Sept. 11, 1951 F. R. BEAN 2,567,361

MANUALLY OPERABLE THERMOSTATIC SWITCH ASSEMBLY

Original Filed Oct. 19, 1942

Fig. 1

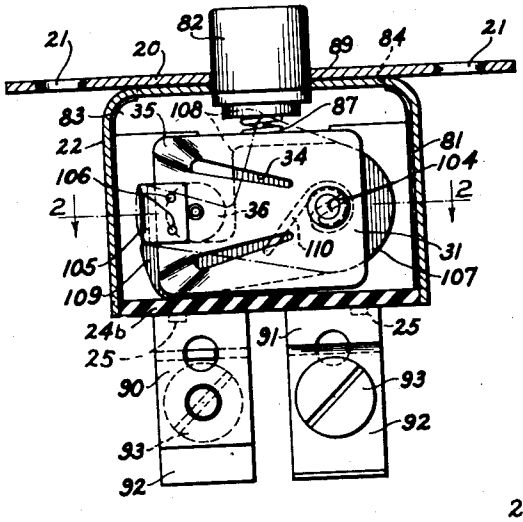


Fig. 2

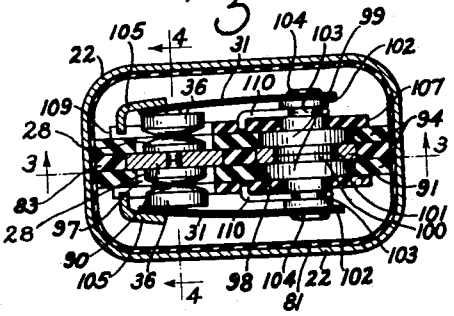


Fig. 3

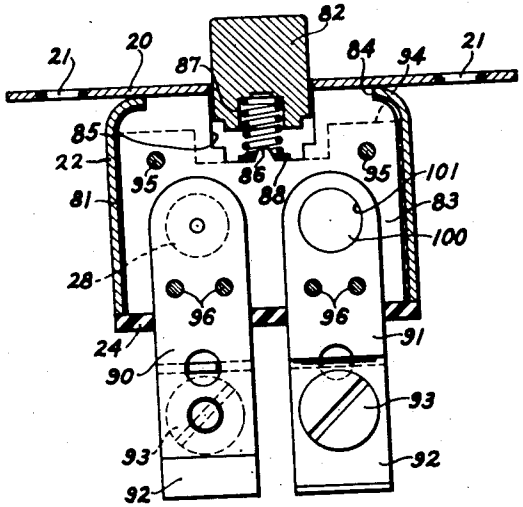
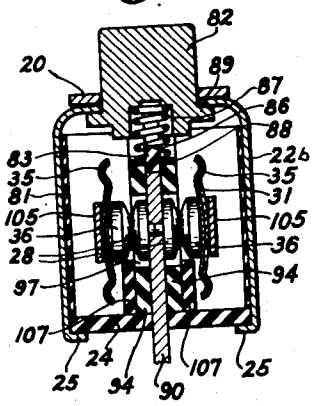


Fig. 4



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MANUALLY OPERABLE THERMOSTATIC SWITCH ASSEMBLY

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Original application October 19, 1942, Serial No. 462,504, now Patent No. 2,520,873, dated August 29, 1950. Divided and this application November 7, 1949, Serial No. 125,990

2 Claims. (Cl. 200—113)

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This application is a division of my co-pending application Serial No. 462,504 filed October 19, 1942, for Manually Operable Thermostatic Switch Assembly, which application has resulted in Patent No. 2,520,873, dated August 29, 1950. The present invention relates to a manually operable thermostatic switch assembly and more particularly to the combination with a thermostatic switch assembly of an intermediate member held in inoperative position by a thermostatic switch arm, movable to render said switch assembly inoperative when said switch arm attains a predetermined temperature, and manually operable member for returning said intermediate member to its inoperative position.

The primary object of the invention is the combination comprising a thermostatic switch assembly having a normally closed thermostatic switch arm, a normally operative intermediate member which is held in inoperative position by said switch arm but normally movable after opening of said switch arm to prevent normal closing thereof, and a manually operable member normally spaced from said intermediate member, located to limit the movement thereof, and for returning the same to its ineffective position.

Other and further objects of the present invention will be suggested to those skilled in the art by the accompanying disclosure.

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, and an intermediate means movable by said manually movable member. Said intermediate means or member is adapted, after said switch arm has been thermally operated, to render said switch arm inoperative, and is returned to inoperative position by resetting movement of said manually operable member.

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

Fig. 1 is a vertical longitudinal section of a thermostatic switch assembly including a manually operable member according to the invention.

Fig. 2 is a horizontal section on the line 1—1 of Fig. 1.

Figs. 3 and 4 are respectively longitudinal and transverse vertical sections on the lines 3—3 and 4—4 of Fig. 2 and all showing said thermostatic switch assembly.

In general the manually operable thermostatic switch assembly according to the invention comprises a switch means including a thermostatic

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switch arm, a manually operable member, and an intermediate member. The manually operable member is spring held in one position spaced from said intermediate member in its ineffective position, located to abut and limit the movement of said intermediate member, and movable to return said intermediate member to its ineffective position. Said manually operable member when moved bears against and controls the position of said intermediate member which determines the operability of the switch arm according to the position of the manually operable member and/or the thermal condition of the thermostatic switch arm. Said switch assembly may be mounted upon an instrument panel or similar support by means of a mounting plate carrying a casing and an insulating base.

The switch assembly may be mounted upon an instrument panel or similar support by means of a mounting plate 20 which is provided with holes 21. A casing 22 having an open side is fastened to said plate 20 in any suitable manner as by spot welding. A base 24 of any suitable insulating material covers the open side of said casing 22 and is held in position as by a plurality of bent tongues 25.

The casing 22 has an insulating liner 81 and the manually operable member is a push button 82 which extends through an opening in the mounting plate 20. As best shown in Fig. 3, a central insulating plate 83 has an edge 84 fitting into a slot in the top of casing 22, is provided with a recess 85, and has a projection 86 at the bottom of said recess 85. The push button 82 is internally recessed to receive a spring 87 which has its other end bearing upon a washer 88 and centered by projection 86. Lateral flanges 89 on push button 82 engage the top of casing 22 to limit the movement of push button 82 by said spring 87.

A pair of terminal straps 90 and 91 each extend through base 24 and into complementary recesses within central insulating plate 83 and each carries a terminal clamp 92 and screw 93 for connection to circuit conductors. Insulating side plates 94 are fastened at each side of central plate 83 by rivets 95 and 96 and are each provided with an aperture 97 and a hole 98. A pair of stationary contacts 28 are fastened to terminal strap 90 each on opposite sides thereof as by spot welding and are each within an aperture 97 of side plates 94. A pair of terminal studs indicated generally as 102 have ends 100 smaller in diameter than the width of terminal strap 91 and fitting into a hole 101 in terminal strap 91. Each of said studs 102 is provided with a groove 103

and has flanges 99 swaged and thereby expanded into the respective side plates 94, preferably at the inner sides thereof. A pair of thermostatic switch arms 31 are fastened to respective terminal studs 102 as by spun over or riveted heads 104. Said thermostatic switch arms 31 are preferably composed of bimetallic sheet material and are of the snap acting type. As best shown in Fig. 1 each switch arm 31 is provided with a pair of diverging slots 34 and is deformed with gathered portions 35 at the outer ends of each slot 34 so that each arm 31 is dished or curved longitudinally as shown in Fig. 2 and curved transversely as shown in Fig. 4. Such deformation or mechanical stress in said switch arms 31 causes abrupt reversal in a known manner when said arms 31 are heated to or above a predetermined temperature. An angle piece 105 is attached by rivets 106 to each of said switch arms 31 and each has a portion overhanging the ends thereof.

The intermediate member comprises a separator normally movable between the open contacts but held out of such position by the switch arm 31 when the contacts are closed. A pair of insulating sectors 107 are each pivotally mounted upon each of said terminal studs 102, each has a corner 108 adjacent push button 82 and each has an extension 109. Spring members 110 each has one end encircling groove 103 and anchored in terminal stud 102 and each has their other end inserted into a hole in sector 107, see Fig. 2. When the contacts 28 and 36 are normally closed, said extension 109 bears against the edge of angle piece 105 by reason of the action of spring member 110. The tension of spring members 110 is such that the pressure of extensions 109 upon the edges of angle pieces 105 is not sufficient to affect the thermal operation or movement of thermostatic switch arms 31.

When the current in the circuit connected to the switch assembly shown is below the critical value, the switch arms 31 are in normally closed position, the contacts 28 and 36 are engaged, and each of the extensions 109 on insulating sectors 107 are pressed against the edges of angle pieces 105. However, when said current exceeds said critical value the thermostatic switch arms 31 are moved to open position, contacts 28 and 36 are separated, and angle pieces 105 are moved out of engagement with extensions 109 of insulating sectors 107 and spring members 110 move said sectors 107 to bring said extensions 109 between the contacts 28 and 36. Even though the operating characteristics of or current passing through switch arms 31 are not precisely the same, as soon as one pair of contacts 28 and 36 are opened the entire current will pass through the other switch arm 31 and immediately heat it above its critical value and cause it to open. The corners 108 of sectors 107 are arranged to abut against the bottom of push button 82 so that the extensions 109 can not be moved beyond the interrupting position between the contacts 28 and 36.

Cooling of the switch arms 31 does not return the switch assembly to operative condition because the insulating sectors 107 or extensions 109 thereof remain between the contacts 28 and 36 until the push button 82 is fully depressed. Downward movement of said push button 82 moves corners 108 of insulating sectors 107 in a counter-clockwise direction until extensions 109 are beyond the edges of angle pieces 105. Since switch arms 31 have cooled off and if the abnormal condition in the circuit has been cleared, said switch arms 31 will normally close contacts 28 and 36 and angle pieces 105 will move into blocking position with respect to extensions 109. Of course, if the abnormal condition has not been cleared switch arms 31 will again open and insulating sectors 107 will be moved to place extensions 109 between the contacts.

It will be obvious to those skilled in the art that the duplex switch assembly of Figs. 1–4 may be provided as a single unit or may be provided with separate halves for controlling two separate or alternative circuits related so that only a single manual reset is necessary.

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 comprising a support, a contact mounted on said support, a bimetallic switch blade having a portion mounted upon said support, having a movable portion carrying a second contact, and normally closing said contacts when said bimetallic switch blade is below a predetermined temperature, an intermediate member normally movable to a position to separate said contacts and releasably held in an ineffective position by said switch blade when the same is below said predetermined temperature, and a manually operable member normally spaced from and independent of said intermediate member when the same is in its ineffective position, located to abut and limit the movement of said intermediate member to its position to separate said contacts, and movable to return said intermediate member to its ineffective position.

2. In a manually operable switch assembly, the combination comprising a support, a pair of contacts, one of which is mounted upon said support, a bimetallic switch blade mechanically stressed per se for abrupt reversal when heated above a predetermined temperature, having a portion mounted upon said support, having a movable portion carrying the other of said contacts, and normally closing said contacts when said bimetallic switch blade is at temperatures below said predetermined temperature, an abutment on the movable portion of said switch blade and movable therewith, an intermediate member normally movable to a position between said contacts and held in an ineffective position by said abutment when said contacts are closed, and a manually operable member normally spaced from and independent of said intermediate member when the same is in its ineffective position, and located to abut and limit the movement of said intermediate member to its position between said contacts, and movable to return said intermediate member to its ineffective position for re-engagement with said abutment when said switch blade is below said predetermined temperature.

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