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Andreas

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[54] **ELECTRICAL SWITCH WITH ADJUSTABLE ACTUATING ARM**

[75] Inventor: **Gordon C. Andreas,** St. Louis, Mo.

[73] Assignee: **UMC Industries, Inc.,** St. Louis, Mo.

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[52] **U.S. Cl.** **200/332,** 200/47, 200/61.41, 200/286

[51] **Int. Cl.** **H01h 3/06**

[58] **Field of Search** 200/61.41, 47, 331, 332, 200/286

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Primary Examiner—Robert K. Schaefer
Assistant Examiner—William J. Smith
Attorney, Agent, or Firm—Koenig, Senniger, Powers and Leavitt

[57] **ABSTRACT**

An electrical switch provided with a pivotally mounted primary actuating arm and an auxiliary arm conjointly movable with the primary arm for actuating the switch and also adjustably movable relative to the primary arm, and means engageable with the auxiliary arm to provide preselected adjusted positions beween which the auxiliary is adjustably movable.

7 Claims, 9 Drawing Figures

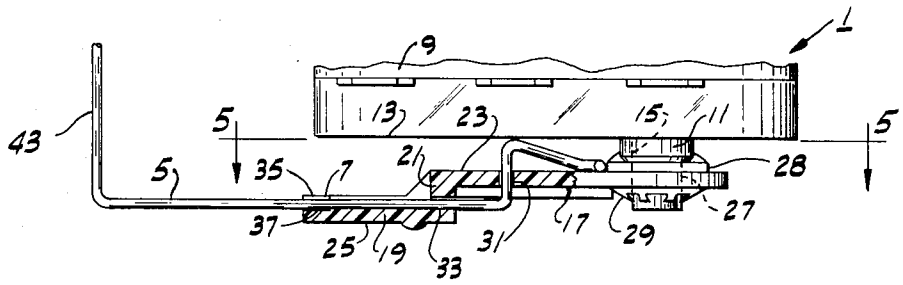


FIG. 1

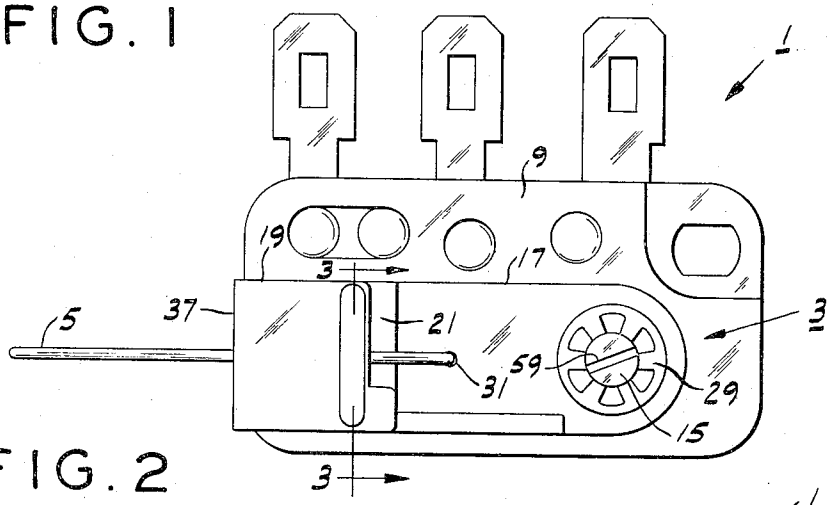


FIG. 2

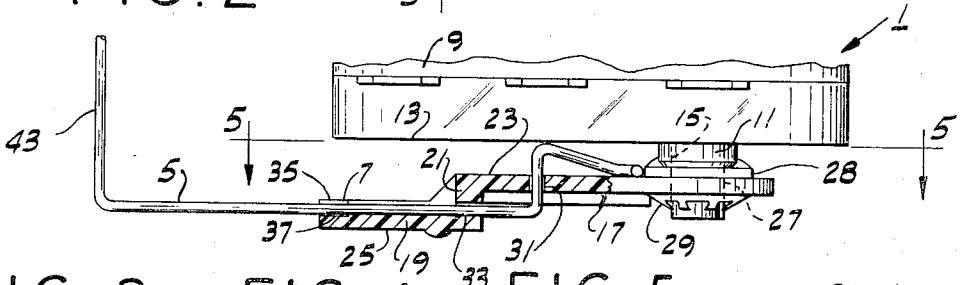


FIG. 3

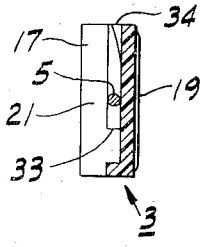


FIG. 4

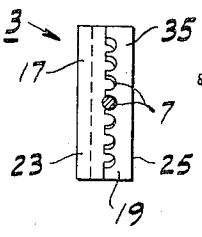


FIG. 5

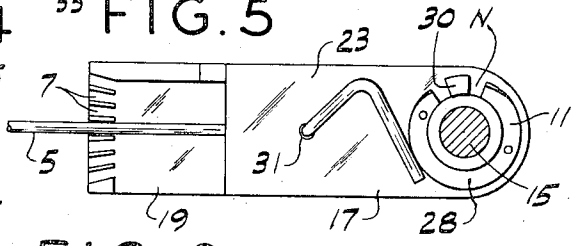


FIG. 6

FIG. 8

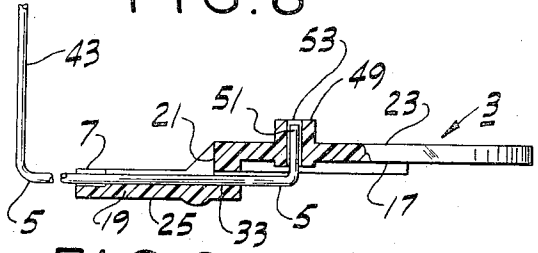


FIG. 7

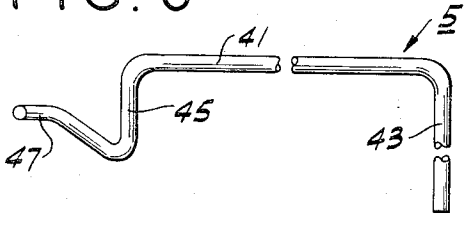
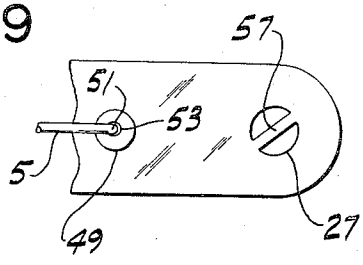
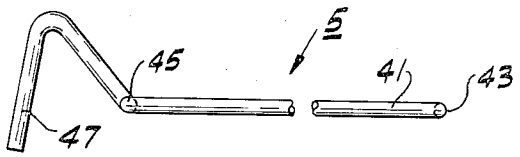


FIG. 9





ELECTRICAL SWITCH WITH ADJUSTABLE ACTUATING ARM

BACKGROUND OF THE INVENTION

The invention is particularly concerned with microswitches of the type having a pivoted actuating arm swingable between a deactuated and a switch-actuated position, such as may be actuated by a cam or other movable element in various mechanisms, e.g., in a vending machine. Heretofore, the actuating arm of such a switch has generally been constituted by a length of thin wire, and, rather than bending the wire for adjustment relative to the switch operator, it has been the approved practice to adjust the location of the switch case relative to the switch operator. However, this approved practice is not always followed; in order to avoid the work of adjusting the location of the switch case, the workman may bend the trip wire, and in many instances this will break it.

SUMMARY OF THE INVENTION

Accordingly, among the several objects of this invention may be noted the provision of a switch of the class described having an actuating arm which is adjustable to avoid any necessity for adjustment of the location of the switch case without any danger of breaking the arm; and the provision of such a switch wherein the arm is easily and quickly adjusted without any necessity for the use of tools, and holds its adjustment. Other objects and features will be in part apparent and in part pointed out hereinafter.

In general, a switch of this invention comprises a primary arm pivotally mounted for switch actuation, an auxiliary arm on the primary arm for conjoint switch-actuating movement with the primary arm and adjustable movement relative thereto, and means for engagement with the auxiliary arm and providing preselected adjusted positions between which the auxiliary arm is adjustably movable.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of an electrical switch embodying the present invention;

FIG. 2 is a front elevation view of the switch of FIG. 1 partially in cross-section;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a fragmentary left end view of a primary switch-actuating arm of FIG. 1;

FIG. 5 is a view taken on line 5—5 of FIG. 2;

FIG. 6 is an enlarged plan view of the switch-actuating trip wire;

FIG. 7 is a top elevational view of the trip wire of FIG. 6; and

FIGS. 8 and 9 are views showing modifications.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings and particularly to FIGS. 1–5, there is shown at 1 an electrical switch having a primary or switch-actuating arm 3 pivotally mounted thereon. An auxiliary arm, such as the switch or trip wire 5, is pivotally mounted on the primary arm and is adjustably movable between adjusted positions

in respective engagement with a series of notches 7 in the primary arm.

More particularly, switch 1 comprises a casing or housing 9 having an annular boss 11 extending from the front 13 thereof, with a switch-operating or pivot post shaft 15 rotatably received in the boss 11. It will be understood that the shaft 15 actuates suitable conventional switch mechanism within the casing 9.

The primary arm 3 has a flat inner end portion 17 secured on the outer end of the shaft 15 and a flat outer end portion 19 offset outwardly from portion 17, with a shoulder 21 integrally formed therebetween. The opposite faces or surfaces of portions 17 and 19 are designated 23, 25. A mounting opening 27 extends between faces 23, 25 adjacent the inner end of portion 17, and the switch shaft 15 is received in this opening in rotatable or pivoting driven engagement with portion 17, said portion being retained on the shaft by suitable means against a collar 28 on the shaft as by a snap washer 29. A stop 30 on boss 11 is engageable by opposite sides of a notch N in the collar thereby predeterminately to limit pivotal movement of primary arm 3. A pivot opening 31 for auxiliarly arm 5 is formed in portion 17 between shoulder 21 and opening 27, and a slot 33 is provided through shoulder 21 in which the axuiliary arm is movable between portions 17,19. Portion 19 of primary arm 3 has an integral retainer or rib part shown at 34 in FIG. 3 adjacent the upper end of slot 33 adapted to hold auxiliary arm 5 in the slot. This is not necessary. A flange 35 is integrally provided adjacent the distal or free end 37 of primary arm 3 on the inside, and the series of grooves or notches 7 is formed in this flange. Notches 7 provide preselected adjusted positions for auxiliary arm 5 received therein, and the notches are angularly or radially disposed with each other extending along imaginary radial lines about 5° apart and emanating approximately from the opening 31.

Referring now also to FIGS. 5 and 6, the auxiliary arm or trip wire 5 is provided with a straight part 41 with a right-angle finger 43 at one end, and a pivot part 45 generally perpendicular to the straight part 41 extending therefrom in the same direction as the finger. A substantially V-shaped abutment portion indicated at 47 is integrally formed at the other end of trip wire 5 and joins pivot part 45 thereof.

Prior to the assembly of primary arm 3 with the switch shaft 15, trip wire 5 is assembled with the primary arm by inserting V-shaped part 47 through the pivot opening 31 in the primary arm from the outside face of the latter 25 to the point where the pivot part 45 is received in its pivoting position in the opening. Pivot part 45 is then rotated in opening 31 to move straight part 41 of the wire past the retainer part 34 of portion 19 into the primary arm slot 33. Upon the entry of part 41 into slot 33, it is flexed slightly in the direction of primary arm face 23 using the edge or sidewall of the slot as a fulcrum, and when so flexed, pivot part 45 is further turned or rotated in primary arm opening 31 thereby to move the straight part into registry with one of notches 7. It should be noted that with trip wire 5 so assembled with primary arm 3, the straight part 41 of the trip wire is received in one of its preselected adjusted positions in releasable displacement preventing engagement with one of notches 7, and in this position, the straight part is relaxed or in its free state.

Subsequent to the assembly of trip wire **5** with primary arm **3**, the latter is mounted on the outer end of switch-operating shaft **15** against collar **28** and secured in place by snap washer **29**. When so assembled, face **23** of primary arm portion **17** is substantially parallel to and predeterminately spaced from front surface **13** of switch casing **9** thereby to provide opposite abutments between which V-shaped abutment **47** of trip wire **5** is contained. Although contained between face **23** of primary arm portion **17** and switch front surface **13**, the V-shaped end **47** of trip wire **5** is somewhat rockably movable to a predetermined limited extent, and maintains the trip wire against displacement from primary arm **3** and also serves to maintain pivot part **45** within primary arm opening **31** in pivotal engagement therein.

From the foregoing, it is apparent that auxiliary arm **5** is not only concertedly pivotable with primary arm **3** to actuate switch **1** but also is adjustably movable relative to the primary arm to preset the finger **43** to different positions as may be required after the switch casing **9** has been mounted in fixed position. Means for providing preselected adjusted positions for auxiliary arm **5** are found in the series of notches **7**, and it is apparent that the pivot part **45** of the auxiliary arm is pivotally movable in primary arm opening **31** thereby to provide means constituting a pivotal connection between the auxiliary arm and primary arm **3** for the adjustable movement of the auxiliary arm between its preselected adjusted positions in engagement with notches **7** and relative to the primary arm.

FIGS. **8** and **9** show a modification of the mounting of the auxiliary arm **5** on the primary arm **3**, involving the provision of an annular boss **49** on portion **17** of arm **3**, with the arm or trip wire **5** having an end pivot portion **51** at its end opposite finger **43** pivotally received in the opening **53** in the boss. The boss **49** (and pivot portion **51** of the wire) extend inwardly from portion **17** of the arm **3** toward but terminate short of the adjacent side of the casing **9**. In the assembly of wire **5** with arm **3**, the pivot portion **51** is entered in opening **53** with the wire out of the slot **33**, the wire then being swung into the slot.

FIG. **9** shows the opening **27** in portion **17** of the primary arm **3** for receiving the shaft **15** of the switch as being bridged by a diametrical bar **57** formed integrally with the arm. This bar fits in slot **59** in the outer end of the shaft to key the arm **3** to the shaft and to determine the angular disposition of the arm **3** relative to the switch casing (or relative to the slot **59**). In order to provide for different angular dispositions of arm **3** relative to the switch casing (or slot **59**), different arms **3** (which are preferably molded of plastic) are provided with bar **57** at different angles relative to the length of the arm to suit various requirements.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A switch having a primary arm pivotally mounted thereon for actuation thereof, an auxiliary arm mounted on said primary arm for conjoint switch-actuating movement with said primary arm and also for adjustable movement relative thereto, and means for engagement with said auxiliary arm and providing preselected adjusted positions between which said auxiliary arm is adjustably movable, said auxiliary arm being a resilient trip wire.

2. A switch having a primary arm pivotally mounted thereon for actuation thereof, an auxiliary arm mounted on said primary arm for conjoint switch-actuating movement with said primary arm and also for adjustable movement relative thereto, and means for engagement with said auxiliary arm and providing preselected adjusted positions between which said auxiliary arm is adjustably movable, wherein said engagement means comprises a series of notches in said primary arm in any one of which said auxiliary arm is engageable to provide the preselected adjusted positions, wherein said primary arm has an opening in which said auxiliary arm is pivotally received, and wherein said primary arm has a slot between said opening and said notches in which said auxiliary arm is movable, a side of said slot being disposed for engagement with said auxiliary arm to resist disengagement of said auxiliary arm from said notches, without bending the arm.

3. A switch having a primary arm pivotally mounted thereon for actuation thereof, an auxiliary arm mounted on said primary arm for conjoint switch-actuating movement with said primary arm and also for adjustable movement relative thereto, and means for engagement with said auxiliary arm and providing preselected adjusted positions between which said auxiliary arm is adjustably movable, wherein said engagement means comprises a series of notches in said primary arm in any one of which said auxiliary arm is engageable to provide the preselected adjusted positions, wherein said primary arm has an opening in which said auxiliary arm is pivotally received, and wherein said primary arm has opposite faces, and at least a portion of said auxiliary arm extends adjacent each opposite face.

4. A switch according to claim **3** wherein said primary arm further comprises a pair of offset elongate portions having an integral shoulder between said opening and said notches, a slot in said shoulder, and said auxiliary arm extending through said slot adjacent each opposite face.

5. A switch according to claim **3** wherein said auxiliary arm comprises means engageable between said switch and one of said faces adjacent thereto for keeping said auxiliary arm within said opening.

6. A switch according to claim **4** wherein said auxiliary arm further comprises a pivoting part extending through said opening and disposed substantially perpendicular to said offset portions, means integral with said pivoting part and engageable between said switch and one of said faces adjacent thereto for keeping said pivoting part in said opening, a substantially straight part integral with said pivoting part and extending through said slot adjacent both faces and receivable in one of the notches, and a finger on the end of said straight part.

7. A switch as set forth in claim **4** wherein said opening is in a boss on the primary arm and the auxiliary arm has an end pivot portion pivotally received in said opening.

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