Oct. 20, 1953 A. D. SLATKIN 2,656,441

THERMOSTATIC SWITCH

Filed Jan. 15, 1949

FIG.1.

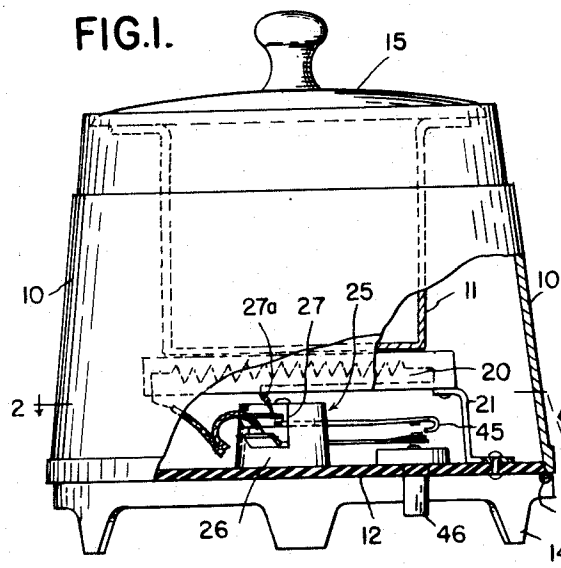


FIG.2.

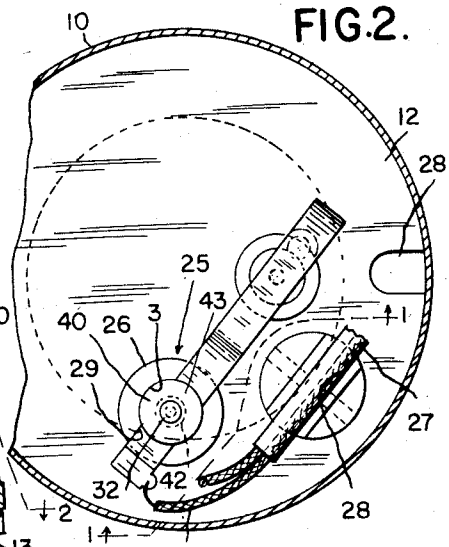


FIG.3.

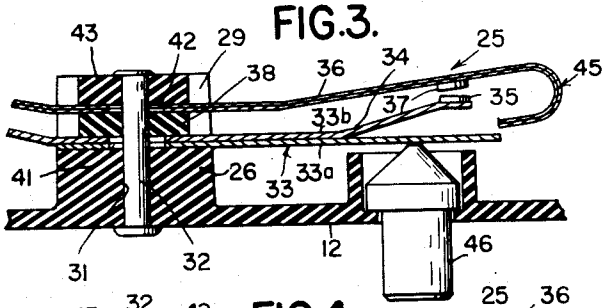


FIG.4.

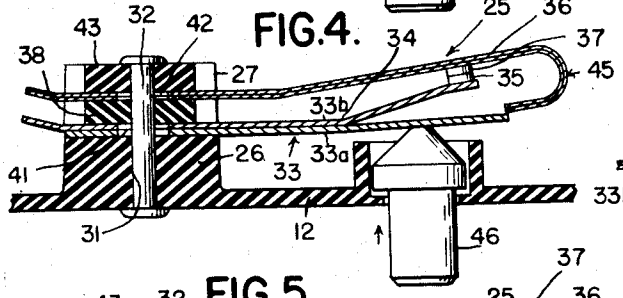


FIG.5.

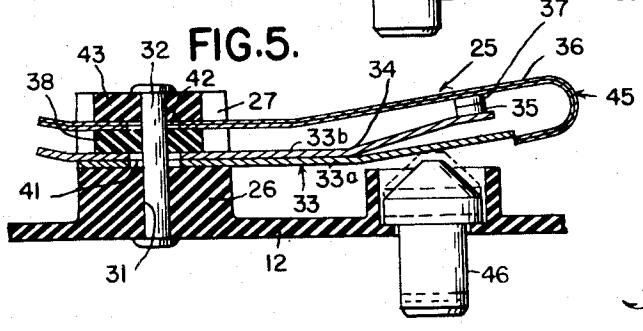
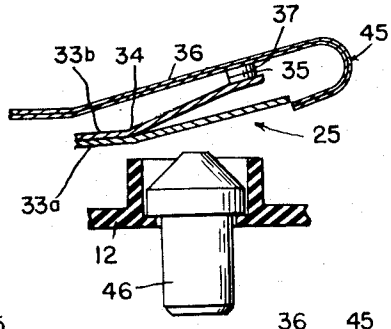


FIG.6.



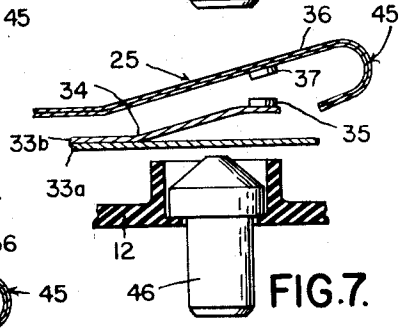


FIG.7.

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THERMOSTATIC SWITCH

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4 Claims. (Cl. 200—138)

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My invention relates to electric heaters and to a switch construction therefor. More particularly, the present invention is applicable to a vaporizer for heating and vaporizing an insecticide or other similar matter, and embodies a switch device employing a thermal responsive element mounted in the air jacket in said heater and operable to automatically open the switch at the proper time.

Whereas, insecticide vaporizers require heat to function properly, they are usually dangerous to use because of the lack of control. In the present construction, the control is had by means of the particular switch construction that has become an actual part of the production products and has been approved by the underwriters.

In such devices as electric heaters, it has become quite necessary to minimize production costs without losing efficiency of the operating parts. The switch and control of the operation is an essential part of such heaters, and a construction which is economical to manufacture and which meets the rigid requirements of the industry and those who must approve of such electrical apparatus, has become of late exceedingly difficult to produce.

It is an object of the present invention to overcome the aforesaid production difficulties by constructing an electric heater equipped with a simplified switch construction that is automatically operable to control the operation of the heater, but is quite competitive commercially and simple and economical to manufacture.

Another object of the present invention is to provide a simplified automatic switch for electric heaters or the like by constructing a switch utilizing a bimetal thermal responsive element adapted to latch the switch arm to maintain electrical contact and operable to release the latch at the proper time.

These and other objects will be more readily apparent as the description progresses in which reference is had to the accompanying drawing illustrating a preferred embodiment of the invention and in which like parts are referred to by like characters throughout the several views, and in which

Fig. 1 is a side elevational view of an electric heater partly in section on the line 1—1 of Fig. 2.

Fig. 2 is a plan view of the base on which is mounted the electric switch and taken on the line 2—2 of Fig. 1.

Figs. 3, 4 and 5 are detail sectional views of the switch respectively showing three positions thereof, and

Figs. 6 and 7 are fragmentary detail sectional views showing the action of the switch latching means.

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The electric heater as illustrated in the accompanying drawing is utilized principally for vaporizing an insecticide or other similar material, although the principles of the invention may be readily embodied in other types of electrical devices. The present heater comprises an outer shell or housing 10 and a reentrant recess or receptacle 11, so spaced from the outer shell as to provide an air jacket surrounding said receptacle. A closure plate 12 is secured to close the bottom open end of said shell, the same being secured in place by a spring ring 13 or other suitable securing means. The housing 10 is provided with leg extensions 14, and a cover 15 is provided for closing the upper open end of the recess or receptacle. The closure plate may be considered as a base plate and the same is preferably constructed of insulating material such as hard rubber, a phenol resin or the like.

The switch and heating element is supported by the base plate 12, said heating element 20 being of any conventional construction but preferably being of such shape and construction as to directly heat the receptacle or pot and to be mounted on suitable brackets 21 fixed or otherwise secured to the base plate 12. A switch designated as a whole by the reference character 25 is also mounted or carried by this base or closure plate 12, said switch being preferably mounted on a post 26 as will be hereinafter described in detail.

A lead-in electric cord 27 is threaded through the opening 28 in the base plate 12 and the switch 25 is connected in series with the heating element 20 in the conventional manner. The post 26 is slotted as at 29 and centrally bored out or recessed as at 30, a hole 31 concentric to said recess 30 being also provided for receiving the bolt or rivet 32 which is provided to secure the switch arms to said post. A spring arm structure 33 is assembled in the slot 29, said arm structure comprising a pair of arms 33*a* and 33*b*, said portion 33*a* consisting of a straight length of spring steel ribbon stock and 33*b* consisting of a similar length of spring steel, but upwardly bent as at 34 and carrying a contact point or button 35.

A bi-metal thermal responsive element 36 is assembled above the spring arm structure and mounted on the post 26 similarly to the spring arm 33 and carries a contact point or button 37 which is aligned with the contact point or button 35. The spring arm and element are spaced apart by a suitable insulating washer 38 and one lead 27*a* of the electric cord is attached or other-

wise electrically connected to the arm 33 while the other lead is connected to the heating element. A connector connects the bi-metal element to the other end of said heating element.

Both said spring arms 33a and 33b, as well as the bi-metal element 36, are provided with enlarged portions 40 which are piloted or otherwise closely fitted into the bored recess 30 of the post, both said spring arms and element being also provided with holes 41 and 42 respectively of a diameter greater than the diameter of the bolt or rivet 32, said holes 41 and 42 being concentric with the enlarged portions 40 and thus as the spring arm and element are assembled to the post, the edges of the holes 41 are concentrically spaced from the bolt 32. A washer 42 is mounted on top of the bi-metal element 36 and the bolt or rivet 32 secures the whole assembly together.

The bi-metal element 36 comprises a return bent extension 45 which is constructed to be engaged by the tip of the spring steel arm 33a to latch the spring arm to said element and maintain the contact points or buttons 35 and 37 in contact with each other.

The current to the heating element is turned "on" by actuation of the button 46, and this action is illustrated in Figures 3 to 5 inclusive. The button 46 is supported in any conventional way by the base plate 12 and the same is pushed against the spring arm structure, moving the same towards the element 36. The contacts 35 and 36 engage first (see Fig. 4), but arm 33a is still not engaged with the element extension 45. Further movement of the actuator button 46 further springs the arm 33b which carries the contact point 35 increasing the pressure of the contact and said spring arm 33a is sprung past the tip of extension 45 and is latched therewith as seen in Fig. 5.

The contacts 35 and 37 thus remain closed and the button 46 is free to drop away. As the electric heating device heats up, the interior of the device becomes warm and the air therein gets hotter and hotter. In time, the heat is carried to the bimetal element 36 causing the same to bend upwardly due to the unequal expansion of the bimetal thermostatic sections, and causing the return bent extension to open up until eventually the spring arm member 33a is free to slip past the tip of this return bent extension 45. The spring arm then snaps back to its original position (see Fig. 7), the current to the heating element is automatically turned "off" since the contact between 35 and 37 is broken, as is likewise the contact between the spring arm member 33a and extension 45. The whole device is permitted to cool and the bimetal element slowly returns to the position shown in Fig. 3, where it is in readiness to again be actuated when desired.

It is thus seen that the present switch device is of simple construction and of economical manufacture. The heating device is readily and economically serviced since the base and its various mechanisms can be removed as a unit, by disconnecting a few connections, and replaced with a new unitary sub-assembly.

It will be apparent to those skilled in the art to which this invention pertains that various changes and minor modifications may be made to the embodiment illustrated and described without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A thermal responsive switch means for an electric heating device comprising a spring arm structure having an intermediate contact button, a bimetal thermal responsive element having an intermediate contact button relatively aligned with the contact button on said spring arm structure, means supporting said arm structure and element, an actuator supported for engagement with said spring arm structure and arranged to be manually actuated to move said spring arm structure in order to engage said contact buttons, and means latching said arm structure to the free end of said element to maintain contact between said buttons, said latching means operable in response to a predetermined increase in temperature to disengage the element from said spring arm whereby to release said latching means and to thereby permit the spring arm structure to return to its original position and to open the contact between said buttons.

2. A thermal responsive switch means for an electric heating device comprising a spring arm structure having a resiliently supported intermediate contact button, a bi-metal thermal responsive element having an intermediate contact button relatively aligned with the contact button on said spring arm structure, means supporting said arm structure and element, an actuator supported for engagement with said spring arm structure and arranged to be manually actuated to move said spring arm structure in order to first engage said contact buttons, and means operable by further movement of said spring arm structure for latching said arm structure to the free end of said element to maintain contact between said buttons, said latching means operable in response to a predetermined increase in temperature to disengage the element from said spring arm to release said latching means and to thereby permit the spring arm structure to return to its original position and to open the contact between said buttons, said latching means comprising return bent extension of said bimetal element and formed to yieldingly engage said under spring arm structure.

3. A thermal responsive switch means for an electric heating device comprising a spring arm structure having a resiliently supported intermediate contact button, a bimetal thermal responsive element having an intermediate contact button relatively aligned with the contact button on said spring arm structure, means supporting said arm structure and element, an actuator supported for engagement with said spring arm structure and arranged to be manually actuated to move said spring arm structure in order to first engage said contact buttons, and means operable by further movement of said spring arm for latching said arm structure to the free end of said element to maintain contact between said buttons, said latching means operable in response to a predetermined increase in temperature to disengage the element and spring arm to release said latching means and to thereby permit the spring arm structure to return to its original position and to open the contact between said buttons, said latching means comprising a return extension of said bimetal element disposed so that said spring arm structure can be forced past the end of said extension on making contact with said element and engaged in latching arrangement to maintain said contacts engaged, said bimetal extension operable in response to being heated to open out for releasing said spring arm structure.

4. A thermal responsive switch means for an electric heating device comprising a spring arm

structure comprising a pair of spring arms, one of said arms carrying a contact, a bimetal element having another contact adapted for contacting engagement with contact on said spring arm and further provided with an extension constructed to latch with said other spring arm, said spring arm structure moved to first bring said contacts together and subsequently moving the spring arm, other than the one carrying the contact, relative to the element and the spring arm carrying said contact to latch same with the extension, said bimetal element responsive to a predetermined rise in temperature to which same is subjected to release said latch and disconnect said contacts.

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