15**. This relationship of the blade **26** and lever **34** is as a result of having, as shown in FIGS. 1 and 3, their respective points of pivotal connection with the pivot posts **22** and **23** and the end wall **16** of the housing, respectively, in substantial horizontal alignment. Any increase in tension of the spring **45** developed by the movement of the actuating lever **34**, is transmitted to the switch blade **26** as well as the pivotal connection of the actuating lever **34** and the end wall of the side section **10** of the casing, and is not imparted into a line of resistance against the movement of the switch-actuating button **47**, thus removing the necessity of a greater amount of operating force to actuate the switch components.

While we have illustrated and described the preferred form of construction for carrying our invention into effect, this is capable of variation and modification without departing from the spirit of the invention. We therefore do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of such variations and modifications as come within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. An actuator lever for a snap action switch including a housing provided with a center cavity, an overcentering mechanism within the cavity consisting of a fixed terminal having spaced apart parallel pivot posts to which a movable switch blade is pivotally connected by a coil spring extending between the pivot posts and connected at one end to the switch blade and with its opposite end connected to the actuating lever with the free end of the blade carrying a contact movable between spaced terminal members wherein the improvement comprises:

(a) an elongated substantially flat actuating lever pivotally positioned within the cavity of the housing and having a length greater than that of the switch blade,

(b) means pivotally connected one end of the lever to one wall of the housing between and in vertical alignment with the spaced terminal members longitudinally beyond the free end of the switch blade,

(c) means provided by the opposite end of said lever positioned between the pivot posts of the fixed terminal and beyond the corresponding opposite end of the switch blade for connecting the opposite end of the spring thereto in the plane of a midline through the long axis of the blade and the pivotal connecting means between said one end of the lever and the housing,

(d) said lever having a medial portion offset laterally out of its normal longitudinal plane and to one side of the vertically aligned spaced terminals to provide clearance for the contact carried by the free end of the blade as the same is pivoted in one direction between the spaced terminal members by the pivotal movement of said opposite end of said actuating lever and the overcentering mechanism.

2. An actuating lever for a snap action switch as defined by claim **1** wherein said means pivotally connecting one end of the lever to the housing comprises a V-shaped groove formed in one end wall of the housing between the spaced terminal members and in horizontal alignment with the point of pivotal connection between the switch blade and the pivot posts of the fixed terminal.

3. An actuating lever for a snap action switch as defined by claim **1** wherein said means provided by the opposite end of said lever comprises a head portion formed at right angles to the longitudinal length of the lever beyond the corresponding opposite end of the switch blade to which the opposite end of the spring is connected so that it lies in a horizontal plane between the pivot posts of the fixed terminal and is movable with said opposite end of said lever to move the contact carrying end of the switch blade with a snap action through the offset portion of the lever and between the spaced terminal members.

4. An actuator lever for a snap action switch including a housing provided with a center cavity, an overcenter-mechanism within the cavity consisting of a fixed terminal having spaced apart parallel pivot posts to which a movable switch blade is pivotally connected by a coil spring extending between the pivot posts and connected at one end to the switch blade and with its opposite end connected to the actuating lever with the free end of the blade carrying a contact movable between spaced terminal members wherein the improvement comprises:

(a) an elongated substantially flat actuating lever of a length greater than the switch blade,

(b) means on one end of said lever extending transversely to its length and positioned to one side of the pivot posts of the fixed terminal and beyond the corresponding opposite end of the switch blade for connecting the opposite end of the spring thereto,

(c) said lever having at its opposite end a base portion of the width greater than that of the lever and extending transversely to its longitudinal length and pivotally connected to one wall of the housing between the spaced terminal members and in horizontal

alignment with the point of pivotal connection between the switch blade and the pivot posts of the fixed terminal,

(d) said lever having a medial portion offset laterally with respect to said first mentioned means and said base portion providing clearance for the contact carried by the free end of the switch blade as the same is pivoted in one direction by the overcentering mechanism.

5. An actuator lever for a snap action switch as defined by claim 4 including means pivotally connecting said base portion of the said lever to one wall of the housing, which means comprises a V-shaped groove formed in the one wall of the housing between the spaced terminal members and in horizontal alignment with the point of pivotal connection between the switch blade and the pivot posts of the fixed terminal.

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