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MANUALLY OPERABLE THERMOSTATIC SWITCH ASSEMBLY

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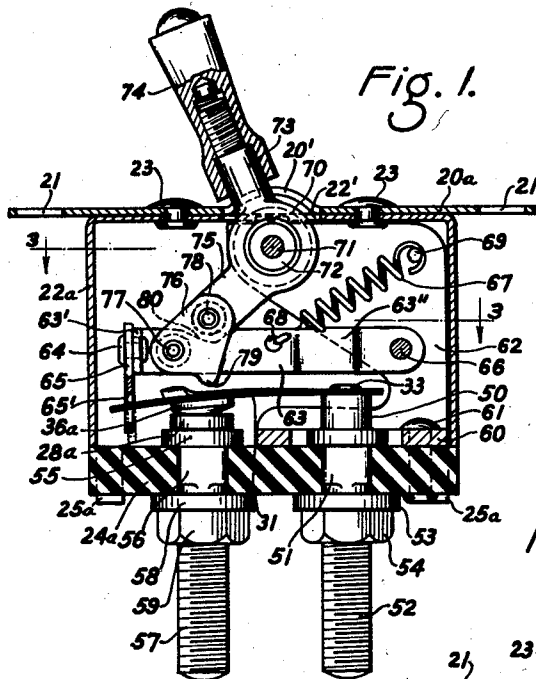


Fig. 1.

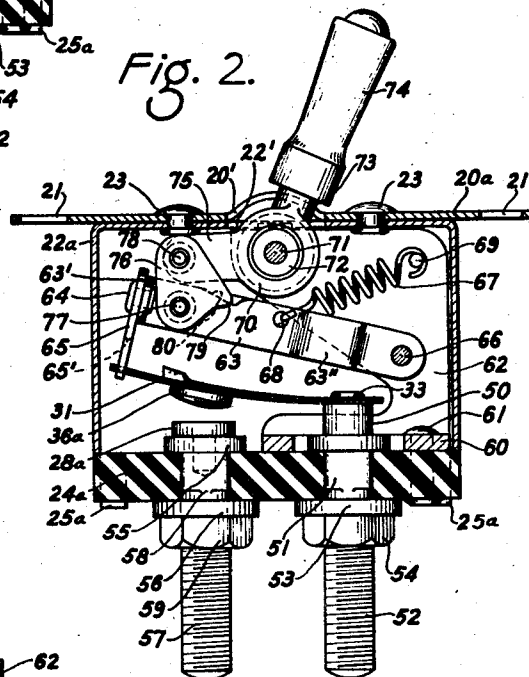


Fig. 2.

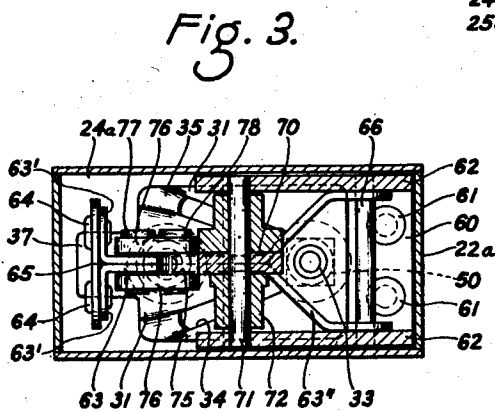


Fig. 3.

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MANUALLY OPERABLE THERMOSTATIC SWITCH ASSEMBLY

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2 Claims. (Cl. 200—116)

1

The present invention relates to a manually operable thermostatic switch assembly and more particularly to the combination with a thermostatic switch assembly of a means movable to two positions and which may be manually operated to re-set or return the thermostatic element of a thermostatic switch to a closed or operative position.

The use of thermostatically operated switches to interrupt an electric circuit under predetermined and/or abnormal conditions is well known. However, it is also necessary and desirable to manually control the position of the switch element of such an assembly and move the same to an "on" and/or "off" position irrespective of the load conditions in the circuit including the thermostatic element.

The primary object of the present invention is the provision of a manually operable member movable to either of two positions and for rendering the thermostatic element of a thermostatic switch assembly operative when said member is moved to one of its positions.

Another object of the invention is the combination with a switch means including a snap acting thermostatic switch arm, of a manually operable re-set member for permitting return of said switch arm to a closed position.

The foregoing and other objects of the invention are embodied in the combination of a thermostatic switch assembly having a normally closed switch arm, a manually operable member movable to either of two positions, and an intermediate means operatively connected to said manually movable member.

Reference is hereby made to the accompanying drawings wherein similar reference characters designate similar elements and wherein:

Figs. 1 and 2 are vertical longitudinal cross-sections of the preferred embodiment of the manually operable thermostatic switch assembly showing the same respectively in closed and open positions.

Fig. 3 is a horizontal section of said preferred embodiment and taken on the line 3—3 of Fig. 1.

The illustrated embodiment of the invention as shown in Figs. 1-3 inclusive, includes a thermostatic switch arm which can be held in an open position, and includes an intermediate means normally opening said switch arm but releasably maintained in an ineffective position and released by thermal operation of said thermostatic switch arm whereupon said arm is moved to open position. A toggle means between the intermediate and manually operable mem-

2

bers is arranged so as to hold the intermediate member in an ineffective position and may be operated by the thermal operation of the switch arm to permit movement of said intermediate member to normal position and to open said switch arm.

In said illustrated embodiment, the assembly is enclosed in a casing 22a which is fastened by rivets 23 to a mounting plate 20a. An insulating base 24a is held by tongues 25a in one side of said casing 22a. The thermostatic switch arm 31 may be mounted in any suitable manner upon the base 24a as by being riveted to the head 50 of a terminal stud 51 which has a threaded portion 52 carrying a washer 53 and a nut 54 for attachment to said base 24a. The contact 36a on switch arm 31 normally engages the contact 28a which is mounted upon the head 55 of a terminal stud 56 which has a threaded portion 57 carrying a washer 58 and nut 59 for attachment to said base 24a. The conductors to the circuit to be controlled by switch arm 31 are attached to said terminal studs 51 and 56.

The intermediate member and manually operable member are both mounted upon a bracket 60 which is fastened to base 24a by rivets 61 and which bracket 60 has side walls 62 with overhanging portions for supporting the manually operable member. Said intermediate member and manually operable member each have two positions, the intermediate member having ineffective and operative positions corresponding to an "on" and an "off" position of the manually operable member.

The intermediate member is preferably a pivoted lever and may comprise a pair of arms 63 oppositely bent at both ends, the ends 63' being bent at right angles for attachment by rivets 64 to a plate 65 and the ends 63'' being bent and perforated to pivot upon a pin 66 which extends between side walls 62 of bracket 60. Said plate 65 is provided with an aperture 65' into which extends the projection 37 of the switch arm 31. A spring member 67 has one end attached to a hole 68 in said arms 63 and has its other end fastened to a post 69 on one of said side walls 62. The normal action of spring member 67 is to hold the intermediate member in the extreme position shown in Fig. 2 with the lower portion of plate 65 engaging the lower face of projection 37 and holding the switch arm 31 with contacts 28a and 36a separated.

The manually operable member according to the invention comprises a bell crank member 70 which is rotatably mounted upon a shaft 71 ex-

tending between the overhanging portions of side walls 62 and which is spaced from one of said side walls 62 by a sleeve 72. One arm 73 of member 70 extends through slots 22' and 20' in casing 22a and plate 20a and has threaded thereon a handle 74 while the other arm 75 of member 70 is within casing 22a. A toggle or tripping means comprises a pair of link members 76, each having one end pivotally connected to the arms 63 of the intermediate member by a pin 77, another end pivotally connected to the arm 75 of the manually operable member by a pin 78, and each having a projection 79 adapted and arranged to be engaged by the thermostatic switch arm 31 when the same is heated and moved to open position thereby.

The "off" position of the thermostatic switch assembly is shown in Fig. 2 and in such position the spring 67 holds the intermediate member in its upper extreme position with contacts 28a and 36a separated and with handle 74 of the manually operable member in a right-hand position which can be immediately distinguished from its other position and recognized as indicating that the switch assembly is open.

Said switch assembly is placed in "on" position by movement of the manually operable member such as by moving handle 74 in a counter-clockwise direction from the position shown in Fig. 2 to that shown in Fig. 1. As the handle 74 is so moved, the bell crank member 70 and arm 75 thereof are also moved counter-clockwise and link members 76 are rotated to move the arms 63 of the intermediate member against the action of spring member 67. The toggle means including link members 76 is arranged so that as handle 74 is moved to "on" position the center of pin 78 crosses the center line between the center of shaft 71 and pin 77 and then arm 75 abuts against the upper edges of arms 63 which may be provided with recesses 80 to permit such movement of said pin 78. Such toggle action maintains the intermediate member in a cocked position with the spring 67 acting to press arm 75 against the arms 63 or in the recess 80 therein. At the same time projection 79 is brought into the path of movement of switch arm 31 and into position slightly above the normally closed switch arm 31 and plate 65 is located so that the aperture 65' therein permits switch arm 31 to move to its normally closed position. Upon thermal operation of movement of the thermostatic switch arm 31 to open position, the projection 79 is engaged by switch arm 31 and moved to return the center of pin 78 across the center line between shaft 71 and pin 77 whereupon the spring 67 acts to move said intermediate member to its upper extreme position and the manually operable member to "off" position and the plate 65, as previously explained, engages projection 37 to hold switch arm 31 in open position. Of course, the manually operable member or handle 74 may be manually moved in a clockwise direction to the "off" position for opening of the switch assembly at will.

In the switch assembly shown, the mechanical opening of the snap acting thermostatic switch arm 31 by the intermediate and manual operable members causes said switch arm 31 to assume a position like that caused by thermal opening thereof in that the curvature of said switch arm 31 is reversed as shown in Fig. 2. Mechanical opening of switch arm 31 by flexing it in the same or similar manner as by thermal operation has obvious advantages because the switch arm

31 is flexed in the same manner as it is designed to be flexed thermally and the abrupt change in curvature of the switch arm 31 also opens the contacts rapidly.

Since many variations of the invention are possible, the present disclosure shall be construed in an illustrative sense and the scope of the invention is defined by the claims which follow.

Having now particularly described my invention what I desire to secure by Letters Patent of the United States and what I claim is:

1. In a manually operable thermostatic switch assembly, the combination with a switch means including a bimetallic switch arm having a free end movable to opened and closed positions, an intermediate member pivotally mounted and carrying an extension provided with an aperture into which the free end of said switch arm extends and which aperture permits thermal operation of said bimetallic switch arm, resilient means normally urging said intermediate member to move the extension thereon so as to engage and open said switch arm, a link member pivotally connected at one end to said intermediate member, a manually operable member pivotally mounted and having an arm pivotally connected to the other end of said link member and movable to move said link and intermediate members against the action of said resilient means into an ineffective position and permit thermal operation of said bimetallic switch arm, the pivotal mounting of said manually operable member and the pivotal connections between said link member and said arm and between said link member and said intermediate member being relatively located so as to form a toggle linkage holding said intermediate member in ineffective position and so that said arm engages said intermediate member to limit the over-center movement of such toggle linkage, and a projection on said link member in the path of movement of said switch arm during over-center position of said toggle linkage and engaged and moved by said switch arm to release said toggle linkage and permit movement of said intermediate member by said resilient means to open said switch arm.

2. In a manually operable thermostatic switch assembly, the combination with a switch means including a bimetallic switch arm having a free end movable to opened and closed positions, an intermediate member pivotally mounted, provided with a recess, and carrying an extension provided with an aperture into which the free end of said switch arm extends and which aperture permits thermal operation of said bimetallic switch arm, resilient means normally biasing said intermediate member to move the extension thereon so as to engage and open said switch arm, a link member pivotally connected at one end to said intermediate member, a manually operable member pivotally mounted and having an arm pivotally connected to the other end of said link member and movable to move said link and intermediate members against the action of said resilient means into an ineffective position and permit thermal operation of said bimetallic switch arm, the pivotal mounting of said manually operable member and the pivotal connections between said link member and said arm and between said link member and said intermediate member being relatively located so as to form a toggle linkage holding said intermediate member in ineffective position and so that said arm enters said recess and engages said intermediate member to limit the over-center movement of such

toggle linkage, and a projection on said link member in the path of movement of said switch arm during over-center position of said toggle linkage and engaged and moved by said switch arm to release said toggle linkage and permit movement of said intermediate member by said resilient means to open said switch arm.

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