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B. E. GETCHELL

1,983,077

ADJUSTABLE THERMOSTATIC SWITCH

Filed Jan. 6, 1934

Fig. 1.

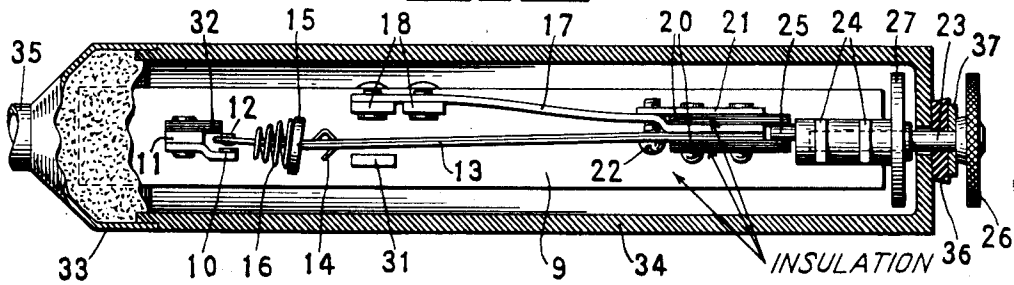


Fig. 2.

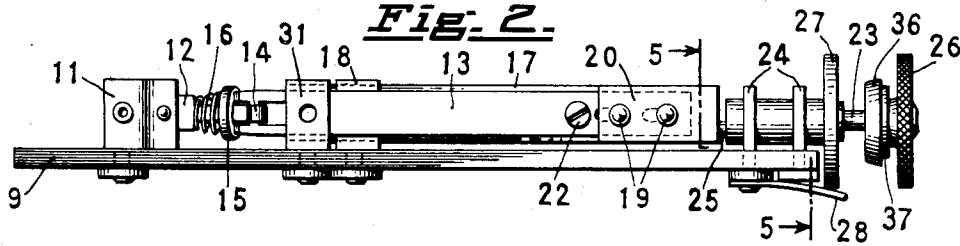


Fig. 3.

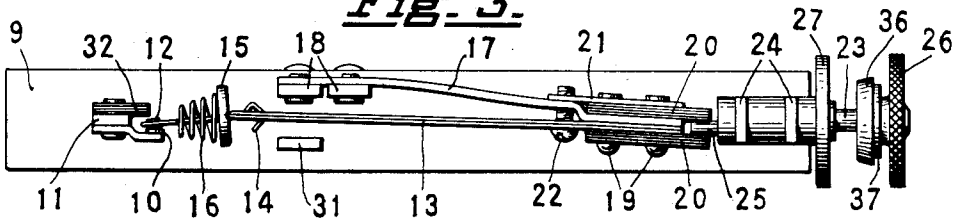


Fig. 4.

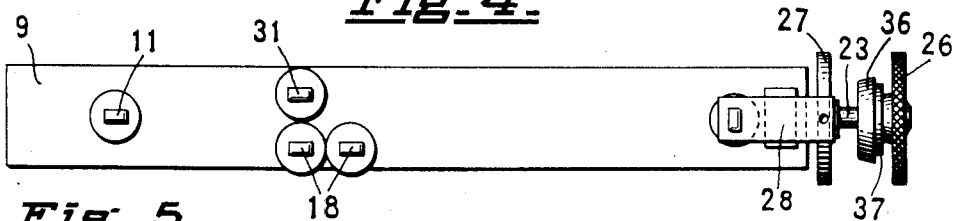


Fig. 5.

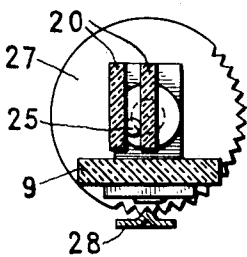
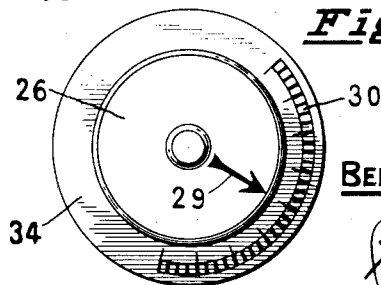
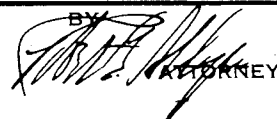


Fig. 6.



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UNITED STATES PATENT OFFICE

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ADJUSTABLE THERMOSTATIC SWITCH

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pany, Plainville, Conn., a corporation of
Connecticut

Application January 6, 1934, Serial No. 705,491

7 Claims. (Cl. 200—122)

My invention relates particularly to a combina-
tion of electric heater and switch provided with
means of adjustment to vary the temperature at
which the switch will operate.

5 One object is to provide a compact, enclosed
type of thermostatic switch provided with external
means to permit adjustment.

Another object is to provide an enclosed snap
action thermostatic switch which may be readily
10 adjusted to operate at different temperatures.

Another object is to provide a switch of the
foregoing character in which the initial adjust-
ments can be effected at the factory to remain
fixed.

15 Another object is to provide a heat actuated
thermostatic switch which can be made economi-
cally and which is reliable in its operation.

Another object is to provide a simple compact
type of heat actuated switch which can be readily
20 adjusted over a wide range of temperatures.

Another object is to provide an adjustable ther-
mostatic switch in which can be readily embodied
without change of construction, an auxiliary
heater for the purpose of compensating for the
25 differential of temperature between the "on" and
"off" movements of the switch.

In carrying out the invention I preferably
mount an operating mechanism inside of a casing
which is sealed and is provided with an external
thumb piece or other adjusting device. The ther-
30 mostatic switch includes a bendable element which
supports the bi-metallic strip in such a manner
that both may be adjusted to vary the action of
the switch.

35 If it is desirable to reduce the "differential" in
temperature between the "on" and "off" move-
ments of the switch, the bendable element sup-
porting the bi-metallic strip may be made of an
electrical resistance material.

40 Fig. 1 is a longitudinal sectional view of one
form of device embodying my invention, showing
the parts of the switch in the open circuit posi-
tion.

Fig. 2 is a side view of the switch mechanism
45 removed from the casing.

Fig. 3 is a plan view of the same showing the
parts of the switch in the closed circuit posi-
tion.

Fig. 4 is a bottom view of the support for the
50 switch with the adjusting mechanism.

Fig. 5 is a transverse sectional view on the
plane of the line 5—5 of Fig. 2.

Fig. 6 is an end view of the device showing the
adjusting member and scale.

55 The conducting parts are preferably carried by
an insulating support 9. The stationary contact
10 is carried by a post-like member 11. The mov-
able switch contact 12 is carried by the bi-metal-
lic thermostatic strip 13. In order to effect a snap
60 action this contact 12 may be carried by an arm

14 hinged to the end of the strip 13 as set forth
in application Ser. No. 701,714 filed December 9,
1933 by Benjamin E. Getchell.

A washer 15 is supported by a knife edge-like
tip of the strip 13 and a spring 16 is interposed be-
tween the washer 15 and a shoulder on the switch
member so as to produce a toggle like action.

The arm 17 is preferably formed of bendable
resistance metal and so as to serve as a support
for one end of strip 13. Arm 17 may be formed
of resistance material to serve as a heater to
70 compensate for "differential." One end of this
arm 17 is supported by a post-like member or
members 18 which are secured to the support 9.
The other end of the arm 17 is secured to one
75 end of the thermostatic strip 13 by rivets 19
with insulating pieces 20, 20 on opposite sides.
A back piece 21 may also be provided to afford
a seat for the adjusting screw 22 which passes
through the strip 13 and the arm 17 so that by
80 tightening or loosening the screw 22 the rela-
tive position of the strip 13 with respect to the
arm 17 may be adjusted.

The shaft 23 is supported in bearings 24 and
has an eccentric pin 25 at its inner end located
85 between the spaced apart ends of the insulating
pieces 20, 20. A finger piece 26 is provided on
the outer end of the shaft 23 for rotating the
shaft and thereby adjusting the heater arm 17
and the thermostatic strip 13.

To hold the shaft 23 and associated parts in
adjusted position I provide a disc 27 on the shaft
23 which coacts with a spring finger 28 carried
by the support 9. The edge of the disc 27 is
90 notched to provide definite positions for the en-
gagement of the spring finger 28.

The finger piece 26 is preferably provided with
an indicating pointer or mark 29 which is adapted
to coact with the stationary scale 30 to show the
adjusted position of the parts.

A stationary stop 31 is provided opposite the
post-like member 18 to limit the movement of
the thermostatic strip away from the heater arm.
An abutment member 32 opposite the contact
10 limits the movement of the switch member
105 away from the contact 10.

The electrical parts are preferably housed in
a casing made up of the two parts 33 and 34
which are suitably connected and one of which
is provided with an outlet 35 for the electric con-
ductors. In order to provide a water tight joint
between the shaft 23 and the casing I may pro-
vide a soft rubber washer 36 and a metal wash-
er 37.

When the parts are in the position shown in
115 Fig. 3 electric current passes successively through
the parts 11, 10, 12, 14, 13, 17 and 18. When the
temperature changes so as to warp the thermo-
static strip 13 from the position shown in Fig.
3 toward the position shown in Fig. 1, the switch
120

parts snap to the open circuit position, and vice versa, and when the temperature conditions change in the other direction, the parts will move from the positions shown in Fig. 1 to the positions shown in Fig. 3.

The temperatures at which these changes occur will depend upon the position of the supporting arm 17. This position can be readily adjusted by simply rotating the finger piece 26 with the shaft 23 and the crank pin 25. The scale 30 may be calibrated to indicate temperature points at which the changes take place, such calibration being in accordance with any suitable code or thermometric standard. The primary adjustment for raising or lowering the adjustable range is effected by means of the screw 22 which adjustment, of course becomes fixed for a given instrument if the parts are sealed in the casing.

When this supporting arm 17 is also used as a heater, it is not for the purpose of moving the bi-metallic strip to produce action of the contacts. It is for the purpose of moving the strip just enough to compensate for the differential between the normal opening and closing temperatures of the thermostat so that a slight further change in external temperature will cause switch action.

For instance; at a setting of 60 degrees—with arm 17 made of low resistance metal which would not heat on load, the thermostat would cause the contacts to snap closed at 60 degrees.

Before the thermostat can snap the contacts open again, it must move a short distance to pass the spring centre. It requires approximately 12 degrees temperature change to move the thermostat the required distance; therefore, without compensation—with a setting of 60 degrees, the thermostat would snap "on" at 60 degrees and "off" at 72 degrees, a differential of 12 degrees.

When the thermostat is controlling a fixed load, it is possible to make arm 17 of resistance metal of just the right resistance to add a pre-determined amount of heat to the thermostat, independent of outside temperature. For instance, if this resistance added 11 degrees of heat to the thermostat, an outside temperature increase of 1 degree would be sufficient to cause it to trip "off".

Thus the differential would be reduced to 1 degree instead of 12 degrees, making it possible to more closely regulate the heating of hotbeds, etc.

This construction has the added advantage over the ordinary enclosed thermostatic switch in that it can be actuated manually to open and close the circuit independently of changes in temperature. For instance, if the parts are normally in the open circuit position of Fig. 1, the switch can be manually actuated to the position of Fig. 3 by simply turning the finger piece 26 and without waiting for the temperature change.

I claim:

1. A thermostatic switch including a bendable arm supported at one end and free at the other end, a bi-metallic strip having one end secured to and movable with the free end of said arm, a switch contact carried by the opposite end of said strip, means for adjusting the position of the strip with respect to the arm to vary the action of the strip with respect to the arm, and means for adjusting the free end of said arm and the attached end of said strip to vary the moment of action of the switch.

2. In a thermostatic switch a heater element, a bi-metallic strip supported thereby, means for

adjusting said strip with respect to said heater element, and means for adjusting one part of said heater element with said strip.

3. In a thermostatic switch, a stationary contact, a bi-metallic strip movable across a predetermined point under the influence of changes in temperature, a contact member carried by said strip and being adapted to move into engagement with the stationary contact under snap action upon the movement of the strip across said point, a heater arm for heating said strip and manual means for variably adjusting the position of said arm and strip relative to said point, said means including a crank shaft operatively connected to said arm and strip and a finger piece for actuating said shaft.

4. In a thermostatic switch, a stationary contact, a bi-metallic strip movable across a predetermined point under the influence of change of temperature, a contact member carried by said strip and being adapted to move into engagement with the stationary contact under snap action upon the movement of the strip across said point, a heater arm for heating said strip and manual means for initially adjusting the position of said arm and strip relative to said point, and means to indicate the positions of said arm and strip relative to said point, said means including a crank shaft, a dial and a pointer carried by the crank shaft.

5. In a thermostatic switch, a stationary contact, a bi-metallic strip movable across a predetermined point under the influence of heat, a contact member carried by said strip and being adapted to move into engagement with the stationary contact under snap action upon the movement of the strip across said point, a heater arm for heating said strip, manual means for initially adjusting the position of said arm and strip relative to said point, said means including a crank shaft having a member engaging the heater arm to move the same and means for holding the crank shaft in adjusted positions.

6. In a thermostatic switch, a stationary contact, a bi-metallic strip movable across a predetermined point under the influence of changes in temperature, a contact member carried by said strip and being adapted to move into or out of engagement with the stationary contact under snap action upon the movement of the strip across said point, a heater arm for heating said strip, means for initially adjusting the position of said strip relative to said arm, means for variably adjusting the position of said arm and strip relative to said point, said latter means including a crank shaft having a portion connected to the heater arm and a manually operable member for rotating the crank shaft and means to indicate the said predetermined point and the adjusted position of the arms and strip relative thereto.

7. A thermostatic switch including a casing, an insulating support therein, a stationary contact on said support, a bi-metallic strip movable across a predetermined point on said support, a contact member carried by said strip and being adapted to move into or out of engagement with the stationary contact under snap action upon the movement of the strip across said point, a heater arm for heating said strip and means positioned exteriorly of the casing for readily adjusting the position of the arm and strip relative to said point.