Jan. 1, 1935. I. W. KNIGHT 1,986,507

THERMOSTATIC SWITCH

Filed July 29, 1932

Fig. 1

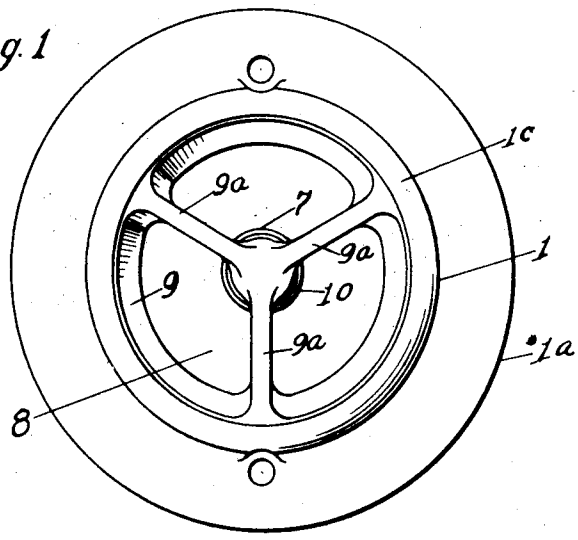


Fig. 2

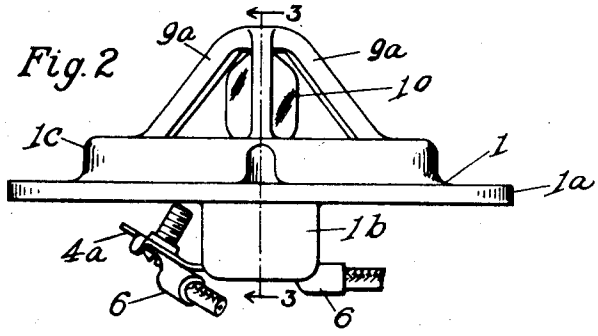


Fig. 3

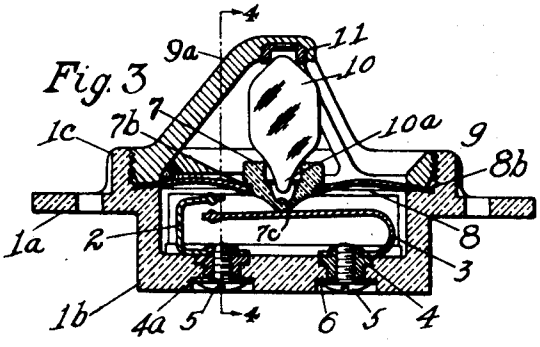


Fig. 4

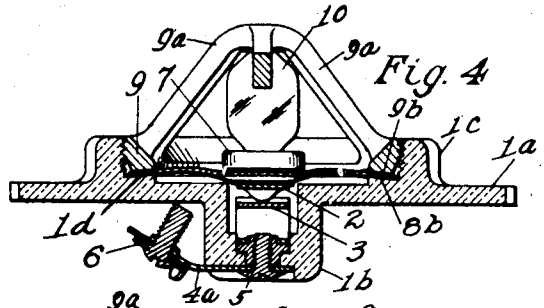


Fig. 5

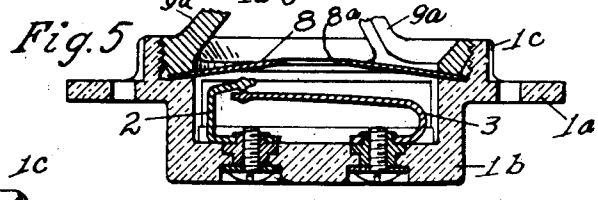
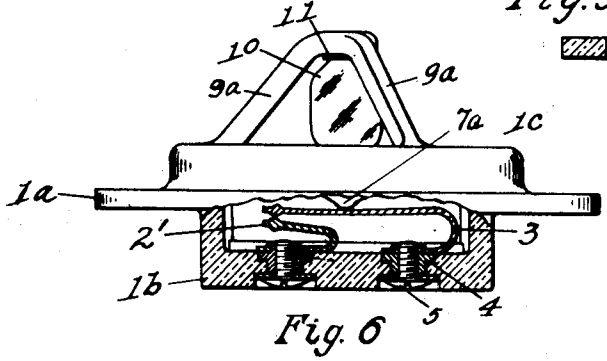


Fig. 6



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Patented Jan. 1, 1935 1,986,507

UNITED STATES PATENT OFFICE

1,986,507

THERMOSTATIC SWITCH

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Application July 29, 1932, Serial No. 625,778

3 Claims. (Cl. 200—142)

This invention relates to improvements in thermostatic switches. More especially it relates to improvements in the type of switch disclosed in Letters Patent No. 1,852,312 granted to me on April 5, 1932.

The switch of the patent is adapted primarily for surface mounting with the binding posts externally arranged for connection with exposed wires. Indeed, one of the contact members, (the diaphragm disk) is fully exposed, which is undesirable especially when said member is carrying live current. And in the patented switch, if it becomes necessary to inspect the contact points, not only must the top be removed but the electric connections must be broken as well, thus preventing an operating test of the points while the switch is dismantled.

It is an object of the present invention to provide a switch for surface mounting with binding posts internally arranged for connection with concealed wires. Indeed it is a feature of the improved switch that all the electricity carrying members are fully concealed. When inspection of the switch is desired the contact points are easily accessible without disturbing the circuit connections, thus permitting operative tests to be readily made while the switch is partly dismantled.

It is also an object of the invention to provide not only a spring contact member which constantly tends to change its position but to provide separate resilient means for normally holding this member against such change, said separate resilient means being so arranged that when the switch as a whole responds to a predetermined temperature condition the resilient means acts to remove itself and leave the spring contact member entirely free to follow its own moving force. It is a feature of the invention to so mount a simple plain flat metallic disk, having inherent but dormant resiliency that this resiliency is rendered active by the mere fastening of the disk.

While it is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exists in the invention disclosed, a preferred embodiment is shown in the accompanying drawing, in which:

Figure 1 is a plan of the improved switch;

Figure 2 is an elevation;

Figure 3 is an elevation in section as on line 3—3 of Figure 2 showing the switch in one standby condition;

Figure 4 is another elevation of the same as on line 4—4 of Figure 3;

Figure 5 is an elevation like Figure 3 but with the parts shown in the positions assumed upon operation of the switch; and

Figure 6 is an elevation, partly in section, showing an alternative arrangement of the contact points for a different standby condition.

Referring more particularly to the drawing, the switch has a base 1 formed of insulating material, such as "Bakelite", and comprising a circular plate 1*a* from which projects on one side a terminal box 1*b* and on the other side a raised socket rim 1*c*. In the hollow of the box are housed the contact points 2, 3, one (2) being substantially immovable and the other (3) being a movable spring point. These points are shown as riveted to bushings 4 which fit into suitable holes in the bottom wall of the box and are threaded to receive binding screws 5. The latter may bind the terminal ends 6 of wires directly to the bushings 4, as shown at the right in Figure 2, or there may be provided a plate extension 4*a* to which the wire is fastened. The point 2 is at one end of the box and may be of two kinds, depending upon whether the switch is to maintain a circuit open or closed under normal standby or quiescent conditions. If open, the point 2 is so disposed as to overlie the spring point as seen in Figure 3; if closed the point 2′ underlies the other as seen in Figure 6.

In either case the movable point 3 is held in its initial or standby position by a button 7 of insulated material having an extended point 7*a* that engages the spring contact point and having an annular shoulder 7*b* that rests on the edge of a hole 8*a* in a disk 8. The latter is a simple, plain, flat metallic disk having inherent but normally dormant resiliency. In the arrangement shown, its edge 8*b* is clamped between a seat 1*a* provided on the base and a ring 9 which threads into the raised socket rim 1*c*. This ring has three upstanding arms 9*a* which come together above the button and form a supporting yoke for a thermally responsive element 10 that is interposed between the yoke and the button.

The element disclosed here is a sealed frangible vessel having a charge of fluid which upon being heated to a predetermined temperature is adapted to completely shatter the vessel. The latter is preferably of the bulb type with a somewhat attenuated neck 10*a* at one end that fits into a suitable hole 7*c* in the button and with a top or upper end that rests against a thimble seat 11 socketed in head of the yoke. The dis-

tance between the top of the yoke and the point 7a of the button is such that when the yoke ring 9 is screwed into the socket rim 1c and firmly clamps the edge 8b of the disk to the base, the spring contact point 3 will be either separated from the point 2 as in Figure 3 or pressed into contact with it (2') as seen in Figure 6. In either case the spring point is bent against its own resilient resistance so that it stands ready to abruptly change its relation to the other point whenever the control of the button is removed.

This, as before indicated, takes place upon the giving way of the thermally responsive element 10 which in the case of the charged frangible vessel illustrated means a complete annihilation of the element. As this occurs the button 7 is snapped free of the spring contact point 3 by the action of the disk 8, leaving the full resilient force of the spring point 3 available to change its relation with the other point.

This active force of the disk is insured by the novel manner in which its edge 8b is clamped so as to be held at an angle to the normal plane of the disk. That is, the edge is so held that the disk is dished upward with its concave side toward the contact points. The disk may be secured to either the base or the yoke member by suitable retaining means or, as herein disclosed, may be clamped between the yoke member and the base. The ring-shaped surface 1d of the latter, upon which the disk edge rests, is formed at a slight angle to the plane of the base with the inner edge of the surface being most removed from said plane and with the remainder of the surface approaching nearer to the said plane. The bottom edge 9b of the yoke ring is correspondingly disposed so that the face which engages the disk is parallel to the angularly disposed annular seat 1d of the base. In consequence, when the yoke is screwed into the raised socket rim 1c and comes to bear upon the disk, the edge of the latter is bent downward as clearly seen in Figures 3, 4 and 5. If there were no vessel or button interposed between the yoke arms and the disk, the latter would assume the position shown in Figure 5, in fact this is the position of the disc when the vessel has been destroyed. But in assembling the switch the vessel and button will be interposed between the yoke and disk so that as the yoke ring turns into the socket rim and firmly clamps the disk edge to the angular seat on the base the disk will be bowed or dished inward as seen in Figures 3 and 4. Since it would otherwise be dished outward, as already explained, it is clear that when dished inward there is established in the disk a resilient force tending strongly to snap the disk to the position shown in Figure 5. Thus it is that when the vessel is destroyed the disk snaps outward due to the said resilient force and pushes the button 7 clear of the spring contact point 3 (indeed the button is usually thrown clear of the switch) leaving the latter free to move with respect to the other contact point.

The provision of force for moving the disk and button is of real advantage because it is not uncommon to find switches, especially when installed with the yoke upward as herein shown, considerably "loaded". That is, dust and other foreign matter collects on the disk and button and, in cases where a switch enjoys a prolonged period of idleness, this collection may have an appreciable weight. If this weight of foreign matter as well as that of the button and disk were to be moved solely by the force of the spring contact point, it is clear that the action of the latter would be at least impeded if not indeed prevented. In the switch of the invention the contact points are completely housed and so no "loaded" condition of the spring point can occur, and because of the resilient force imposed upon the disk by its manner of mounting the loading of the latter can be disregarded since the force thus imposed will insure the prompt movement of the disk and button and the immediate release of the spring point with all its own force available to cause its change in relation with the other point.

Although the switch is shown and has been described as positioned with the yoke uppermost, it is to be understood that the switch can be installed in any position. Since all the current carrying parts are associated with the box, if the latter is placed in a recess with the circular plate 1a attached to the surface of the material surrounding the recess the said parts and the wires leading thereto may be entirely concealed. If it is desired to test the connections and determine the operativeness of the contact points the yoke can simply be unscrewed from the base and the vessel, button and disk lifted out. This will completely expose the contact points and they can be manually actuated to test the circuit. To restore the switch to normal standby condition the removed parts need only be returned to their initial positions. If no testing of the switch is anticipated, the yoke may be sealed in the base to prevent its removal by an unauthorized individual.

The three-armed yoke serves as a protector of the frangible vessel from accidental blows of passing objects, yet provides ample space for the fragments of the vessel to fly clear when its shattering occurs. The provision of the box on one side of the base plate, so that it may be placed in a recess, makes the switch as a whole stand close to the surface to which it is attached, making it less conspicuous, less apt to excite the curiosity of an inquisitive observer, and less likely to be accidentally hit.

I claim:

1. A thermostatic switch comprising a base having an enclosed chamber on one side thereof; a substantially immovable contact point and a movable spring contact point arranged in said chamber; a disk mounted in position to form a yieldable cover for said chamber; a support attached to said base and outstanding therefrom on the side thereof opposite to said chamber; means interposed between said support and said disk comprising a charged frangible vessel adapted upon being heated to a predetermined temperature to destroy itself and a seating member for said bulb engaging the edge of a hole in the disk and extending therethrough into engagement with the spring contact point, whereby the said point is normally held in predetermined relation to the other point; the last said means remaining undisturbed as respects the holding of said spring contact point until a predetermined temperature is reached, and then giving way to permit said disk and said spring contact point to move and thereby alter the relation of said contact points with respect to one another.

2. A thermostatic switch comprising a base having a chamber therein; contact points arranged in said chamber and movable with respect to one another; a member mounted on said base; a disk held in position to form a cover for the chamber, there being an annular seat for the edge

of said disk having a surface disposed at an angle to the normal plane of the disk whereby the disk being clamped to said seat it tends to dish outward with respect to the contact points; and means interposed between the member and said disk and engaging a contact point whereby the said disk is normally held dished inward toward the contact points and the engaged point is held in predetermined relation to another point; the last said means remaining undisturbed as respects the said holdings until a predetermined temperature is reached and then giving way to permit said disk to snap outward and separate said means from said engaged contact point thereby permitting the said points to alter their relation to one another.

3. A thermostatic switch comprising a base having a chamber therein and an internally threaded rim; a seating surface within said rim disposed at an angle to the plane of said base; a resilient disk arranged with its outer edge overlying said seating surface and having a central opening; an open frame member having a base portion fitting said internally threaded rim and provided with a seating surface parallel to the said seating surface of the base, whereby upon the member being screwed into the rim the edge of the disk is clamped between said seating surfaces and the disk is caused to flex outward from the chamber; contact members in the said chamber capable of assuming a predetermined relation with one another; a button seated on the edge of the central opening of said disk having a portion extending therethrough; and heat actuated means interposed between said button and said frame member for holding said button against the resilient force of the disk against one of the contact members to thereby alter their predetermined relation; the last means giving way when a predetermined temperature is reached to permit the disk to remove the button from contact with the contact member and thereby enable said contact members to assume their predetermined relation.

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