June 4, 1946. D. B. MacKENDRICK 2,401,650

ELECTRIC SWITCH

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Fig. 1.

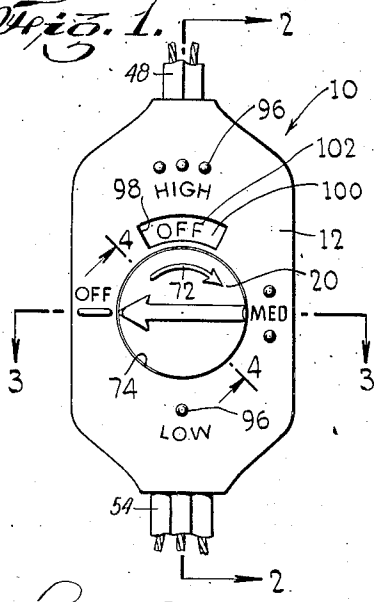


Fig. 5.

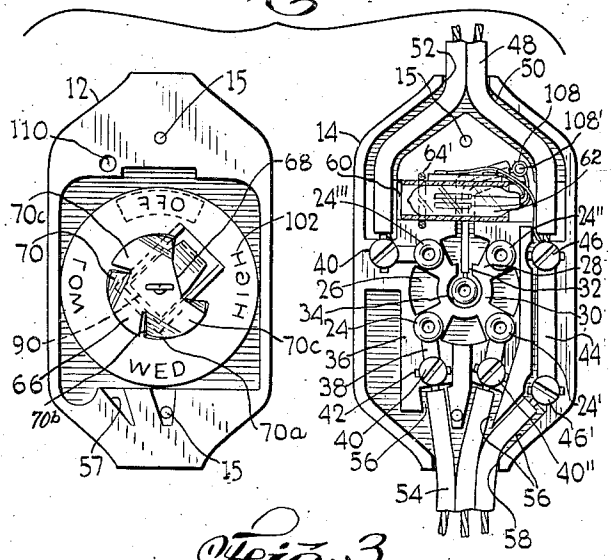


Fig. 2.

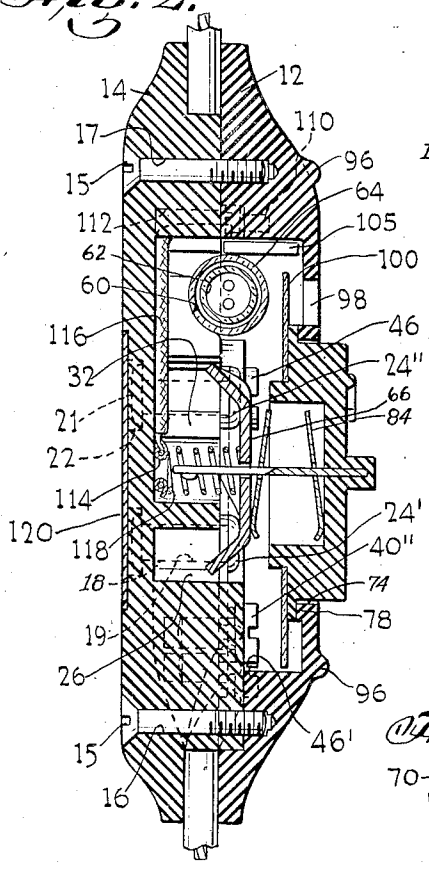


Fig. 3.

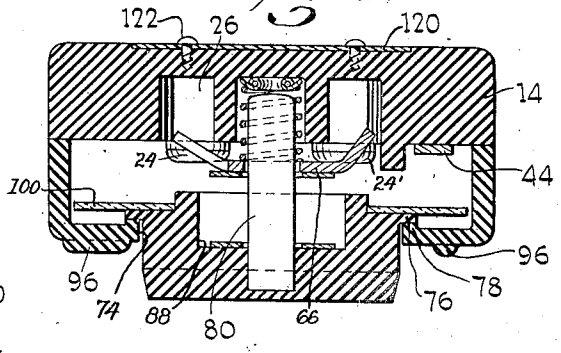


Fig. 4.

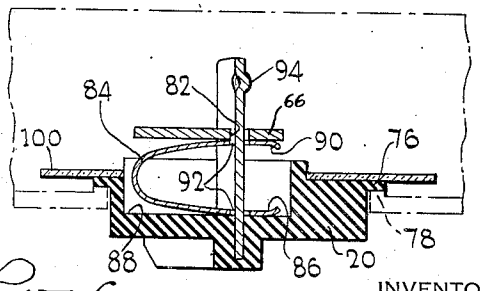
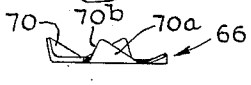


Fig. 6.



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Fig. 7.

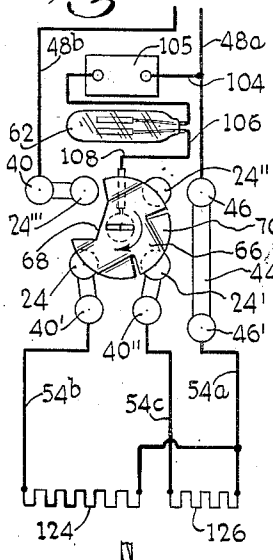


Fig. 8.

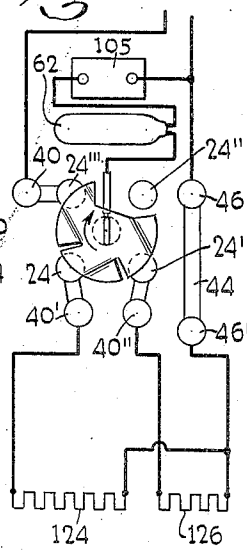


Fig. 9.

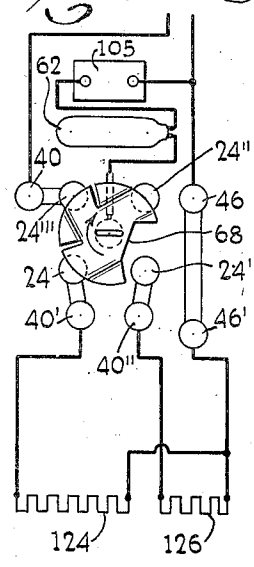
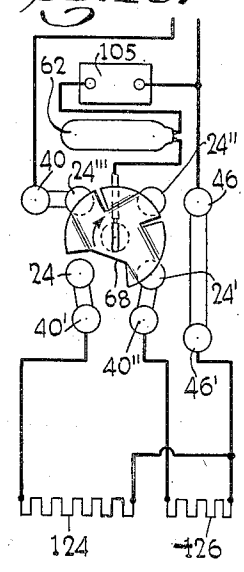


Fig. 10.



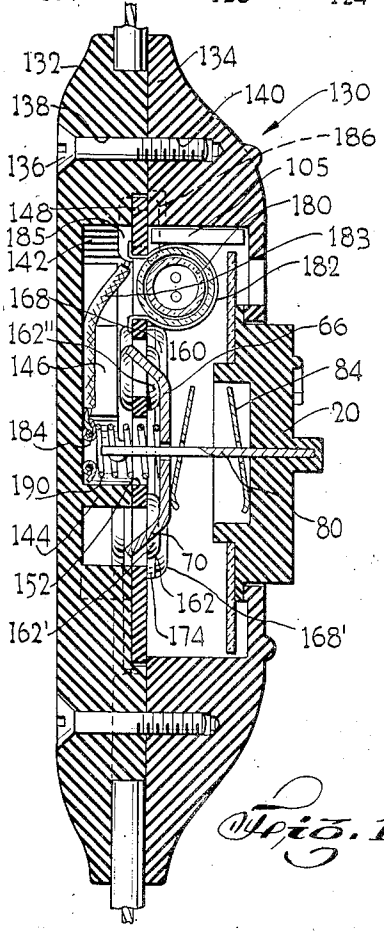
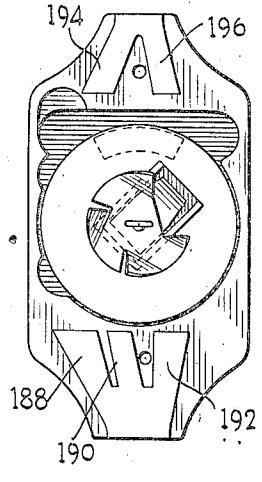
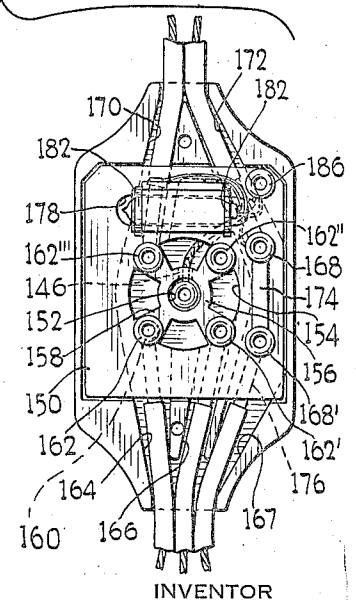


Fig. 11.

Fig. 12.





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Patented June 4, 1946

2,401,650

UNITED STATES PATENT OFFICE

2,401,650

ELECTRIC SWITCH

David B. MacKendrick, New York, N. Y.

Application September 10, 1943, Serial No. 501,768

13 Claims. (Cl. 200—11)

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This invention relates to electric switches. More particularly it is directed to an electric switch which is adapted to provide a plurality of different circuit connections between a supply line and an electric appliance such as a heating pad, percolator, toaster, etc.

One object of the invention is to provide an improved switch of this character which shall be of compact and rugged construction, extremely easy to assemble and manufacture and of low cost.

A further object of the invention is to provide a switch of the character described which will emit a sharp and distinct click when operated and yet comprise few and simple parts.

A more specific object of the invention is to provide an improved device of the character described having an improved switching mechanism which affords a clean and positive contact in every position of the switch.

Other objects of the invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combination of elements, and arrangement of parts which will be exemplified in the constructions hereinafter described, and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which are shown various possible embodiments of this invention and wherein like numbers refer to like parts throughout,

Fig. 1 is a top plan view of a through cord switch embodying the invention;

Figs. 2 and 3 are enlarged longitudinal and transverse sections therethrough, taken substantially along the lines 2—2 and 3—3 respectively of Fig. 1;

Fig. 4 is an enlarged section through the rotary actuating knob taken substantially along the line 4—4 of Fig. 1, the switch casing being indicated in dot-and-dash lines;

Fig. 5 is an inside view of the two halves of the switch set side by side;

Fig. 6 is a side elevational view of the novel contact disk;

Figs. 7, 8, 9 and 10 are schematic views of the switch mechanism successively disposed to respectively connect two resistances of a heating appliance in "off," "high," "medium" and "low" positions;

Fig. 11 is a longitudinal sectional view, similar to Fig. 2, through a switch embodying a modified form of my invention and

Fig. 12 is a view similar to Fig. 5 of said switch.

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Referring now to the drawings and more particularly to Figs. 1 through 6, 10 denotes a through cord switch embodying the invention. Said switch may conventionally include a casing consisting of an upper half 12 and a lower half 14 of electrically non-conductive material suitably internally recessed to receive the various operative switch elements and flexible electric conductors. The halves are maintained in assembled relationship by screws 15 which freely pass through smooth-bore apertures 16 in the lower half and are threaded into tapped apertures 17 in the upper half.

In accordance with the invention I associate with one of the casing halves, as for example the lower half 14, a group of projections the majority of which comprise contact points to be electrically connected to line and to various circuits of the heating appliance, and of which at least one is not adapted to be so connected. These projections, which are preferably circularly aligned and substantially coplanar, are mutually separated by recesses and are arranged to support a rotary disk resiliently pressed against the projections. The disk has a cut-out portion so located that in any operative position of the switch the disk will rest upon less than all of the projections.

In the switch 10 said projections comprise four elongated electrically conductive tubular eyelets 18 which are equiradially and equiangularly spaced around the axis of rotation of the rotary actuating knob 20 for the switch. Each eyelet is freely received in an aperture 19 extending through the lower casing half 14 and has one end spun over to provide a bead 21 which sets in a countersunk recess 22 in the outer wall of said half. The other ends of the eyelet are likewise spun over to form four substantially coplanar beads 24, 24', 24'', 24''' which are raised above the adjoining surface of the bottom half. Between the several heads the bottom half is cored out to provide intermediate recesses 26. Ridges 28 lying between these recesses extend radially outward from a hollow central hub 30 through whose tubular wall a slot 32 passes to connect the bore 34 of said hub to one of said recesses. The ridges function mainly to reinforce the hub and the walls of the apertures 21. The level of the top surface of the hub 30 is coincident with that of the ridges 28, all of these parts comprising integral portions of the lower housing half 14.

The ridges 28 and recesses 26 are surrounded by a flat 36 of appreciable area which principally

serves as a support for means to connect three of the heads 24, 24', 24''' in an electric circuit. Said means comprises a plurality of lugs 38 each having an apertured end which is placed around the inside end of an eyelet before the bead 20 and head 24 are formed. The other ends of the lugs are tapped to receive binding screws 40, 40', 40''. Said screws are also threaded into tapped holes in the flat 36. Conventional ears 42 can be employed on the tapped end of each lug to retain conductor wire around the shanks of the binding screws 40, 40', 40''. Since only three lugs are provided for the four heads, one of the heads 24'', hereinafter referred to as the dead or idle head, never serves to carry current from line to an electric circuit. This head, therefore, can be replaced, if desired, by a teat on the casing no higher than said head.

A jump bar 44 is secured to the lower casing half by a pair of binding screws 46, 46', which are threaded through tapped apertures in the opposite ends of said strip and received in tapped holes in the underlying portion of the casing.

The five binding screws 40, 40', 40'', 46, 46' constitute all the means in the switch 10 for connecting the circuits of an electric appliance to a source of electric current. Two of the binding screws 40, 46 adjacent one end of the casing are adapted to be connected to two flexible electric conductors 48 running to a source of electric power. The portions of these conductors within the lower casing half lie in channels 50 which converge to an exit mouth 52. The other three binding screws 40', 40'', 46' at the opposite end of the casing are adapted to be connected to three flexible electric conductors 54 running to an electric appliance. The portions of these latter conductors within the lower casing half lie in channels 56 which converge to an exit mouth 58. The ribs between these last named channels 56 may be raised to ensure proper registration of the two casing halves, said ribs being adapted to be received in matching recesses 57 in the upper casing half.

It may be mentioned that the set of two binding screws 40, 46 at one end of the casing are approximately equally spaced from the mouth 52 and that the binding screws at the other end of the casing are approximately equally spaced from the mouth 58. I have found that this greatly facilitates connection of conductors to the switch since the two line conductors 48 may be evenly cut off and stripped, as may the three apparatus conductors 58, there being no need to have one or more of the conductors longer or differently stripped than the others.

The flat 36 has a groove 60 formed between the widely spread portions of the line conductors 48 to receive the glass envelope of a glow lamp 62 which is enclosed in a capsule 64 of transparent material of any desired color. The capsule is held in place by a staple 64' whose legs are imbedded in the flat 36.

The heads 24, 24', 24'', 24''' support a rotary disk 66 of electrically conductive material. Said disk may be generally circular in outline and large enough to extend over the heads when disposed with its center coincident with the center of rotation of the actuating knob 20. The disk has a large peripheral notch 68 of such size that when the knob 20 is in one of its four predetermined operating positions the presence of said notch will prevent the disk from contacting one of the heads. The disk will thus contact only three of said heads in any operating position of the knob. Since the disk is resiliently urged against the beads by means soon to be described, and since it only rests upon three heads at any predetermined actuating position of the switch, an even positive contact will be maintained between the disk and any three heads in all such positions.

In switches of the character under consideration, it is desirable to have a click sound when the knob 20 moves from one predetermined operating position to another. This is accomplished in accordance with my invention by providing the disk 66 with three similarly sloped wings 70 (see Fig. 6), the tips of which have the same equiangular and equiradial spacing relative to the knob 20 as three consecutive heads 24, 24', 24''. One sloping edge 70*a* of each wing is substantially coincident with the circular periphery of the disk and the other sloping edge 70*b* oblique or radial to said periphery so that at this latter edge 70*b* there is an abrupt change in height at the periphery of the disk between the tip of a wing and a flat peripheral surface 70*c* of the disk, while at the other edge 70*a* the height of the periphery of the disk changes gradually. The disk is so arranged that the wings slope towards the heads 24, 24', 24'', 24'''.

It will be appreciated that when the disk is stationary and the switch in an operating position, each wing will lie in one of the recesses 26, while the three flat peripheral surfaces 70*c* rest on three of the heads 24, 24', 24'', 24''', the fourth head being registered with the notch 68 and thus out of contact with said disk.

As the disk is turned in the direction of the arrow 72 on the knob 20, each of the edges 70*a* will engage an underlying head and uniformly cam the disk away from the bottom casing. As rotation continues the tips of the wings will finally ride over the heads and abruptly drop into the next succeeding recesses 26 when the edges 70*b* clear the heads. At such time the flat peripheral surfaces 70*c* will sharply strike three heads and emit a loud and distinct click. In the new position the notch 68 will be in registration with the next succeeding head which will thus be out of contact with said disk. The number of predetermined operative positions is determined by the number of recesses (in this case four) which are just long enough to fully receive a wing. Reverse rotation of the disk is prevented by the radial orientation of the edges 70*b*, and accidental forward rotation by the gradual slope of the edges 70*a*.

From the foregoing it will be seen that it is necessary for the means which urges the disc against the heads 24, 24', 24'', 24''' to be resilient, so as to allow the disk to move toward and away from said heads, and that it is desirable to provide means to mount the disk for such reciprocatory movement. To this end the upper casing half 12 may be furnished with a large central aperture 74 through which the actuating knob 20 projects. A flange 76 around the base of the knob, which rides on an annular ridge 78 in the casing, secures the knob in position. The knob carries a central shaft 80 of non-circular cross-section, which may comprise a metal strip which is embedded in the knob and extends toward the bottom casing half 14 where it is received in the bore of the hub 30. The strip passes through an aperture 82 in the disk 66 having a contour similar to but slightly larger than the transverse profile of the shaft 80 whereby the disk will rotate with and be slidable along the shaft.

The means for resiliently pressing the disk against the heads 24, 24', 24'', 24''' includes a hair pin leaf spring 84 one of whose ends 86 abuts against the bottom of a well 88 in the under surface of the actuating knob 20 and whose other end 90 abuts against the disk 66. Both ends of the spring may be slightly rounded as indicated to avoid scoring.

It is desirable to have pressure applied to the disk in a predetermined spot relative to the notch 68 and for this reason the spring, like the disk 66, is mounted for rotation with the shaft 80, said shaft passing through apertures 92 in the two legs of the spring. The spring apertures, like the disk aperture 82, are of the same general configuration as the transverse profile of the shaft 80 but large enough to permit relative movement of the shaft and spring. The spring apertures 92 may be even larger than the disk aperture 82 since there is a tendency for said spring to bind on the shaft because of the relative angular movement of the legs of the spring and the shaft.

I prefer to so arrange the spring 84 and disk 66 that the end 90 of the spring presses against a spot on the disk diametrically opposite to the notch 68, since I have found that such application of pressure insures good contact between the flat peripheral surface 70c, diametrically opposite to the notch, and an underlying head.

It may be pointed out that with the construction above described assembly of the switch is extremely simple since but two moving parts have to be mounted on the knob and these parts need not even be tightly secured thereon. The disk is prevented from accidentally falling off the shaft by a teat 94 near the tip of the shaft which the disk can only pass if tilted.

The outer surface of the casing can be provided with a conventional set of identifying nubs 96 which enable a user to tactily ascertain the angular position of the actuating knob.

Pursuant to an ancillary feature of the invention, I also provide improved means for visually ascertaining the angular position of the actuating knob in the dark. Such means includes an arcuate opening 98 in the upper casing half 12 adjacent the central aperture 74, said arcuate opening lying above the encapsulated glow lamp 62. Between said lamp and opening there is interposed a transparent disk 100 mounted for rotation with the knob 20. This disk has a plurality of opaque symbols 102 imprinted thereon and so angularly arranged that the symbol appearing through the arcuate opening 98 corresponds to the angular position of the knob. The glow lamp 62 is energized from the source of power. One lead 104 runs from one terminal of the glow lamp to the binding screw 46 through a resistance 105. The other terminal of the lamp is connected by a lead 106 to a bus conductor 108. The connection between said lead and conductor is effected by twisting together said conductor and lead. The twisted portions of the lead and conductor are wound around an anchor post 108' embedded in the lower casing half 14 and received in a socket 110 in the upper casing half, said socket being countersunk to receive the twisted lead and conductor. The conductor runs from the post 108' through a passageway 112 in the lower casing half 14, one of the recesses 26 and the slot 32 to an eyelet 114 resting on the bottom of the bore in the hub 30. I prefer to insulate substantially the full length of the conductor 108 with a piece of tubing 116 to prevent short-

circuit. Contact is effected between the eyelet 114 and the disk 66 by a light helical spring 118 seated on the eyelet and pressing against said disk. It will be appreciated that whenever the disk 66 carries potential the glow lamp will be lighted.

To impart a finished appearance to the switch and conceal the beads 21 which anchor the eyelets 10, I may cover the same with a nameplate 120 set flush into the outer surface of the bottom casing half and held by drive screws 122.

To illustrate the operation of my improved switch, in Figs. 7, 8, 9 and 10 I have schematically shown said switch connected, by way of example, to a conventional three wire heating pad having two resistances 124, 126, the magnitudes of which are so selected that when full line potential is applied solely to the resistance 124 a greater heat will be developed than when full line potential is applied solely to the other resistor 126. The various elements of the switch in said schematic figures are denoted by the same reference numerals as they are in Figs. 1 through 6.

The electric circuit from line to the heating pad through the switch 10 is as follows:

One line conductor 48a is permanently connected through the binding screw 46, jump bar 44, binding screw 46' and one apparatus conductor 54a to one side of each of the two heating resistances 124, 126. The other side of the first heating resistance 124 is connected through another apparatus conductor 54b and binding screw 40' to the head 24. The other side of the second heating resistance 126 is connected through the third apparatus conductor 54c and binding screw 40'' to the head 24'. Said first line conductor 48a is also permanently connected through lead 104 and resistance 105 to one terminal of the glow lamp 62, the other terminal thereof being connected through lead 106, conductor 108 and helical spring 118 to the disk 66. The other line conductor 48b is connected through binding screw 40 to the head 24'''. The remaining head 24'' is dead, that is, it is not adapted to be connected to line or to the heating pad.

In Fig. 7 the switch is shown with its elements in "off" position. The notch 68 of the disk 66 is in registration with the head 24''' so that the disk carries no potential, both resistances 124, 126 are unenergized and the glow lamp 62 is dark.

In Fig. 8 I have shown the position of the disk 66 after the knob 20 has been turned approximately 90° in the direction of the arrow 72, the proper predetermined positioning of the knob being effected automatically by releasing the same after hearing one click. At this time, the switch is in "high" position, that is, it so connects the pad to line that the greatest amount of heat will be liberated. The arrow on the knob points to the three nubs 96 which are recognized to indicate the highest heat. The indicia 102 "high" appears in the arcuate opening 98. The orientation of the disk 66 is as shown. One flat peripheral surface 70c contacts the line head 24''' so that the disk is at the potential of line conductor 48b. Energization of the disk applies potential of the line to the other terminal of the glow lamp 62 and lights the same. Another flat peripheral surface 70c contacts the head 24 to apply line potential through conductor 54b to an end of the resistance 124. The third flat peripheral surface 70c contacts the head 24'' and applies line potential through appliance conductor 54c to an end of the resistance 126. Under these conditions both resistances will heat.

The next position of the switch, assumed upon further rotation and sounding of a second click, is shown in Fig. 9. This is known as "medium" position. The arrow on the knob points to the two nubs recognized to indicate medium heat. The indicated "medium" appears through the opening 98. One flat peripheral surface 70c contacts the line head 24'''. Another such surface rests on the dead head 24''. The third such surface contacts the head 24 and applies the potential of line 48b to an end of the resistance 124. The head 24' connected to the resistance 126 is in registration with the notch 68 so that although line potential is applied to the glow lamp 62 and resistance 124, the resistance 126 will remain idle and heat only developed in the resistance 124.

The next partial turn of the knob 20 will place the switch in "low" position wherein line potential will be applied to resistance 126 but not to resistance 124. Line potential is also applied to the glow lamp.

It will be appreciated that with a switch mechanism such as described, I am able to secure excellent and even contact between the disk and heads, since in each of its four positions the disk rests against only three heads and is resiliently pressed thereagainst at a point within the triangle defined by these three heads.

In Figs. 11 and 12 I have shown a switch 130 embodying a modified form of my invention. The switch is generally similar to that shown in Figs. 1 through 6 in that four raised protuberances, of which three are alive and one dead, support a winged and notched disk of conductive material which is resiliently urged thereagainst. This form of switch is further similar to that previously described in that it employs a hair pin leaf spring to press the disk against the protuberances and a coil spring to maintain contact between the disk and a glow lamp as the disk shifts toward and away from said protuberances.

Said switch 130 comprises lower and upper casing halves 132, 134 which are maintained in assembled relationship by screws 136 passing through smooth-bore apertures 138 in the lower casing half and threaded into tapped apertures 140 in the upper casing half. The switch elements carried by the upper casing half 134 are exactly similar to the elements carried by the upper casing half 12 of the first described form of my invention so that they will hereinafter be referred to by the same numerals and not again described.

The lower casing half 132 is recessed, except at its ends and center, to provide a large cavity 142 in the center of which is raised a tubular wall 144 having a slotted passageway 146 extending therethrough. A ledge 148 running around the periphery of the cavity receives a rectangular table 150 of insulating material which is clamped against the ledge by the upper casing half 134. The table has a central circular aperture 152 of the same size as and in registry with the bore of the tubular wall 144. The table is also provided with a plurality of arcuate apertures 154 having the same plan contour and relative position as the recesses 26 of the switch 10. These arcuate apertures 154 and circular aperture 152 define a ring 156 which rests on the wall 144 and is connected to the balance of the table by four radial arms 158. Each of said arms has an aperture 160 cut therethrough to receive an eyelet 162, 162', 162'', 162''' whose ends are spun over to firmly secure the same to the table. One of these eyelets 162 is adapted to be connected to one of

the three appliance conductors which enters the switch through a channel 164 in the lower casing half 132. The second eyelet 162' is adapted to be connected to another appliance conductor which enters the switch through a channel 166. The third appliance conductor which enters the switch through a channel 167 is adapted to be connected to an eyelet 168' extending through the table and secured thereto by spinning of its ends. The third eyelet 162'' is dead, that is, it is not adapted to be connected either to line or to an appliance conductor. The fourth eyelet 162''' is adapted to be connected to a line conductor which enters the switch through a passageway 170. The other line conductor enters the switch through passageway 172 and is adapted to be connected to an eyelet 168 extending through said table and secured thereto by spinning of its ends. The two eyelets 168, 168' are permanently electrically connected by a jump bar 174 beneath the table.

The various line and appliance conductors are connected to the eyelets 162, 162', 162'', 168, 168' by a tube 176 of malleable electrically conductive metal. To effect assembly a conductor is stripped to its cooper core strands, inserted in a tube and the tube squeezed to flatten the same and clench it to the core. The tube may be indented during flattening to secure a firmer hold on the core. The free end of the tube is then apertured and slipped over the shank of an eyelet before the second end of the eyelet is spun.

All the eyelets are so positioned that, as with the switch 10, the line and appliance conductors can be uniformly cut and stripped.

The table is provided with an elongated slot 178 to support an encapsulated glow lamp 180 which is fixed to the table by a metal clip 182. This glow lamp is connected in circuit as follows: lead wire 183 lies in a slot 146. One end thereof is secured to the eyelet 186 and the other end to an eyelet 184, which lies in the aperture 152. A conductor from one terminal of the lamp is wound around a split rivet 185, which is inserted in eyelet 186, and the other terminal of the lamp is similarly wound around a split rivet inserted in eyelet 168. Connection between the eyelet 184 and the disk 66 is made by means of the coil spring 190. With a switch construction such as just described the electric parts may be assembled apart from the casing in which the table is mounted, this method of fabrication being preferred by some manufacturing concerns.

As noted above, the switch elements carried by the upper casing half 134, that is, the knob 20, shaft 80, hair pin spring 84 and disk 66, are exactly similar to the elements denoted by the same numerals in Figs. 1 through 6. However, the upper casing half may be of slightly modified shape. For example, three ridges 188, 190 and 192 are raised on the inner surface of said casing half, the same being adapted to clamp the appliance conductor wires in the channels 164, 166 and 167. Other ridges 194, 196 clamp the line conductors in the channels 170 and 172.

The operation of the switch 130 is the same as that of the switch 10, i. e., as the knob 20 is turned, the wings 70 of the disk 66 will ride up and down over the spun heads of the eyelets 162, 162', 162'', 162''' facing said knob. In any one of the four operating positions, "off," "high," "medium" and "low," the wings will extend through the apertures 154 as indicated in Fig. 11 at which time the three flat peripheral surfaces 70c will press against said ends of the eyelets and the notch 68 bridge one of the eyelets. The glow

lamp will be lit whenever the appliance is connected to line in any position of the switch except "off."

It will thus be seen that I have provided various devices which achieve the several objects of this invention, and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth and/or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An electric switch of the character described comprising a support, a group of circularly arranged equi-angularly spaced substantially coplanar projections carried by said support, a majority of which are electrically conductive and are to be connected to line or to an electric appliance, the remainder of said projections not being adapted to be so connected, a rotary electrically conductive disk resting upon said projections, said disk being mounted to turn about an axis coincident with the center about which said projections are arranged and to move towards and away from said projections, said disk having in the periphery thereof a notch and a plurality of wings, each of said wings having a tip, adjacent tips having the same angular spacing as said projections and being disposed the same distance from the center of rotation of the disk, each of said wings including one edge which slopes gradually from the flat periphery of the disk and another edge which provides an abrupt drop at the periphery of the disk, the peripheral flat surfaces of the disk intermediate the wings having the same angular spacing as said wings and projections and being the same distance away from the center of rotation of said disk, and means to resiliently press said disk against said projections.

2. An electric switch as set forth in claim 1 wherein the resilient means presses against the disk at a point disposed diametrically opposite to the notch in the periphery of the disk.

3. An electric switch as set forth in claim 1 wherein the resilient means comprises a spring member, one leg of which is forced against the disk at a point diametrically opposite to the notch in the periphery of the disk.

4. An electric switch as set forth in claim 1 wherein a knob is provided to turn the disk, said knob having a shaft of non-circular cross-section which is slidably received in a matching aperture in the disk whereby the disk is free to slide along the shaft but rotates therewith.

5. An electric switch as set forth in claim 1 wherein a knob is provided to turn the disk, said knob having a shaft of non-circular cross-section which is slidably received in a matching aperture in the disk and in a matching aperture in the resilient pressing means whereby said disk and resilient pressing means are free to slide relative to the shaft but will rotate therewith, said resilient pressing means pressing against a point on the disk diametrically opposite to the notch in the periphery thereof.

6. An electric switch for optionally connecting

an electric supply line to either one of two electric heating circuits in a three-heat electric appliance or to both of said circuits in parallel, said switch comprising a support, a group of four projections on said support equiangularly arranged about a common center, means to connect only three of said projections to line or to an appliance, said three projections, at least, being electrically conductive, an electrically conductive disk resting upon said projections, means to mount said disk in said switch for rotation about said center, means to detain said disk against accidental angular displacement in each of four quadrantally spaced operating positions, and means to resiliently press said disk against said projections, said disk having a cut-out portion of such size and so arranged that in any operating position of said disk, said disk rests upon only three of said projections.

7. An electric switch as set forth in claim 6 wherein the projections are circularly arranged about the axis of rotation of the disk.

8. An electric switch as set forth in claim 6 wherein the projections are substantially coplanar.

9. An electric switch as set forth in claim 6 wherein the projections are substantially coplanar and are circularly arranged about the center of rotation of the disk.

10. An electric switch as set forth in claim 6 wherein the support for the projections is a table of insulating material, and wherein the switch includes a two-part casing between whose parts the table is clamped.

11. An electric switch as set forth in claim 6 wherein the means to resiliently press the disk against the projections engages the disk eccentrically at a point greater than 90° away from the cut-out portion in the disk.

12. An electric switch as set forth in claim 6 wherein the means for detaining the disk in its operating positions comprises three similar quadrantally spaced inclined surfaces on the disk, each surface abruptly terminating at one of its ends so that during rotation of the disk when said surfaces engage the projections the disk will be gradually forced away from said projections and when said ends of the surfaces clear the projections the disk will be suddenly forced against said projections.

13. An electric switch comprising a support, a group of projections carried by said support, a majority of which are electrically conductive and are adapted to be connected to line or to an electric appliance, a rotary electrically conductive disk resting upon said projections, means to press said disk against said projections, said disk being of such configuration that in any operating position thereof it rests upon less than all of said projections, said disk having inclined surfaces adapted to cooperate with at least three of said projections to gradually force the disk away from said projections as the disk is turned, said surfaces terminating abruptly at the periphery of the disk, said means for pressing the disk against said projections being resilient whereby when the tips of said inclined surfaces clear said projections the intermediate peripheral portions of said disk will be suddenly forced thereagainst.

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