

Oct. 24, 1933.

L. W. HODGES

1,932,071

THERMOSTATIC HEAT CONTROL SWITCH

Filed Jan. 19, 1931

2 Sheets-Sheet 1

Fig. 1.

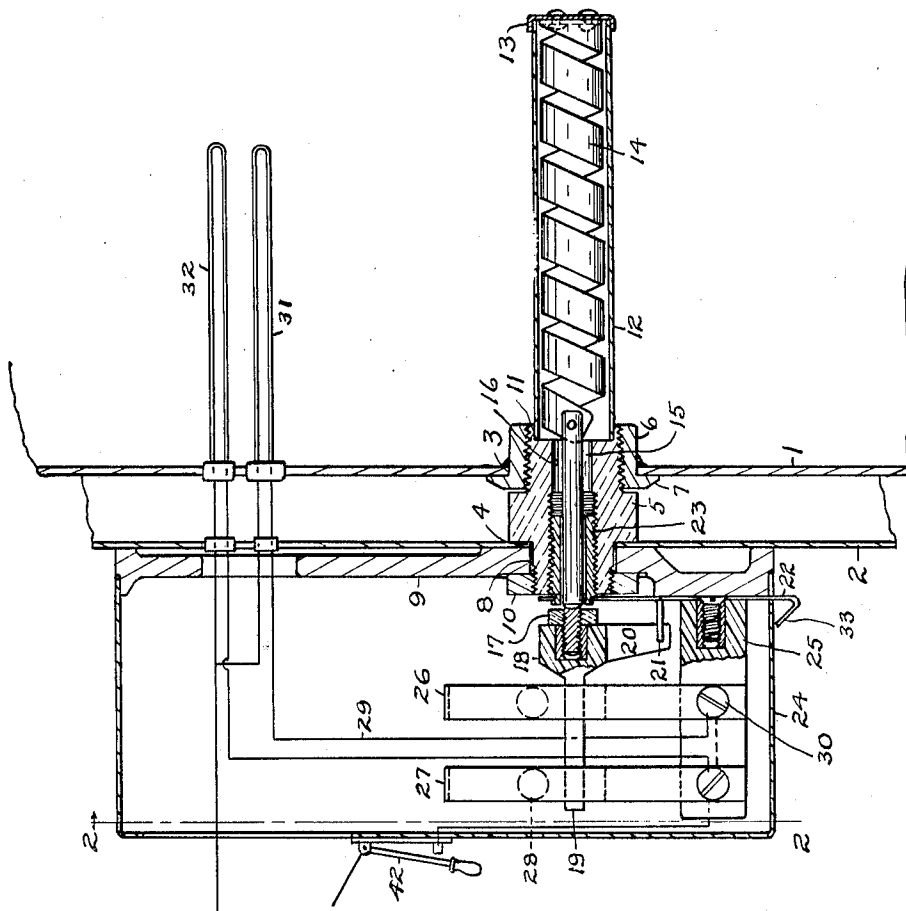
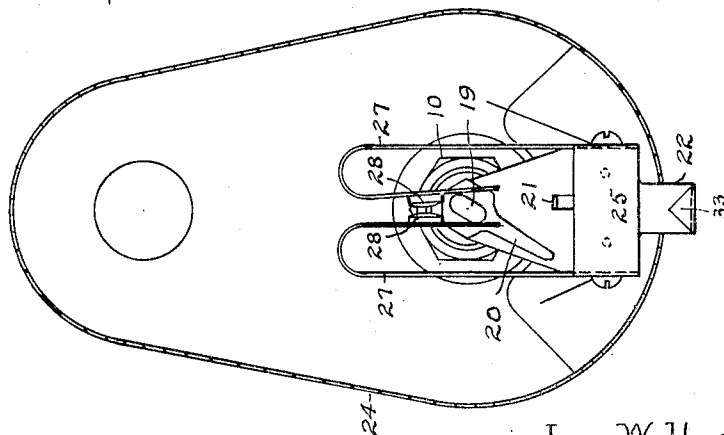


Fig. 2.



Lee W. Hodges

INVENTOR

BY: Elmer M. Hulce
ATTORNEY

Oct. 24, 1933.

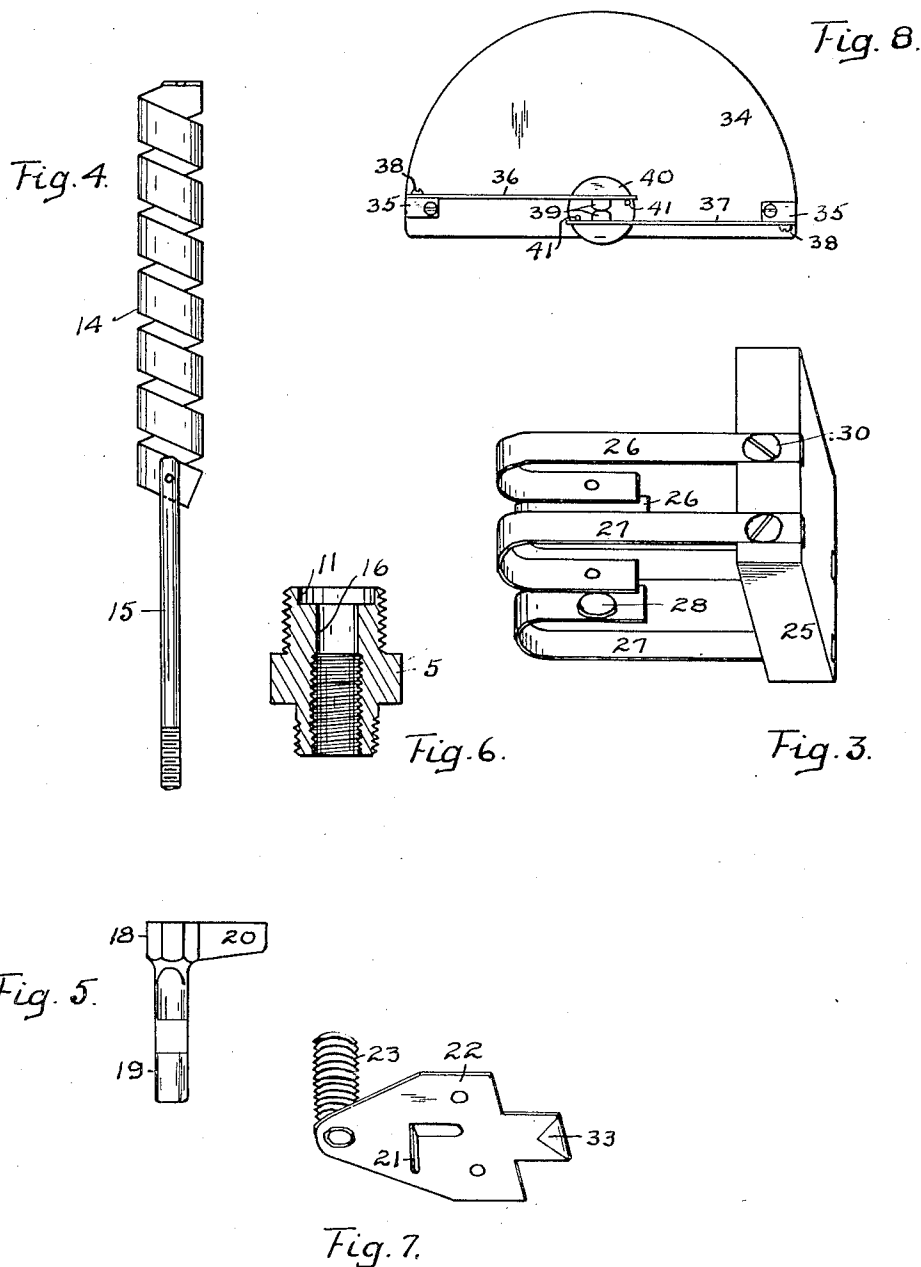
L. W. HODGES

1,932,071

THERMOSTATIC HEAT CONTROL SWITCH

Filed Jan. 19, 1931

2 Sheets-Sheet 2



Lee W. Hodges
INVENTOR
BY: Elwin M. Hulley
ATTORNEY

UNITED STATES PATENT OFFICE

1,932,071

THERMOSTATIC HEAT CONTROL SWITCH

Lee W. Hodges, Sturgis, Mich., assignor, by mesne assignments, to Lectrolite Corporation, Defiance, Ohio, a corporation of Ohio

Application January 19, 1931. Serial No. 509,728

14 Claims. (Cl. 200—138)

The invention relates to thermostatic heat control switches adapted to control the operation of an electrical heater, especially where such heater is applied to a water tank, or other electrically heated object.

The object of the invention is to provide a simple and novel switch that is operated by a thermostat which is responsive to the temperature of the medium being heated, the switch being adapted to control the operation of the heating element or elements.

The invention consists of a thermostatic element adapted to be placed in the fluid to be heated and to open and close a switch adapted to control an electrical heating element or elements designed to heat the fluid, the switch being adjustable to operate at selected temperatures of the fluid.

The invention is illustrated in the accompanying drawings, in which

Figure 1 is a cross-sectional view of a fraction of a tank having the invention applied thereto; Fig. 2 a cross section on line 2—2 of Fig. 1; Fig. 3 a perspective view of the switch contacts and supporting member; Fig. 4 an elevational view of the thermal unit; Fig. 5 an elevational view of the switch operating arm; Fig. 6 a cross section of the base; Fig. 7 a perspective view of the regulator and Fig. 8 a bottom plan view of a modified form of the switch.

Referring to the illustrative embodiment of the invention 1 represents a wall of a tank and 2 a spaced outer wall, suitable insulation (not shown) being placed between the walls. An opening 3 is formed in the inner wall 1 and an opening 4 is formed in the wall 2 in-alinement with the opening 3. A head or base 5 is disposed in both openings 3, 4 and a gland 6 is threaded on the inner end of the base. A flange 7 on this gland abuts the outer face of the wall 1 and forms a fluid tight joint between the base and the wall 1. The forward end of the base 5 also projects through an opening 8 in a base plate 9 and said end is externally threaded to receive a nut 10 which is tightened against the base plate 9 to fix the base 5 in position. A recess 11 is formed in the inner end of the head 5 in which is secured one end of a tube 12. The opposite end of the tube is closed by a cap 13 to which is secured one end of a coiled thermostatic element 14 that extends substantially the length of the tube. The coil 14 is arranged adjacent the interior wall of the tube so as to be readily responsive to temperature changes of the water surrounding the tube and the tube itself seals the space for the coil from contact

with the water. A rod 15 is secured at one end to the forward end of the element 14 and extends loosely through an opening 16 in the head 5.

The forward end of the rod 15 is threaded and is engaged by a gland 17 that is secured in the head 18 of the cam 19 and is preferably formed of suitable insulation. An arm 20 projects laterally from the head 18 and is adapted to abut a stop 21 that projects from a blade or plate 22 which is mounted on a sleeve 23 having threaded engagement with the wall of the opening 16 in the head 5. The blade is free to swing on the sleeve 23 and about the axis of the cam. The blade projects through a slot in a case 24 suitably mounted on the base plate 9.

A block of insulation 25 is secured to the blade 22 and secured to this block are any selected number of pairs of spring contacts, two such pairs 26, 27 being shown in the drawings. The free ends of each pair of springs are bent over and face each other with the cam 19 between them. Contact points 28 are mounted on the springs and, when the longer axis of the cam is parallel to the springs 26, the free ends of the springs 26 approach each other and the points 28 contact to close the electrical circuit 29 leading from the screws 30 to the heating element 31 that may be used to heat the contents of the tank. The rotation of the cam forces the free ends of the springs apart and simultaneously separates the contact points 28 with rapidity and without sparking at said points.

The other pair of contact springs 27 may be connected to another element 32 to provide additional heat for the tank or to heat any other object, and the cam will be so formed that it will first separate or release one pair of contacts before it does the other pair.

Upon swinging the blade 22 to a selected point indicated by the pointer 33 on the blade upon a scale (not shown) formed on the case 24, the spring carrying block 25 is simultaneously swung. This movement changes the position of the springs relatively to the cam so that the cam will separate or release the contact points at any selected temperatures of the medium being heated.

In Fig. 8 I may use the blade or plate 34 instead of the blade or plate 22 and mount two insulating blocks 35 on the blade. Two springs 36, 37 are secured to the blocks respectively by the screws 38 and overlap at their free ends, the contact points 39 being mounted upon the opposed sides of the springs 36, 37 and normally held in contact by the springs. I omit the cam 19 in this form of the invention and suitably mount a disk of in-

sulation 40 on the head 18 the disk carrying at diametrically opposite points two rods or pins of insulation 41 which extend between the free ends of the springs and upon opposite sides of the contact points 39. When the head 18 is rotated the rods or pins 41 will either separate or release the free ends of the springs and disconnect the points or permit them to engage in accordance with the direction of rotation of the head 18.

In operation, the thermostatic coil 14, as the heat of the medium increases turns or twists and this movement is imparted to the cam 19. When the maximum temperature for which the blade 22 has been set is reached the cam separates the contact points breaking the electric circuit at those points to the heating unit.

When the temperature of the medium falls to the selected minimum degree the retracting thermostatic coil rotates the cam in the opposite direction and releases the contact points so that they engage and the heating unit is again set into operation.

When the unit is not in use and the electric current is turned off at the control switch 42 and the medium is cold, the arm 20 abuts the stop 21 and prevents further rotation of the cam, otherwise the cam might be retracted to a position in which it would hold the switch points apart so that the electric current cannot flow to the heating unit when the control switch 42 is closed.

The electric circuit for the contacts 26 includes the supply wire 43, the switch 42, the wires 44, 45, the wire 46, the element 31 and the wire 47 which connects to the supply wire 48 and the circuit for the contacts 27 includes the wire 43, the switch 42, the wires 44 and 49, the element 32 and the supply wire 48.

As many circuits may be controlled by the switch as are desired, the make and break member being formed according to the number of circuits.

The thermostatic coil could be reversed so that the winding thereof will be in the opposite direction. The device would then be adapted to control cold temperatures.

What I claim is:

1. In mechanism of the class described, an apertured base, a loose rod in the apertured base, a casing secured to the base, a coiled thermostatic element in the casing and secured at one end to the casing and at its other end to the rod, an actuator secured to the other end of the rod, a plate revolvably carried by the base and rotatable on the axis of the actuator, a resilient contact member carried by the plate and disposed adjacent to the actuator and adapted to make and break contact under the influence thereof and cooperating means in the actuator and on the plate to limit the movement of the actuator under the influence of the thermostatic element.

2. In a mechanism of the class described, a revoluble member of insulating material, a support rotatable about the axis of the revoluble member, switch members mounted on the support and capable of movement relative to each other to make and break an electric circuit under the influence of the revoluble member and a thermal responsive element having an operating connection with the revoluble member.

3. In a mechanism of the class described, a mounting member, a tube secured thereto and extending therefrom, a revoluble member journaled in said mounting member, a thermo-sensitive element in said tube and having its inner

end connected therewith and its outer end operatively connected with said revoluble member, a switch base mounted on said mounting member and rotatably adjustable relative thereto about the axis of said revoluble member and switch contacts carried by said switch base and operatively engaged by said revoluble member to make and break an electric circuit in accordance with temperature changes affecting said thermo-sensitive element.

4. In a mechanism of the class described, a mounting member, a revoluble member journaled therein, a thermo-sensitive element operatively connected with said revoluble member to rotate it relative to said mounting member, a switch base mounted on said mounting member and rotatably adjustable relative thereto about the axis of said revoluble member and switch contacts carried by said switch base, operatively engaged by said revoluble member to make and break an electric circuit in accordance with temperature changes affecting said thermal sensitive element and carried by said base when it is adjusted to a new position.

5. In mechanism of the class described, an apertured base, a loose rod in the apertured base, a casing secured to said base, a coiled thermostatic element in said casing and secured at one end thereto and at its other end to said rod, an actuator secured to the other end of said rod, a plate carried by said base, a resilient contact member carried by said plate and disposed adjacent said actuator and adapted to make and break contact under the influence thereof and cooperating means on the actuator and on the plate to limit the movement of said actuator under the influence of said thermostatic element.

6. In mechanism of the class described, an apertured base, a loose rod in the apertured base, a casing secured to said base, a coiled thermostatic element in said casing and secured at one end thereto and at its other end to said rod, a cam secured to the other end of said rod, a plate carried by said base and resilient contact members carried by said plate and disposed adjacent said cam and adapted to make and break contact under the influence thereof.

7. In a mechanism of the class described, a revoluble member, a switch member adapted to make and break contact under the influence of the revoluble member, a thermostatic element having operative connection with the revoluble member, a member supporting the switch member and rotatable about the longitudinal axis of the revoluble member for adjustment purposes and means to limit the rotation of the revoluble member.

8. In a mechanism of the class described, a revoluble member, a support rotatable about the axis of the revoluble member for adjustment purposes, a switch member resiliently mounted on the support and adapted to make and break contact under the influence of the revoluble member and a thermostatic element having operative connection with the revoluble member and with the support.

9. In a mechanism of the class described, a revoluble member, relatively movable switch members adapted to make and break contact under the influence of the revoluble member, a thermostatic element having operative connection with the revoluble member, a member supporting at least one of said switch members and rotatable about the longitudinal axis of the revoluble member for adjustment purposes and means carried

thereby to limit the rotation of the revoluble member relative thereto.

10. In a mechanism of the class described, a pair of relatively movable switch members, switch points carried thereby and normally maintained in contact with each other, an actuator, a rod on which said actuator is mounted, a tubular member and a thermostat coil within and anchored at one end to said tubular member and having its other end connected with said rod.

11. In a mechanism of the class described, a revoluble member of insulating material, a support rotatable about the axis of the revoluble member, switch members, one of which is mounted on said support, said switch members being movable relative to each other to make and break an electric circuit under the influence of the revoluble member and a thermal responsive element having operative connection with the revoluble member.

12. In a mechanism of the class described, a mounting member, a tube secured thereto and extending therefrom, a revoluble member journaled in said mounting member, a thermo-sensitive element in said tube and having its inner end connected therewith and its outer end operatively connected with said revoluble member, a switch base mounted on said mounting member and rotatably adjustable relative thereto about the axis of said revoluble member and switch contacts, one of which is carried by said switch base and operatively engaged with the other one, said revoluble member influencing them to make and break an electric circuit in accordance with

temperature changes affecting said thermo-sensitive element.

13. In a mechanism of the class described, an apertured base, a rotatable rod extending through said apertured base, a coiled thermostatic element secured at one end to a part thereof and at its other end to said rod, an actuator secured to the other end of said rod, a plate revolubly carried by said base and rotatable on the axis of said actuator, contact members normally engaged for establishing an electric circuit and adapted to break said circuit when separated under the influence of said actuator and cooperating means on said actuator and said plate to limit the movement of said actuator under the influence of said thermostatic element.

14. In a mechanism of the class described, an apertured base, a rod extending loosely through said apertured base, a coiled thermostatic element secured at one end to a part thereof and at its other end to said rod, an actuator secured to the other end of said rod, a plate revolubly carried by said base and rotatable on the axis of said rod, a nut on said base for retaining said plate thereon, a second plate rotatable on the axis of said rod and spaced outwardly from said first plate, said second plate being rotatably adjustable relative to said first plate for range adjusting purposes and contact members normally engaged and adapted to be separated by said actuator under the influence of said coiled thermostatic element.

LEE W. HODGES.

110

115

120

125

130

135

140

145

150