United States Patent

[11] **3,562,462**

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[45] Patented **Feb. 9, 1971**

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[54] **TILT SWITCH WITH FLAT SPRING CENTERING MEANS**
2 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **200/153,** 200/6, 200/67
[51] **Int. Cl.** **H01h 21/24**
[50] **Field of Search** ..... 200/6C, 67, 67.7, 159A, 67C, 166.1, 5 (Cursory), 154, 172, 172B, 153.10

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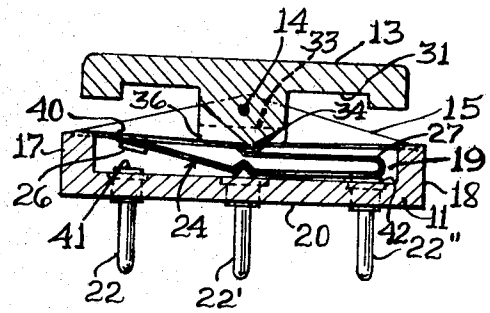
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Primary Examiner—Robert K. Schaefer
Assistant Examiner—Robert A. Vanderhye
Attorney—Edward C. Threedy

ABSTRACT: A switch having a tiltable actuator for pivoting a switch blade about a pivot terminal post in a make and break movement with respect to a pair of associated terminal contacts. A flat spring engages a cooperating flat portion on the bottomside of the actuator, and serves to bias the actuator to the center, untilted position.

The title has been changed to: "Tilt Switch With Flat Spring Centering Means."



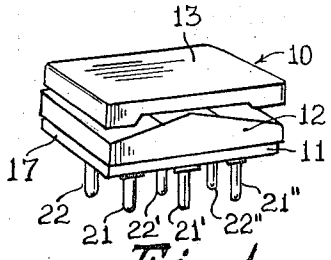


Fig. 1.

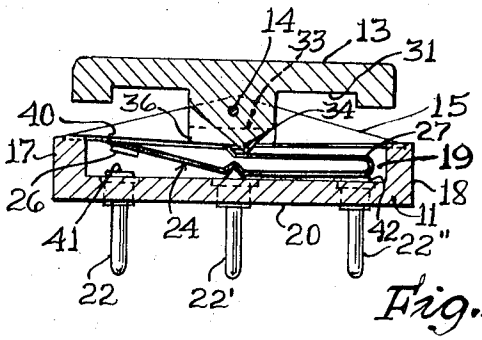


Fig. 2.

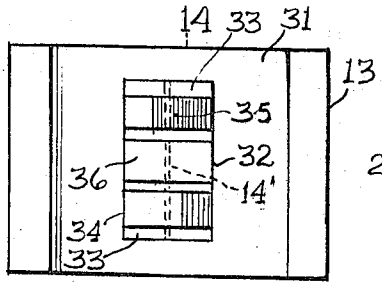


Fig. 4.

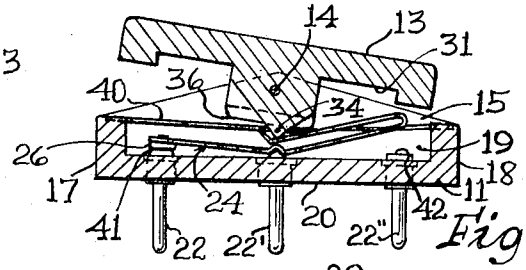


Fig. 3.

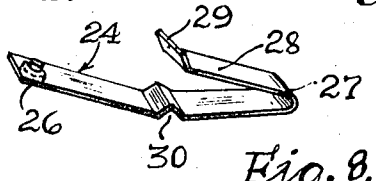


Fig. 8.

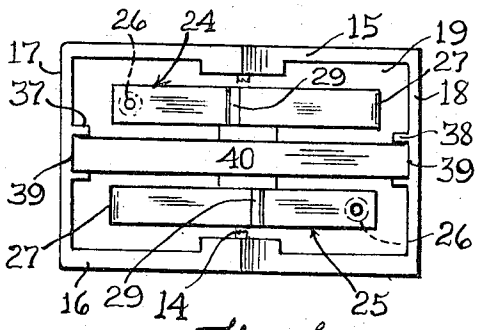


Fig. 5.

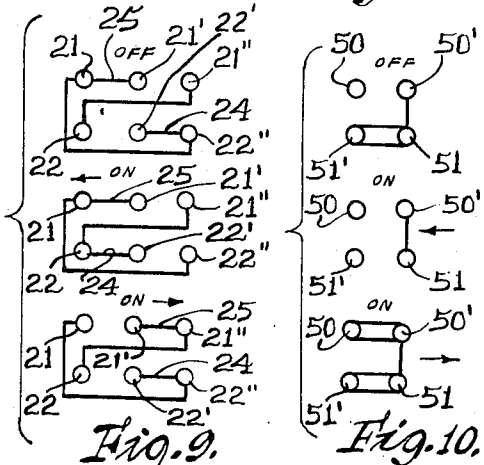


Fig. 9. Fig. 10.

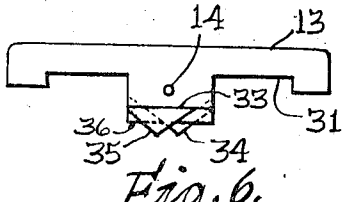


Fig. 6.

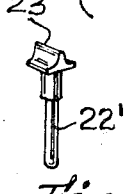


Fig. 7.

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TILT SWITCH WITH FLAT SPRING CENTERING MEANS

SUMMARY OF THE INVENTION

A switch, including a housing for a plurality of terminal contacts, with one of the terminal contacts providing a fulcrum for a tiltable switch blade; a preformed switch blade so arranged as to have its opposite ends movable into and out of contact with certain of the terminal contacts when the blade is tilted about the fulcrum. A tiltable actuator mounted on the housing in a neutral position, and having an actuating element in contact with the tiltable blade, and in operative relationship to the fulcrum provided by one of the terminals to effect tilting of the blade thereabout, as the actuator is tilted in either direction out of its neutral position against a spring that yieldably maintains the actuator in its neutral position.

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

The invention will be best understood by reference to the accompanying drawings showing one form of construction and in which:

FIG. 1 is a perspective view of the tilt switch;

FIG. 2 is a side elevational detailed view of the tilt switch in its neutral position;

FIG. 3 is a side elevational detailed view of the switch in one actuated position;

FIG. 4 is a plan underside view of the switch actuator;

FIG. 5 is a top plan view of the tilt switch with the actuator removed;

FIG. 6 is a side elevational view of the actuator;

FIG. 7 is a perspective view of the fulcrum terminal post;

FIG. 8 is a perspective view of one of the switch blades of the switch;

FIG. 9 is a schematic circuit representing the different operations of the tilt switch; and

FIG. 10 is a schematic circuit representing the different operations of modified tilt switch.

The tilt switch **10** as shown in FIG. 1 provides a hollow base **11** having a portion thereof covered by a protective sleeve **12**. A tiltable actuator **13** is pivotally mounted on a pin shaft **14** extending between triangularly shaped side walls **15** and **16** of the base **11**. The base **11** also provides end walls **17** and **18** which together with the sidewalls **15** and **16** define a center cavity **19**.

Extending through the bottom wall **20** of the base **11** are a plurality of aligned terminals **21**, **21'** and **21''** as well as parallelly aligned corresponding terminals **22**, **22'** and **22''**.

The terminals **21'** and **22'** are of the construction shown in FIG. 7, and as such each provides a fulcrum **23**.

The switch **10** as shown in the drawings includes two switch blades **24** and **25**. Each of the switch blades **24** and **25** are of a similar construction and one is more specifically shown in FIG. 8 wherein the blade **24** has a contact bearing end **26**, and its opposite end reversely bent as at **27** so as to provide a yieldable finger **28** which terminates into an angular tab **29**. The medial portion of the blade has formed therein an inverted V-shaped seat **30** which is adapted to sit on the fulcrum head **23** of either of the terminals **21'** or **22'**. As shown in FIG. 5 the switch blades **24** and **25** are reversely positioned within the cavity **19** so that a specific operation may be achieved and which is hereinafter explained. The yieldable actuator **13** has, as shown in FIG. 4, its underside **31** formed to provide a center block **32** which includes side edges **33** as well as triangularly shaped pivot bearings **34** and **35**, which pivot bearings have their apexes offset horizontally with respect to each other as clearly shown in FIG. 6. The center block **32** also provides a center support **36** having a substantial flat surface, which lies below the horizontal plan of the side edges **33** as seen in FIG. 6.

The end walls **17** and **18** of the base **11** are provided with posts **37** and **38** which form recesses **39** which in turn receive the opposite ends of a flat spring **40**. When the actuator **13** is mounted between the sidewalls **15** and **16** the flat surface of the center support **36** of the center block **32** formed on underside **31** thereof will lie in facial abutment on the flat spring **40** as seen in FIG. 2, maintaining the switch **10** in its neutral position. To actuate the switch so as to establish a circuit through certain of its terminals and switch blades, the actuator **13** may be pivoted in either a clockwise or anticlockwise direction about the pin shaft **14** as viewed in FIGS. 2 and 3. As specifically shown in FIG. 3 the actuator **13** has been tilted about the pin shaft **14** in a clockwise direction and this movement has caused the triangularly shaped pivot bearing **34** to move against the yieldable finger **28** of the switch blade **24** to a position where its line of force upon the yieldable finger **28** extends to the opposite side of the fulcrum head **23** causing the blade **24** to pivot thereabout into the position shown in FIG. 3. At the same time pivot bearing **35** has been moved further along the finger portion of blade **25** to maintain it in its unactuated position. In the pivoted position of the blade **24**, as shown in FIG. 3, its contacting end **36** has been moved into contact with the terminal head **41** of the terminal **22** while its opposite end **27** has been pivoted out of contact with the contact head **42** of the terminal **22''**.

In the event the actuator **13** is tilted in an opposite direction, the other oppositely disposed switch blade **25** will pivot about its fulcrum **23** when the pivot bearing **35** moves against the yieldable finger **28** of the switch blade **25**.

The operation of the switch **10** is schematically shown in FIG. 9 wherein the uppermost diagram illustrates the tilt switch **10** in its neutral position. In such a position the switch blade **24** is depicted as making a connection between terminal **22'** and terminal **22''** while switch blade **25** is shown as completing a circuit between terminals **21** and **21'**. The tilting movement of the actuator **13** effects the change in circuitry as illustrated in the second diagram of FIG. 9 wherein switch blade **24** has now been pivoted about its fulcrum so that it now makes contact between terminals **22'** and **22** while switch blade **25** has not been affected by the movement of the actuator **13**. If, however, the actuator **13** is pivoted in an anticlockwise direction from its position as shown in FIG. 2, then the third diagram of FIG. 9 depicts the circuitry established by the pivotal movement of the switch blade **25**.

A switch embodying the structural characteristics as heretofore described but employing only two sets of two terminals each is depicted by the schematical circuitries of FIG. 10. In such an arrangement the two switch blades are positioned to have their contact ends juxtapositioned in one end of the housing, and have the pivot bearings on the actuator reversed from that shown in FIG. 6. Upon tiltable movement of the actuator in one direction the one blade **24'** will be moved from its position shown in the first diagram of FIG. 10 and be disconnected from the terminals **50** and **50'** will make a circuit as shown in the second diagram of FIG. 10. In the event the actuator is tilted in an opposite direction both switch blades **24'** and **25'** will make a circuit connection between their respective terminals **50** and **50'** and **51** and **51'**.

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

I claim:

1. A momentary electrical tilt switch having an open housing providing a center cavity and including a plurality of terminals extending through one wall of the housing and providing head portions within the cavity with certain head portions of a pair of the plurality of terminals providing juxtapositioned pivot seats for a plurality of switch blades, wherein the improvement comprises:

a. an actuator pivotally connected to the housing for tiltable movement in opposite directions;

b. first and second elongated switch blades each positioned upon one of the pivot seats within said cavity and each providing a contact-bearing and extending in opposite directions and to either side of the pivot seats;

c. said switch blades each providing at their opposite ends a yieldable arm reversely bent with respect to their longitudinal axis and of a length such that their free ends project over and beyond their respective pivot seats;

d. actuating members on the bottom of said actuator for each of said switch blades, with each actuating member spaced laterally and horizontally from each other so as to contact said yieldable arms of said switch blades inwardly of their free ends and at a point on opposite sides of their respective pivot seats so as to maintain each of said switch blades in an unbalanced condition;

e. a flat spring within the housing extending parallelly between said switch blades and in an elevated plane with respect thereto and in contact with a flat portion on the bottom of said actuator between said actuating members for yieldably maintaining said actuator in an untilted position;

f. said actuating members movable with said actuator so as to reposition the downward contact force of either one of said actuating members onto the free end of said yieldable arm of one of said switch blades at a point to the other side of the pivot seat to pivot the contact-bearing end of said switch blade into contact with a head portion of one of the terminals.

2. A momentary electrical tilt switch as defined by claim 1, wherein said actuating members are inverted triangularly shaped pivot bearings depending from the bottom of said actuator to either side of the flat portion thereof that is in contact with said flat spring and having their apexes in sliding contact with said yieldable arms of said switch blades.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,562,462 Dated February 9, 1971

Inventor(s) Eric L. Long

It is certified that error appears in the above-identified paten and that said Letters Patent are hereby corrected as shown below:

Column 2, line 74, "and" should read -- end --.

Signed and sealed this 14th day of January 1975.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents