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C. S. MERTLER

2,543,040

SNAP-ACTION THERMOSTATIC SWITCH

Filed Sept. 24, 1946

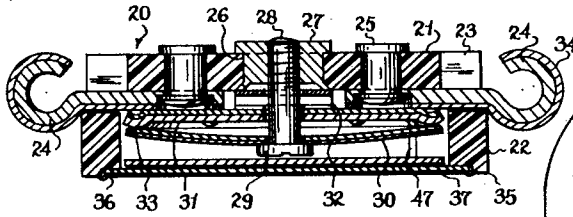


Fig. 1

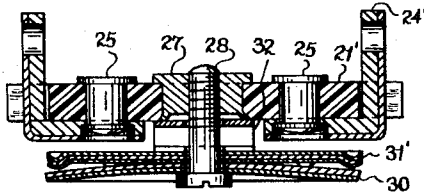


Fig. 2



Fig. 4

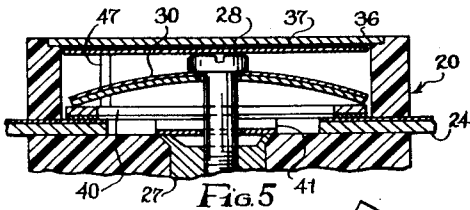


Fig. 5

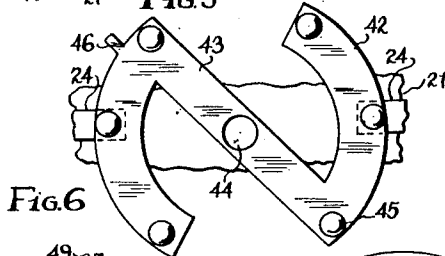


Fig. 6

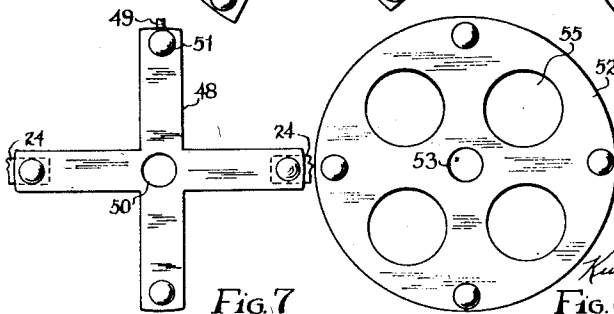


Fig. 7

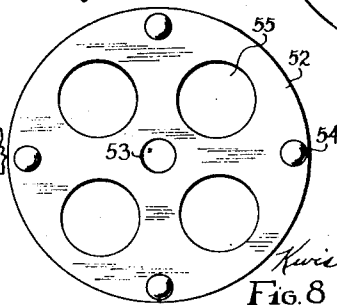


Fig. 8

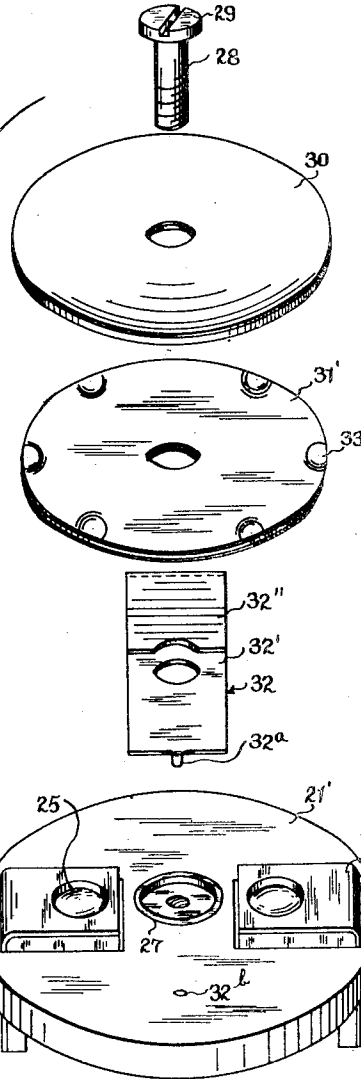


Fig. 3

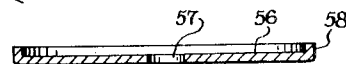


Fig. 9

INVENTOR.  
CHARLES S. MERTLER  
BY

*Kurie, Hudson, Boughton & Williams*  
ATTORNEYS

## UNITED STATES PATENT OFFICE

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## SNAP-ACTION THERMOSTATIC SWITCH

Charles S. Mertler, Mansfield, Ohio

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12 Claims. (Cl. 200-113)

1

This invention relates to improvements in thermostatic switches and, in particular, to thermostatic switches of the type commonly known as snap acting.

Thermostatic switches, as heretofore constructed, have generally comprised one or more stationary contacts and one or more movable contacts, the latter being mounted on or connected to a curved bimetallic member which is adapted to reverse its direction of curvature when a predetermined temperature is attained. In such switches the bimetallic member is generally loosely connected to the supporting base and the contacts loosely connected to the member to prevent interference with its operation. This introduces considerable lost motion requiring a relatively large size switch to effect satisfactory contact separation, and this large size consequently requires a relatively large change of temperature to effect operation. In order to improve the operation various devices, such as combinations of levers and springs, have been employed to assist the movement of the bimetallic member in reversing its direction of curvature. Such snap acting constructions necessarily result in switches of comparatively large size so that they cannot be embedded in the windings of a motor or transformer, or in warming pads, electrically heated blankets, or the like, where a miniature size is essential.

It is, therefore, a principal object of the invention to provide improved snap acting thermostatic switches having a construction such that they are of comparatively small size yet rapidly effect satisfactory contact operation when subjected to a predetermined temperature.

Another object of the invention is to provide improved thermostatic switches in which the movable contact is controlled by a bimetallic element, and resilient means is provided to assist the bimetallic member in effecting contact separation and to prevent inadvertent engagement of the contacts when the switch is subjected to vibrations or impacts.

A further object of the invention is to provide an improved snap acting thermostatic switch in which the movable contact is a conductive member engaged on one side by a curved bimetallic element for moving the said conductive member into engagement with the stationary contacts, and resilient means is provided to bias the said conductive member for movement out of engagement with the stationary contacts upon the reversing of the direction of curvature of the bimetallic member so that contact separation is effected upon the occurrence of a relatively small

2

change in temperature, the construction being such that suitable separation may be effected in a switch of relatively small size.

A still further object of the invention is to provide snap acting thermostatic switches of the type mentioned in the preceding object in which the said conductive member and bimetallic element are substantially disk shaped, and the periphery of the conductive member is provided with an upstanding projection or projections for engagement with the bimetallic element adjacent the periphery thereof whereby the central area of the bimetallic element is out of contact with the central area of the conductive member when the latter is in engagement with the stationary contacts or passing through its neutral position while reversing its direction of curvature.

An additional object of the invention is to provide an improved snap acting thermostatic switch in which the movable contact is a separate conductive member biased in a contact separating direction against the action of a bimetal element and in which the movable contact member acts as a heater for the bimetal element when the current flow through the switch exceeds a predetermined value.

It is also an object of the invention to provide the movable contact member, of thermostatic switches of the type mentioned in the preceding object, with cut-out portions whereby the current carrying capacity of the said member may be so limited that excessive current flow will heat the said member and thereby the bimetallic disk to provide for contact separation under conditions of current overload.

It is likewise an object of the invention to provide an improved enclosed thermostatic switch of relatively small size in which contact separation is assisted by resilient means cooperating with the movable contact surface.

Other objects and advantages of the invention reside in the various combinations, constructions and arrangement of parts as will hereinafter become apparent from the detailed description and the appended claims.

Referring now to the drawings:

Fig. 1 is an enlarged vertical section through the center of an enclosed snap acting thermostatic switch constructed in accordance with this invention and illustrating the contacts in a closed position;

Fig. 2 is an enlarged sectional view through an open type thermostatic switch constructed in accordance with this invention and showing the contacts in their open or disengaged position;

Fig. 3 is an exploded perspective view of the

3

switch illustrated in Fig. 2, the parts being inverted from the position shown in the latter figure.

Fig. 4 is an enlarged sectional view through a modified form of contact disk adapted to be used in switches of the type illustrated in Figs. 1 and 2;

Fig. 5 is an enlarged sectional view through a modified form of an enclosed thermostatic switch employing a ring-shaped movable contact member;

Fig. 6 is an enlarged top elevational view of a modified form of a movable contact member having cut-out portions to reduce its current carrying capacity, a portion of the stationary contacts and the base also being shown;

Fig. 7 is an enlarged top elevational view of a still further modified form of movable contact member having portions cut away to form a substantially cross-shaped member of limited current carrying capacity, the stationary contacts being indicated below two ends of the cross;

Fig. 8 is an enlarged top elevational view of a still further modified form of a movable contact member having cut-out portions to decrease the current carrying capacity; and,

Fig. 9 is an enlarged sectional view through yet another form of a contact disk and illustrating a continuous flange on its periphery.

The illustrated embodiments of the snap action thermostatic switches of this invention appearing in the drawings have been drawn to a greatly enlarged scale to more clearly reveal their novel construction. These switches as actually constructed, however, have an external diameter, inclusive of the housing, which is slightly less than the diameter of a dime, and this miniature size enables their employment in installations such as heating pads, electric blankets, windings of motors or transformers or similar environments where miniature size is of paramount importance. The said switches, in spite of their small size are, nevertheless, so constructed that their contact separation is rapidly effected upon attainment of a predetermined temperature so that arcing is prevented, and the contact separation is positively maintained thereby preventing accidental reengagement due to vibration or impacts such as are encountered in certain installations.

As shown in Fig. 1 of the drawings, an enclosed thermostatic switch constructed in accordance with this invention comprises a housing 20 having a base 21 and an integral upstanding flange 22. This housing may be constructed of ceramic materials, plastics, hard rubber or like insulating material and is provided with two diametrically opposed openings 23 for the reception of conductive terminal members 24. These terminal members have flat portions resting upon the top surface of the base 21 and held in place thereon by rivets 25 thereby constituting the stationary contacts or contact surfaces of the switch. The outer ends of the terminals may be curved, as shown, or otherwise provided with facilities for attachment to the wires in the electrical circuit.

The central portion of the base 21 is provided with an opening 26 in which is disposed a nut 27 adapted to threadedly receive the lower end of a bolt 28. This bolt has a head 29 at its upper end which engages the upper surface of a curved bimetallic member 30 which is formed as a dish-shaped disk, the shank of the bolt passing through a hole in the center of the disk. Disposed between the disk 30 and the stationary contacts 24 is a movable conductive contact sur-

4

face or member 31, which is preferably disk-shaped, and has a central opening to enable the bolt 28 to pass therethrough. A resilient means, such as a leaf spring 32, is disposed between the base 21 and the undersurface of the movable contact disk 31. This spring extends transversely of the housing 20 at substantially right angles to the diameter containing the contacts or terminals 24, and the spring is provided with a central opening through which the shank of the bolt passes.

The spring 32, contact disk 31 and bimetallic disk 30 are, therefore, maintained in a predetermined relationship by the single bolt 28 which may be adjusted to vary the operating characteristics of the thermostat. Having been so adjusted, a drop of solder or the like can be applied to the outer end of the bolt 28 to prevent it from moving and changing the operating characteristics of the thermostat. After the bolt 28 has been adjusted, the central portion of the bimetallic member or disk 30 is maintained in predetermined spaced relationship with respect to the base. While a bolt is a convenient means for this purpose, it will be apparent that other means may be employed.

It will be observed that the bimetallic disk 30 contacts the movable contact member 31 adjacent the periphery thereof when the thermostat is in its circuit-closing position, as shown in Fig. 1. For this purpose the contact disk 31 is provided with raised means adjacent its periphery, this means in the present embodiment comprising a plurality of spaced projections 33, the projections being formed by indenting the undersurface of the contact disk in a stamping or other forming operation. The height of these projections 33 is such that the bimetallic disk cannot contact the central portion of the movable contact disk 31 until slightly after the bimetallic disk has passed through its neutral or planar position in response to the attainment of the predetermined temperature at which the switch is designed to operate, thereby preventing interference with the operation of the bimetallic disk. This bimetallic disk is of a well-known type, similar to that disclosed in the U. S. Patent No. 1,697,886 issued January 8, 1929, to John A. Spencer, and hence need not be described in detail.

The leaf spring 32 may have a configuration such as illustrated in Fig. 3 or that designated 41 in Fig. 12 and may be formed of Phosphor bronze or other suitable spring material. As shown in Fig. 3, spring 32 comprises a substantially flat portion 32', which extends transversely of the housing 20, and an angularly, upwardly directed portion 32'' for engaging the lower surface of the contact member 31. The outer end of the angularly extending portion 32'' has a notch to freely engage around the shank of the bolt 28 while the flat portion 32' is provided with a centrally located opening through which bolt 28 extends. The end of the flat portion 32', opposite to the end from which the angular portion 32'' is formed, may be provided with a downwardly directed tongue or projection 32a for reception in a hole or recess 32b in the base of the switch to assist in properly locating and retaining the spring in the assembly.

The angular portion of the spring is maintained in a compressed condition as shown in Fig. 1 so that it biases the movable contact member 31 in a direction to move the latter from engagement with the stationary contacts 24 when permitted by the bimetallic disk reversing its direction of

5

curvature upon attaining the predetermined temperature at which the switch is designed to operate. Hence, when the bimetallic disk has been heated to this temperature, the contact disk 31 is immediately moved from engagement with the stationary contacts 24, engagement of the projections 33 on the contact disk with the bimetallic disk adjacent the periphery thereof assisting the bimetallic disk in snapping from the position shown in Fig. 1 to that shown in Fig. 2. The spring continues to bias the movable contact disk 31 while the latter is in open position thereby preventing accidental engagement of the stationary contacts even though the switch be subjected to vibration or impacts. Moreover, by forming the movable contact surface or member 31 as a disk any angular shifting thereof has no effect upon the switch operation. These features render the switch especially useful for installations where vibrations or impacts are encountered. Furthermore, the movement of the contact disk 31 is substantially in a straight line at all points so that it moves from engagement with both of the stationary contacts simultaneously and cannot cock or tilt. Thus, the necessary contact separation is achieved in less space than in prior devices where allowance had to be made for such tilting or cocking of the movable contact or contacts. The provision of the projections 33 adjacent the periphery of the contact disk 31 is particularly advantageous because it enables the force of the spring 32 to be applied to the bimetallic disk adjacent the periphery thereof where it has the greatest effect in assisting in the movement of the latter in a contact opening direction.

The stationary contacts 24 and the undersurface of the movable contact member 31 may be coated with silver as indicated at 34 to lower the contact resistance and prevent pitting or other deterioration. The housing 20 of the switch has the outer end of its flange 22 provided with a shoulder 35 to position and assist in retaining a cover member 36 which may be cemented or otherwise attached to the flange 22. If desired, a disk 37 of mica or other insulating material may be interposed between the cover 36 and the head 29 of the bolt 28.

Turning now to Figs. 2 and 3, the thermosatic switch illustrated therein has substantially the same operating elements as those illustrated in Fig. 1 and, therefore, are designated by corresponding reference numerals. It will be noted, however, that the switch here shown is of the open type; that is, it is not sealed in a housing such as 20 in Fig. 1 but simply comprises a base 21' of insulating material on which the terminals or stationary contacts 24' are mounted by means of rivets 25. The central portion of the base 21' is likewise provided with a nut 27 for threadedly receiving the lower end of the bolt 28, the latter passing through the aligned openings in the bimetallic disk 30, a movable contact disk 31' and the resilient member or spring 32. These elements are all identical with corresponding elements illustrated in Fig. 1, except that the movable contact 31' is provided with a silver coating on both faces to provide better heat conduction to the bimetal disk 30 for a purpose hereinafter described.

In Fig. 4 of the drawings there is illustrated a modified form of contact disk, designated 38, which is substantially like the previously disclosed contact disk 31 but differs therefrom in that the projections adjacent the periphery of the disk are now formed by buttons 39 of ce-

6

ramic or insulating material which has shanks extending into holes provided in the disk 38. This modified form of disk may be employed in the same manner as disk 31 or 31' of the switches shown in Figs. 1 and 2.

The switches thus far described are intended to operate upon changes in ambient temperature to which they are subjected, heat being readily conducted to the bimetallic disk 30 through the metallic elements of the switch even when the latter is enclosed in a housing such as 20, the projections 33 assisting in this conduction of heat to the bimetallic member 30. In addition, the switches can be employed to protect against excessive currents by so selecting the composition and thickness of the contact disk 31, 31' or 38 that they are heated by the flow of excessive current therethrough, since the path of the current through the switches is from one of the stationary contacts of terminal members 24 through the contact disk and the bimetallic disk in parallel, thence to the other stationary contact or terminal member 24. Hence, by proper design of the contact disk, it can be made to act as a heater element for the bimetallic disk, the heat being communicated to the latter by conduction and radiation, thereby causing the bimetallic disk to reverse its curvature and open the contacts, when the current flow is excessive, even though the ambient temperature has not yet attained the predetermined value at which the switch is designed to operate.

Fig. 5 of the drawings illustrates a modified form of enclosed snap acting thermostatic switch incorporates the novel features of this invention. This form of the switch comprises a housing 20, similar to that shown in Fig. 1, provided with stationary contacts 24, a cover member 36 and an insulating disk 37. Within the housing is disposed a movable contact surface or member 40, which is substantially ring shaped and preferably silver coated on the surface which engages the stationary contacts 24. Obviously, both surfaces of the ring may be silver coated or the entire ring may be formed from silver if desired. The periphery of the bimetallic disk 30 engages the contact ring 40 to move the latter to contact closing position as illustrated in Fig. 5. A resilient means such as a spring 41, similar to that shown in Figs. 10 and 12, but inverted with respect to its position illustrated in the latter figures, is disposed between the base of the housing 20 and the ring 40 to move the latter from engagement with the stationary contacts when the bimetallic disk 30 reverses its curvature upon reaching the predetermined temperature for which it is set. A bolt 28 passes through the center of the bimetallic disk and an aligned opening in the spring 41, the lower end of the bolt 28 being threadedly received in the nut 27 provided in the housing 20, as in the structures illustrated in Figs. 1 and 2.

It will be observed that, in this form of the switch, the movable contact member 40 is retained in proper centralized position by the circular flange or side wall of the housing 20. Since the central portion of the contact disk 40 has been removed, there is no possibility of the latter engaging the central portion of the bimetallic disk when the disk passes through its neutral or planar position. Therefore, the member 40 need not be provided with projections, such as 33 or 39 previously described as provided upon the disks 31, 31' and 38. The operation of this form of the device is the same as previously

described for the other embodiments of the invention, the only difference being that the shaping of the contact member 40 as a ring enables the switch to be more readily employed for overload protection. Since the conductivity of the member 40 is limited by its cross-sectional area, the size of its central opening may be chosen to provide sufficient area for conducting normal currents without heating, but to become heated upon the flow of excessive currents there-through. This device, of course, will also operate in response to changes in ambient temperature, as heretofore disclosed for the other embodiments.

Referring now to Fig. 6, there is illustrated a further modified form of the movable contact member, designated 42, which is substantially N-shaped and may be considered as having been formed from a disk similar to 31, 31' or 38 with portions thereof cut away. The transverse leg 43 of this contact member is provided with a centrally located opening 44 for receiving the connecting bolt 28. The curved legs of the contact member are provided with upstanding buttons or projections 45, which may be similar to the projections 33 or 39, and provided for the same purpose. When a movable contact member, such as 42, is employed, the curved legs thereof cooperate with the stationary contacts 24 mounted upon the base 21 (only a fragment of which is here illustrated). In order to prevent such a contact member from shifting around to a position where it will not properly engage the stationary contacts 24, a projecting tongue or lug 46 is provided for cooperation with a corresponding groove 47 in the housing 20 (see Figs. 1 and 5). While only one tongue and cooperating groove have been illustrated, it will be evident that a plurality of such expedients and/or equivalent means may be employed. These grooves are normally provided in the housings for all the enclosed switches for the sake of uniformity of production.

The other elements of a snap action thermostatic switch embodying a movable contact member such as 42 may be similar to those previously described and description thereof will not, therefore, be repeated. It will be appreciated, however, that this form of movable contact member is provided for the switches intended primarily to be employed for overload protection, since the conductivity of the member 42 may be controlled by the width or thickness of the several legs thereof, as well as by varying its composition, the former being a more convenient method from the standpoint of mass production.

Fig. 7 illustrates a still further modified form of movable contact member for use in an overload type thermostatic switch. As shown, the member, designated 48, is cross-shaped and may be formed by cutting away sectors from a contact disk such as 31, 31' or 38. In addition, a projecting tongue or lug 49 is provided at the end of one arm of the member 48 for cooperation with a groove such as 47 in a housing 20 in order to properly maintain the ends of the other arm of the member 48 in alignment with the stationary contacts 24. The movable contact member 48 is also provided with a central opening 50 for reception of the connecting bolt 28, and the end of each arm of the cross is provided with an upstanding projection 51 for cooperation with the periphery of a bimetallic disk. A switch embodying the movable contact 48 is constructed substantially like those illustrated in Figs. 1 and 5

and operates in the same manner, the current carrying capacity of the switch being determined by the dimensions and/or composition of the cross-shaped member 48. Such a switch, while primarily intended for overload protection in a circuit, is likewise equally suitable for operation upon changes in ambient temperature, as will be readily apparent from the detailed description of the switches illustrated in Figs. 1, 2 and 5.

Fig. 8 illustrates a still further modified form of the movable contact member. This form of the member, generally designated 52, is disk shaped and has an opening 53 centrally thereof for receiving a connecting means such as the bolt 28 for positioning the said disk in a switch assembly similar to those shown in Figs. 1 and 2. The contact disk 52 likewise has a plurality of projections or upstanding bosses 54 at spaced points adjacent the periphery of the disk for the same purpose as the projections 33 and 39 of the disks illustrated in Figs. 1, 3 and 4. The contact disk 52 is intended for use in a switch designed for overload protection as well as for response to changes in the ambient temperature. Therefore, the disk is provided with a plurality of holes or cut-out portions 55 to reduce its area and thereby regulate its current carrying capacity, the number and size of the openings 55 being chosen to provide a predetermined current carrying capacity for the disk without appreciable heating thereof, but to be heated by current flow in excess of the predetermined value.

In Fig. 9 there is illustrated a sectional view through a still different form of the movable contact member. This member, designated 56, is disk-shaped and provided with a centrally located opening 57 for receiving the connecting means, such as bolt 28, of the switch. In this form of the contact disk, however, the spaced projections adjacent the periphery, such as 33, 39, etc., of the prior forms of the disks are replaced by a continuous upstanding flange 58. This flange is adapted to contact a bimetallic disk 30 adjacent the periphery thereof when this contact disk is employed in a switch assembly and functions in the same manner, and is provided for the same purpose, as the projections 33. The continuous flange represents the ideal form for projections or raised means for contacting the bimetallic disk because the edge of the bimetallic disk is supported at all points so that the latter cannot sag between spaced projections, such as might occur if only a relatively few such projections are employed. Such a sagging or deformation of the bimetallic disk is undesirable since the disk pull (resulting from the attainment of a temperature which tends to cause the disk to reverse its direction of curvature) would not result in equal movement of the periphery of the disk, thus causing erratic operation of the switch. Such difficulties would be present primarily, however, only when but two of the spaced projections such as 33 are employed, and by employing a greater number of projections this sagging of the bimetallic disk can be rendered negligible. As previously noted, the sagging can be completely eliminated if the projections be replaced by a continuous flange as illustrated in Fig. 9, but this flange must have a uniform height and is for that reason not as easy to produce in large quantities as the disk employing spaced projections.

A contact disk such as disclosed in Fig. 9 may have the central portion removed to form a ring or provided with cut-out portions of different

shapes to reduce its current carrying capacity, if so desired. Likewise, while the disk 56 has been shown as formed from but a single metal, it will be apparent that various alloys may be employed, or the disk can be formed of one metal which is coated with silver or the like.

For the sake of ease in illustration, certain of the forms of switches herein disclosed have been shown in inverted position from the position occupied by others of the switches. This also serves to emphasize the fact that the operation of the switches is not effected by their position, since the motion of the movable contact member thereof is positively controlled at all times by the joint action of the biasing spring and of the bimetal disk, and therefore gravity has no appreciable effect on the operation.

The herein disclosed constructions of the thermostatic switches all employ the same basic concept of a movable contact surface controlled by a bimetal disk which is biased to contact opening position by resilient means, the said resilient means being continuously effective to prevent fluttering of the movable contact when the latter is in its open position. This construction, by providing a quick acting contact separation and an accurate maintenance of the movable contact surface in its open position, enables a much smaller overall size of the switch than in prior devices thus greatly increasing its usefulness, since it may be embodied in constructions where space limitations heretofore have prevented the use of snap acting thermostatic switches. It will be appreciated that switches constructed in accordance with this invention may be employed either primarily for opening a circuit when a temperature exceeds a predetermined value, or for closing a circuit upon the occurrence of such a condition depending upon the design of the bimetal disk, as is well known in the art.

While a variety of different switches and contact members have been shown, it will be appreciated that the disclosed forms are but illustrative of a wide variety of modifications which may be employed in accordance with this invention. For example, the heads of the rivets 25 may themselves constitute the stationary contacts by properly positioning the rivets so that their heads may engage the movable contact surface. In such a construction small silver rivets may be employed, and connection to the switch may be made directly to the outer ends of the rivets. Hence, separate terminal members 24 need not be used. Alternatively, terminal members 24 of base metal may be used without silver plating, the terminal members being secured to the base by silver rivets, the heads of which constitute the stationary contacts.

Other modifications and adaptations of the device will be readily apparent to one skilled in the art and, therefore, it is to be expressly understood that the invention is not limited to the exact construction and arrangement of parts, as herein disclosed, but is limited only by the spirit and scope of the appended claims.

Having thus described my invention, I claim:

1. A snap action thermostatic switch comprising a base, a stationary electrical contact mounted on said base, a stud supported on said base and extending outwardly therefrom adjacent said contact, a rigid conductive member having a central aperture through which said stud extends with a clearance such that said

member is free to move axially to and from engagement with said stationary contact, a spring intermediate said base and conductive member normally urging the latter from engagement with said stationary contact, a dished bimetallic disk having a central aperture through which said stud extends, the periphery of said disk being free to move and in one position engaging said movable conductive member adjacent the periphery of the latter to overcome the biasing of said spring thereby engaging said member with said stationary contact, the said bimetallic member being adapted to reverse its curvature upon a predetermined change of temperature to another position thereof thereby freeing the movable conductive member under influence of the spring from engagement with the stationary contact, and means on the outer end of said stud limiting axial movement of said bimetallic disk in a direction away from said base.

2. A snap action thermostatic switch comprising a base, a plurality of stationary electrical contacts mounted on said base, a stud supported on said base and extending outwardly therefrom intermediate said contacts, a rigid conductive member having a central aperture through which said stud extends with a clearance such that said member is free to move axially to and from bridging engagement with said stationary contacts, a spring intermediate said base and conductive member normally urging the latter from engagement with said stationary contacts, a dished bimetallic disk having a central aperture through which said stud extends, the periphery of said disk being free to move and in one position engaging said movable conductive member adjacent the periphery of the latter to overcome the biasing of said spring thereby engaging said member with said stationary contacts, the said bimetallic member being adapted to reverse its curvature upon a predetermined change of temperature to another position thereof thereby freeing the movable conductive member to move under influence of the spring from engagement with the stationary contacts, and means on the outer end of said stud limiting axial movement of said bimetallic disk in a direction away from said base.

3. A snap action thermostatic switch as defined in claim 2 in which the outer surface of said movable conductive member is provided with raised means adjacent its periphery for engagement by the portion of the bimetallic disk adjacent the periphery thereof, whereby the central portion of the latter is free from contact with the movable conductive member when the latter is in engagement with said stationary contacts.

4. A snap action thermostatic switch as defined in claim 2 in which the outer surface of said movable conductive member is provided with a plurality of raised bosses adjacent its periphery for engagement by the portion of the bimetallic disk adjacent the periphery thereof.

5. A snap action thermostatic switch as defined in claim 2 in which the movable conductive member is a disk provided with a central hole, and the said stud is a bolt, the shank of which has a threaded inner end portion and an unthreaded portion intermediate the said threaded portion and the head, the inner end of said bolt being threadedly received in a nut provided in the said base, whereby the operation of said switch may be adjusted.

6. A snap action thermostatic switch comprising a base, a plurality of stationary electrical contacts mounted on said base, a stud supported on said base and extending outwardly therefrom intermediate said contacts, a rigid conductive member having a central aperture through which said stud extends with a clearance such that said member is free to move axially to and from bridging engagement with said stationary contacts, the thickness and composition of said movable conductive member being so chosen that the member is heated by excessive current flowing therethrough, a spring intermediate said base and conductive member normally urging the latter from engagement with said stationary contacts, a dished bimetallic disk having a central aperture through which said stud extends, the periphery of said disk being free to move and in one position engaging said movable conductive member adjacent the periphery of the latter to overcome the biasing of said spring thereby engaging said member with said stationary contacts, the said bimetallic member being adapted to reverse its curvature upon a predetermined change of temperature to another position thereof thereby freeing the movable conductive member to move under influence of the spring from engagement with the stationary contacts, and means on the outer end of said stud limiting axial movement of said bimetallic disk in a direction away from said base.

7. A snap action thermostatic switch as defined in claim 6 in which the movable conductive member is provided with a plurality of raised bosses adjacent its periphery for engagement by the portion of the bimetallic disk adjacent the periphery thereof, the said movable conductive member also having one or more cut-out portions to reduce its current carrying capacity.

8. An enclosed snap action thermostatic switch comprising a housing of insulating material including a circular base and an integral upstanding cylindrical flange, a pair of stationary electrical contacts mounted on said base within said flange, a conducting terminal connected to each of said contacts and extending exteriorly of said housing through openings provided in the latter, a movable conductive disk within said housing and adapted to bridge said stationary contacts and to be disengaged therefrom, a spring cooperating with said conductive disk to bias the latter out of engagement with the stationary contacts, a dished bimetallic disk within said housing normally contacting said conductive disk to overcome the biasing of said spring and engage the said conductive disk with the stationary contacts, the said bimetallic disk being adapted to reverse its direction of curvature when heated to a predetermined temperature thereby freeing the conductive disk for movement under influence of said spring, means maintaining the central portion of said bimetallic disk in predetermined spaced relationship with respect to said base, and a cover member secured to said flange for sealing the housing.

9. An enclosed snap action thermostatic switch as defined in claim 8 in which the outer surface of said movable conductive disk is provided with raised means adjacent its periphery for engagement by a portion of the bimetallic disk adjacent the periphery thereof, whereby the cen-

tral portion of the latter is free from contact with the conductive disk when the contacts are in engagement.

10. An enclosed snap action thermostatic switch as defined in claim 8 in which the outer surface of said conductive disk is provided with a plurality of raised bosses adjacent its periphery for engagement by a portion of the bimetallic disk adjacent the periphery thereof, whereby the central portion of the latter is free from contact with the conductive disk when the contacts are in engagement.

11. An enclosed snap action thermostatic switch as defined in claim 8 in which the movable conductive disk has one or more cut-out portions to reduce its current carrying capacity so that excessive currents flowing therethrough will heat the said conductive disk thereby heating the bimetallic disk and causing the latter to reverse its direction of curvature when the said switch is subjected to current loads above a predetermined value.

12. A snap action thermostatic switch comprising a base, a pair of spaced stationary electrical contacts mounted on said base, a stud supported on said base and extending outwardly therefrom intermediate said contacts, a rigid conductive contact disk having a central aperture through which said stud extends with a clearance such that said disk is free to move axially to and from bridging engagement with said stationary contacts, a leaf spring intermediate said base and contact disk extending at substantially right angles to a line joining said contacts, said spring having a portion engaging said disk substantially centrally thereof and normally urging the disk from engagement with the stationary contacts, a dished bimetallic disk having a central aperture through which said stud extends, the periphery of said disk normally engaging the said contact disk adjacent the periphery thereof on the side opposite from said spring to thereby effect engagement of said conductive disk with the said stationary contacts, said bimetallic disk being adapted to reverse its direction of curvature upon a predetermined change of temperature thereby freeing the movable conductive disk so that the latter moves under the influence of the leaf spring from engagement with the stationary contacts, and means on the outer end of said stud limiting axial movement of said bimetallic disk in a direction away from said base.

CHARLES S. MERTLER.

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| 2,011,610 | Bletz        | Aug. 20, 1935  |
| 2,015,545 | Bletz et al. | Sept. 24, 1935 |
| 2,199,387 | Bolesky      | May 7, 1940    |
| 2,199,638 | Lee          | May 7, 1940    |
| 2,262,026 | Hastings     | Nov. 11, 1941  |
| 2,312,915 | Kurtz        | Mar. 2, 1944   |
| 2,358,357 | Stilwell     | Sept. 19, 1944 |