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ROTARY SWITCH WITH U-SHAPED ROTATABLE CONTACT STRUCTURE

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This invention relates first to a novel switch structure having a U-shaped rotatable contact structure.

The prime object of this invention is to provide a specially constructed switch of compact and simple form whereby by successive steps in the operation thereof a motor such as a fan motor for a hair dryer is first placed in the circuit, after which a resistor of one heating value is placed in circuit, followed by the placing of a resistor of a different value in circuit, and finally followed by placing both resistors in circuit during all of which operations the fan motor remains energized.

The various detailed objects of this invention within the above scope of operation will become apparent from the following detailed description of the embodiment of the switch of this invention illustrated in the accompanying drawings.

In the drawings,

FIGURE 1 is a plan view of the switch structure showing the housing in cross-section on the line 1—1 of FIG. 2;

FIGURE 2 is a cross-sectional view taken on the line 2—2 of FIG. 1;

FIGURE 3 is a plan view of the contact assembly blank in a partially bare state;

FIGURE 4 is a detailed cross-sectional view taken on the line 4—4 of FIG. 1; and

FIGURE 5 is a diagrammatic and schematic view illustrating the hair dryer circuit for which the switch is specially devised.

In the form selected for disclosure purposes the switch includes a thin plate of suitable insulating material 10 to the undersurface of which is attached a thin sheet of insulating material 12 for protective purposes and overlying which and enclosing the operating structure is a cover 14. These parts are complementarily shaped, as indicated in FIG. 1, and in assembled form are secured together by means of rivets such as eyelets 16a and 16b passing through the ears 14a and 14b of the cover 14 and the superposed layers of insulating material 10 and 12. The plate 10 is provided with a pair of concentric arcuate apertures 10a and 10b, see FIG. 1.

The assembly illustrated in FIG. 1 will be more easily understood by referring first to the metallic stamping 18 shown in FIG. 3. This stamping provides all of the circuit terminals and contacts connected as a single unit for handling purposes during dismounting on the plate 10. As shown in FIG. 3 it generally consists of a pair of contacting and terminal elements 20 and 22 arranged in circumferentially spaced relation and concentric with respect to the radially inwardly arcuate contact and terminals 24 and 28. At the center of these parts is a central contact and terminal part 30. It is to be noted that the parts 24 and 28 are circumferentially spaced. Each of the parts 20, 22, 24 and 30 end in connecting terminals which will be referred to later. This metal stamping can be formed, if desired, in a punch press and at the time of formation the various parts are provided with circular apertures as shown, of the required diameter. The arcuate contact 24 is provided with a pair of upwardly projecting bosses 20d. The parts 24 and 28 are provided with upwardly projecting stop tabs 24c and 28b, while the central contact is provided with a downwardly projecting

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indexing tab 30', and the part 28 is provided with a similar downwardly projecting indexing tab 28'. The stamping 18 is superposed upon the insulating plate 10, which is provided with the apertures so that the parts 20 and 22 can be riveted thereto, preferably by means of the eyelets 20a and 22a.

Similarly the part 24 is attached by means of the eyelet 24a and the round headed rivet 24b. The part 28 is attached by means of the round headed rivet 28a. If desired these rivets can be attached in a single operation and at the same time the necks between the arcuate contact 24 and the contacts 20 and 22 are severed along the dotted lines C, see FIG. 3, with the severed ends 20' and 24' turned down into the related apertures 10a and 10b, as shown for example in FIG. 4, to further anchor and position the parts. In the same way the part 28 is disconnected from the part 30 and the cut ends turned inwardly also in the aperture 10b.

As clearly shown in FIG. 1, the insulating layers are shaped so as to leave access parts A, B and D in the assembly so that the circuit wires 25, 26, 27 and 32 can be attached to the related contacts by clamping and/or soldering them thereto through these parts, even though the switch is completely assembled.

At 34 is an operating shaft which can be provided with an operating handle, not shown, which is rotatably mounted in the plate 10. The shaft is provided with an annular flange 34a, see FIG. 2, intermediate its ends, lying in an aperture in the insulating layer 12. The inner end of the shaft 34 is of noncircular cross-section, see FIG. 1, and is provided with a lock washer 36 attached thereto in any suitable manner. This lock washer holds a generally U-shaped switch blade 38 in position to successively catch the contacts when rotated by the shaft 34. This switch blade is preferably of spring metal and its upper leg is shaped to provide two contact fingers 40 and 42 which are circumferentially spaced. The lower leg of the blade 38 is shaped to provide a single contact finger 44 which lies under the contact finger 40, see FIGS. 1 and 2.

FIG. 5 diagrammatically illustrates the manner in which the switch operates with the circuit elements of a hair dryer, for example, to successfully connect these elements in circuit for proper operation.

Before describing the combination illustrated in FIG. 5, it is noted that the member 28 of the switch is not a part of the electrical circuit. It simply provides an off stop position for the switch blade which is the position illustrated in FIG. 1, at which time the finger 44 lies against the upstanding stop tab 28b. The first position of the switch blade 38 in a counterclockwise direction will cause the finger 44 to be indexed between the rounded heads and the rivets 24b and 28a, see FIG. 1. At this time current will flow from one side of the current source through the wire 32 to the center terminal 30. From there it will pass through the contact finger 44 to the contact 24 and thence by way of conductor 27 to one side of the fan motor M, the other side of which is connected to the other side of the source by wire 50. At the same time the fingers 40 and 42 will advance one step but the leading finger 40 will not come into circuit. Thus the fan operates without energizing either heating resistor H1 or H2.

In the next counterclockwise position of the switch blade 38 the contact finger 40 will engage the eyelet 22a and the contact 22 while the lower finger 44 will remain in engagement with the arcuate contact 24. Thus, as seen in FIG. 5, with the motor M operating the resistor H1 will be energized. On the next counterclockwise step contact finger 40 will engage the first eyelet 20a of contact 20, while contact finger 44 will remain in engagement with the contact 24. This the motor M continues to

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operate but the heating resistor H2 is now in circuit supplying more heat to the fan.

In the next and final position of the switch blade 38 the contact fingers 40 and 42 will respectively engage the second eyelet 20a of the contact 20 and eyelet 22a of contact 22 while the contact finger 44 remains in engagement with the contact 24. At this time the switch blade engages the stop tab 24c on the contact 24. In this position, as indicated in FIG. 5, current will be supplied to both heating resistors H1 and H2 in parallel, supplying the maximum amount of heat to the fan. The bosses 24d serve to aid in indexing the position of the switch blade and imparting a "feel" to its operation.

From the above description it will be apparent that the switch of this invention is capable of some variation in detail and it is intended, therefore, that the particular form of switch given for descriptive purposes is to be considered as exemplary only.

What is claimed is:

1. An electric switch comprising an insulating support, a contact assembly secured to said support comprising an elongated arcuate contact, a central terminal, a pair of contacts positioned radially outwardly of said arcuate contact and a U-shaped switch blade rotatably mounted in engagement with said central terminal having a pair of circumferentially spaced contact fingers forming one leg of said U-shaped blade and a single contact finger forming the other leg of said U-shaped blade.

2. In the combination of claim 1, said central terminal and said contacts each having means for circuit wire attachment thereto.

3. In the combination of claim 1, said single contact finger successively connecting said central terminal to said contacts.

4. In the combination of claim 1, means for limiting rotational movement of said switch blade.

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5. In the combination of claim 1, said support having apertures and said contacts having integral tabs engaging in said apertures.

6. An electric switch comprising a support having mounted thereon a central terminal, a U-shaped switch blade rotatably mounted in engagement with said terminal, having a single contact finger forming one leg of said blade and a pair of circumferentially spaced contact fingers forming the other leg, said single finger being shorter than and extending radially below one of said pair of fingers, a contact positioned to be engaged by said single finger and a pair of spaced contacts positioned to be successively engaged by said pair of fingers, said switch blade electrically interconnecting all of said contacts in one position.

7. In the combination of claim 6, said contacts having detents for positioning said blade in each of its positions.

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