April 14, 1942. R. KNOPP 2,279,753

SWITCH

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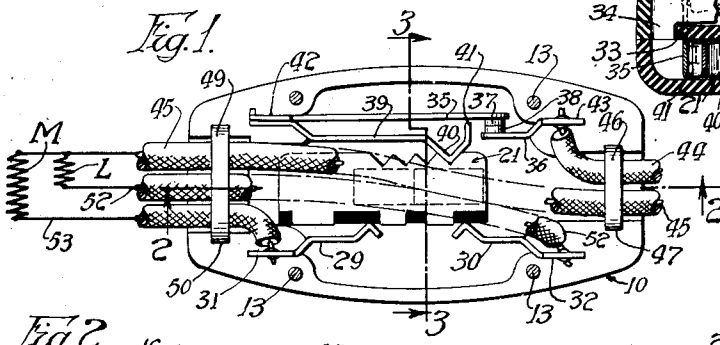

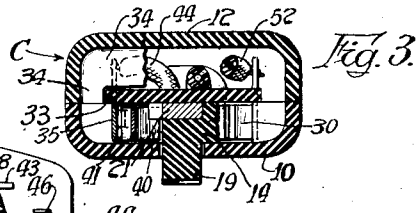

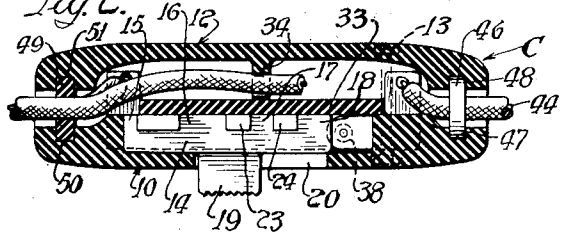

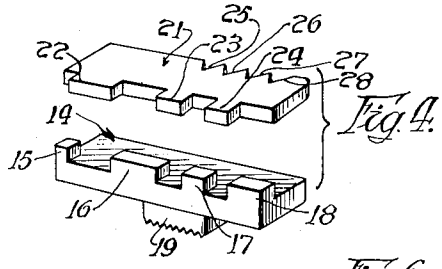

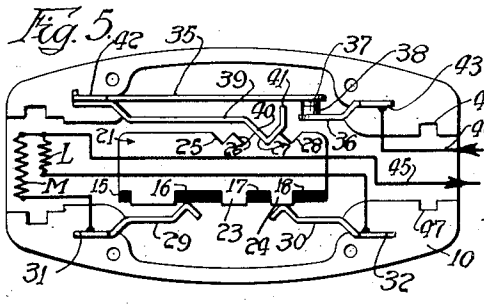

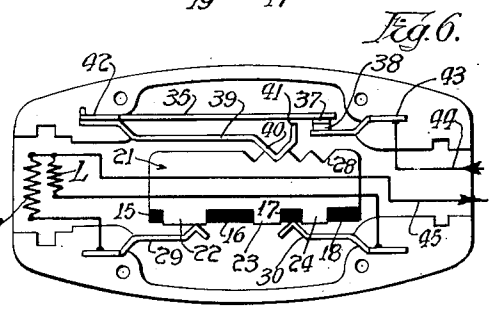

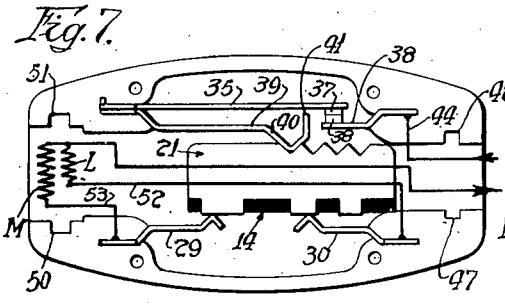

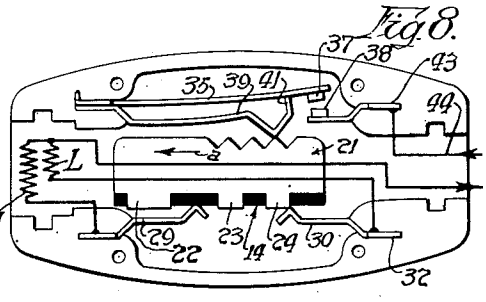

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SWITCH

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5 Claims. (Cl. 200—4)

My present invention relates to a switch particularly adapted for heating pads and the like, where the switch is mounted in a current supply cord and controls selectively a plurality of heating elements or other electrically operated devices.

The most important object of my present invention is to provide a switch of the general character referred to having sliding circuit closing elements and a circuit breaker which breaks the circuit through the switch prior to disengagement of any of the slidable circuit closing elements from each other.

A further object is to provide a switch structure which can be inexpensively manufactured of a minimum of parts and readily assembled without the necessity of complicated wiring connections and parts alignment prior to enclosing of the switch mechanism in a two-part casing provided therefor.

Still another object is to provide a switch structure in which a simple sliding circuit closing element cooperates slidably with stationary circuit closing elements and arcing between the elements is prevented by the use of a single circuit breaker having separable contacts operated by the movable circuit closing element, and which may be made of tungsten, platinum or the like, thus confining all arcing to the one pair of contacts.

A further object is to provide means to impart more or less snap action to the contacts of the circuit breaker to aid in minimizing arcing between them when the circuit is broken.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing, wherein:

Figure 1 is a plan view of my switch structure with the upper casing member removed and the screws for holding it in position shown in section;

Figure 2 is a longitudinal sectional view on the line 2—2 of Figure 1, showing the upper part of the casing in position;

Figure 3 is a similar transverse sectional view on the line 3—3 of Figure 1;

Figure 4 is a separated perspective view of a slidable member and a movable circuit closing element of my switch structure, and

Figures 5, 6, 7 and 8 are diagrammatic views showing the switch adjusted for, respectively, low heat, medium heat, high heat and just prior to "off", the off position being shown in Figure 1.

On the accompanying drawing I have used the reference character C to indicate a casing comprised of a lower portion 10 and an upper portion 12. The portions 10 and 12 are held together by four screws 13.

Within the lower portion 10 of the casing C, I provide a movable platelike member 14 formed preferably of insulating material and having a plurality of upstanding projections 15, 16, 17 and 18 and a downwardly directed projection 19. The member 14 is adapted to slide on the bottom of the casing portion 10 with the element 19 projected through a slot 20 therein for the purpose of guiding the member 14 in its sliding movement and to form a protuberance that can be engaged by the thumb or finger of the user for sliding the member 14 to its various positions.

Resting on the platelike member 14 is another plate 21 of current-conducting material notched out to fit the projections 15, 16, 17 and 18. The plate 21 has projections 22, 23 and 24 extending between the projections of the plate 14 and slightly beyond the edge thereof, as shown in Figure 1, to serve as movable circuit-closing contacts. Opposite the contacts 22, 23 and 24 is a series of notches 25, 26, 27 and 28.

For cooperation with the movable contacts 22, 23 and 24, I provide a pair of stationary circuit-closing elements or contacts 29 and 30. The contacts 29 and 30 are in the form of leaf springs of suitable shape fitting in sockets 31 and 32 of the lower portion 10 of the casing C and held therein by a partition wall 33 preferably of insulation. The wall 33 is held in its proper position by projections 34 from the upper portion 12 of the casing C when the two portions of the casing are assembled and the screws 13 inserted in position.

In connection with my switch structure, I provide a circuit breaker comprising leaf springs 35 and 36 carrying contacts 37 and 38 and an operator for the circuit breaker comprising another leaf spring 39. The leaf spring 39 has a cam portion 40 to cooperate with the various notches 25, 26, 27 and 28 and terminates in a finger 41 for operating the circuit breaker, as will hereinafter appear. The springs 35 and 39 are spot welded together at their left end in Figure 1 and fit in a socket 42 of the lower casing portion 10 for assembly purposes. Similarly, the spring 36 fits in a socket 43.

A pair of current supply wires 44 and 45 are provided which pass through a retainer washer 46 held in grooves 47 and 48 of one end of the

casing C. The supply wire 45 passes on through another retainer washer 49 held in grooves 50 and 51 of the casing portions 10 and 12.

The supply wire 45 is connected with one end of a low heat heating element L and with one end of a medium heat heating element M, as shown diagrammatically. The other end of the heating element L is connected by a wire 52 to the stationary contact 30 and the other end of the heating element M is connected by a wire 53 to the stationary contact 29. The wire 44 is connected to the circuit breaker spring 36.

Practical operation

Referring to Figures 5, 6 and 7, it is believed obvious how low, medium and high heat can be obtained by adjusting the plate 14 to a position where the cam 40 of the circuit breaker cooperates with the notch 27, 26 or 25, respectively, of the plate 21. For low heat in Figure 5, the current can be traced through the elements of the switch as follows: 44—36—38—37—35—39—40—27—21—24—30—52 and L back to 45.

In Figure 6, the current can be traced as follows: 44—36—38—37—35—39—40—26—21—22—29—53 and M back to 45.

When the switch is adjusted for high heat, as in Figure 7, then current flows as follows: 44—36—38—37—35—39—40—25 and 21, after which it divides, part going through 23—30—52 and L to 45, and part going through 22—29—53 and M to 45. In this instance both the low and medium heating elements L and M are energized, thus giving high heat.

In Figure 8, the plates 14 and 21 are being moved from low to off position, the cam 40 leaving the notch 27 prior to entering the notch 26 as the plates are moved in the direction of the arrow *a*. It will be noted that in this intermediate position between notches, the cam 40 has been lifted to bend the spring 35 upwardly to open the contacts 37 and 38 of the circuit breaker. The movable contact 24 has not yet disengaged the stationary contact 30 and it is therefore evident that the circuit has been broken through the circuit breaker so that it does not have to be broken across the sliding contacts 24 and 30. A little further movement of the plates 14 and 21 toward the left will result in the switch being in "off" position.

The notches 25, 26, 27 and 28 are all so related with respect to the contacts 22, 23 and 24 that the circuit breaker will be opened similarly as described in connection with Figure 8 just prior to disengagement of any of these three contacts from the contacts 29 and 30. Thus the only possible arcing that can occur is across the circuit breaker contacts 37 and 38 and these may be made of tungsten or platinum without great expense, since there are only two of them, thus confining all circuit opening operations to these two contacts only. Making them of tungsten or platinum results in the provision of contacts which will usually give lifetime service, and if cleaning is required it would be only after many years' use of the switch. Also, by the use of the notch and cam arrangement, some snap action is imparted to the contacts 37 and 38 of the circuit breaker, whereas only relatively slow sliding movement occurs between the movable contacts 22, 23 and 24 and the stationary contacts 29 and 30. The result is a satisfactory straight line operating switch for heating pads and the like, which can be inexpensively manufactured and will give trouble-free service.

While I have shown a particular embodiment of my invention, it will be understood of course that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the claims appended hereto to cover any such modifications or substitutions of mechanical equivalents as fall within the true spirit and scope of my invention without sacrificing any of its advantages.

I claim as new and desire to secure by Letters Patent of the United States:

1. In a switch structure, a two-part casing, a slidable member in one part of said casing, a loose partition member between said parts of said casing, means in said other part to retain said partition member in position for confining said slidable member to a predetermined sliding position in said one part of said casing, a plurality of stationary circuit closing elements in said casing, a movable circuit closing element cooperating with said stationary circuit closing elements and carried by said slidable member, and circuit breaking means operated by movement of said slidable member to break the circuit through said switch prior to disengagement of said movable circuit closing element from any one of said stationary circuit closing elements.

2. In a switch structure, two hollowed out parts arranged with their concave sides facing each other to form a casing, a slidable member in one of said parts, a partition member between said parts and held by the other part for confining said slidable member to a predetermined sliding position in said one of said parts, a plurality of stationary circuit closing elements in said casing, a movable circuit closing element cooperating with said stationary circuit closing elements and carried by said slidable member, and a circuit breaker operated by movement of said slidable member to break the circuit through said switch prior to any disengagement of said movable circuit closing element from said stationary circuit closing elements.

3. In a switch structure, a casing, a slidable plate of insulating material therein, an operating knob on said insulating plate, said casing having a slot through which said knob extends to the exterior of the casing, projections on one face of said insulating plate opposite said knob, a circuit closing plate on said insulating plate and having notches to receive said projections, a plurality of stationary circuit closing elements engageable and disengageable with relation to said projections and the edge of said circuit closing plate between said projections, said circuit closing plate having a series of V notches in its other edge, a circuit breaker, and an operating element for said circuit breaker having a cam portion cooperating with said V notches to open said circuit breaker prior to disengagement of said circuit closing plate from any one of said stationary circuit closing elements.

4. In a switch structure, a casing, a slidable plate of insulating material therein, an operating knob on said insulating plate, said casing having a slot through which said knob extends to the exterior of the casing, projections on one face of said insulating plate opposite said knob, a circuit closing plate on said insulating plate and having notches to receive said projections, a plurality of stationary circuit closing elements engageable and disengageable with relation to said projections and the edge of said circuit closing plate between said projections, a circuit breaker including a pair of contacts normally engaged for

supplying current through said switch, and means cooperating with the opposite edge of said circuit closing plate and timed with relation to engagement thereof with said stationary circuit closing elements to open said contacts of said circuit breaker prior to disengagement of said circuit closing plate from any one of said stationary circuit closing elements.

5. A switch comprising an elongated flat casing, a slidable circuit closing plate therein, a plurality of stationary circuit closing elements therein for selective cooperation with one edge of said plate, and a circuit breaker operated by the opposite edge of said plate, said circuit breaker comprising a leaf spring detent, said plate having a series of notches to receive said detent with snap action and a pair of contacts, one of which is carried by a leaf spring engaged by said detent when not in one of said notches to break the circuit of said stationary circuit closing elements prior to disengagement of said one edge of said plate from any one of said stationary circuit closing elements as the plate is moved longitudinally of said casing.

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