

June 30, 1942.

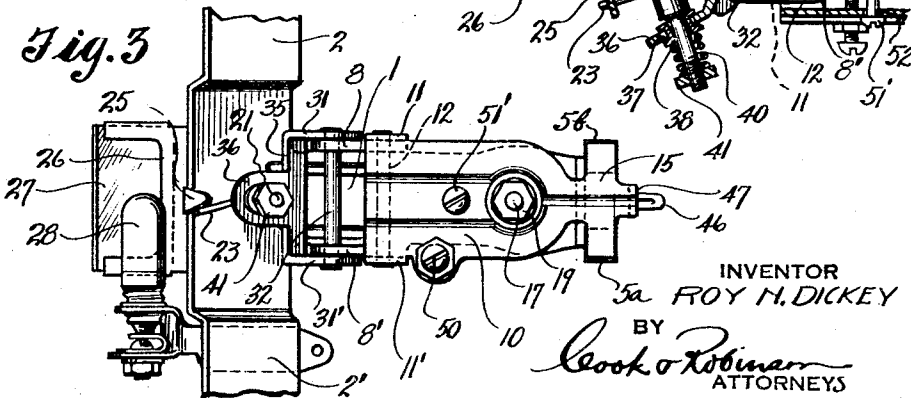
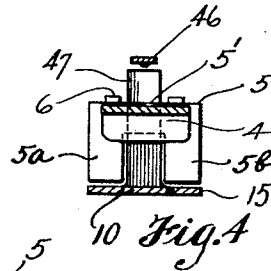
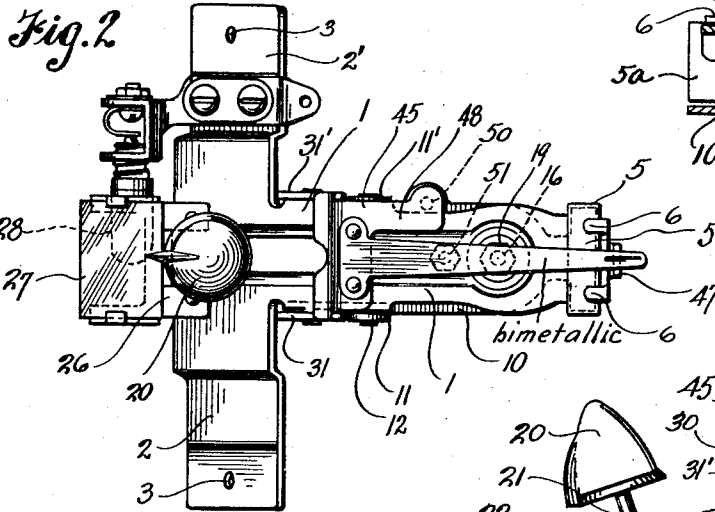
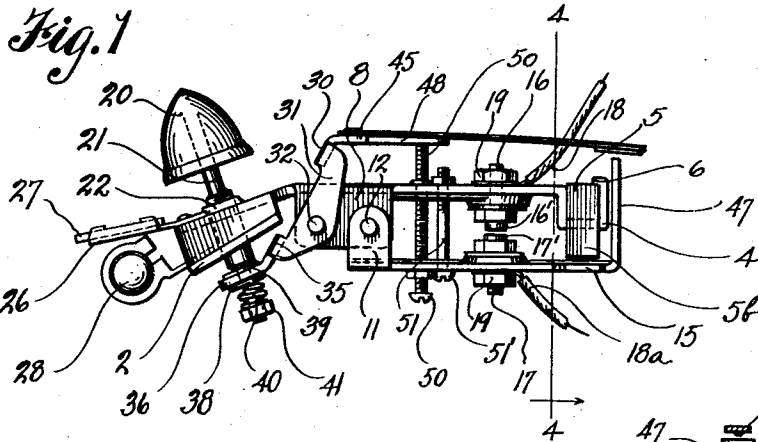
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2,287,787

THERMOSTATIC SWITCH

Filed Sept. 4, 1940

2 Sheets-Sheet 1



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THERMOSTATIC SWITCH

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2 Sheets-Sheet 2

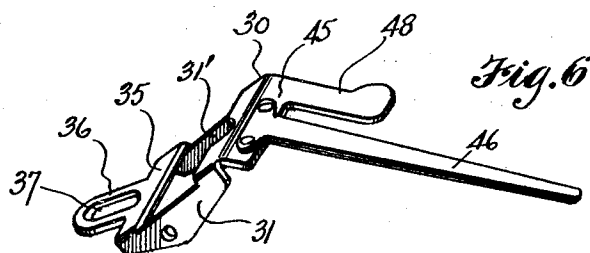


Fig. 6

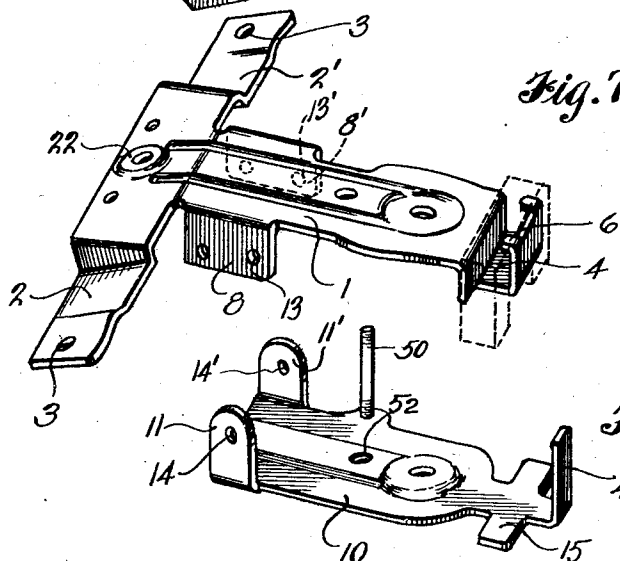


Fig. 7

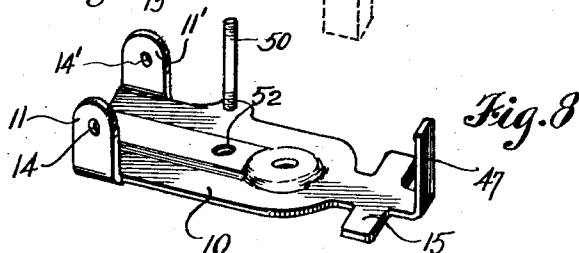


Fig. 8

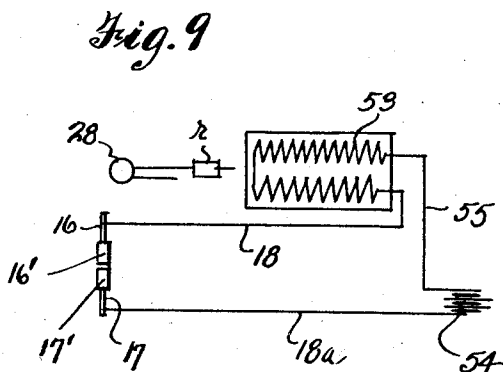


Fig. 9

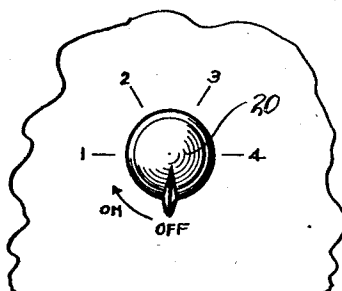


Fig. 10

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2,287,787

THERMOSTATIC SWITCH

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Application September 4, 1940, Serial No. 355,355

5 Claims. (Cl. 200-139)

This invention relates to switches, and has reference more particularly to improvements in circuit control switches of those types especially designed for use with the electric heating circuits of cooking appliances such as waffle irons, toasters, and the like, and which operate to automatically open the circuit after the appliance has been heated to a predetermined degree.

It is the principal object of the present invention to provide an improved type of thermostatic switch, having a single control whereby the switch may be opened and closed, and whereby, upon closing the circuit, a thermostatic element may be set to effect the opening of the circuit at any selected degree of heat within the range provided.

It is a further object of this invention to provide a switch of the above stated character wherein a quick break of the circuit is effected upon reaching the predetermined degree of heat.

Other objects of the invention reside in the adaptation of a magnet in a novel combination of elements for accomplishing the quick breaking of the circuit at a predetermined degree of heat.

Still further objects of the invention reside in the details of construction of parts, in their relationship and mode of operation, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side view of a switch embodying the present invention, showing the switch open.

Fig. 2 is a top or plan view of the same.

Fig. 3 is a bottom, or underside view of the switch.

Fig. 4 is a cross section on line 4-4 in Fig. 1.

Fig. 5 is a sectional detail of the switch setting means.

Fig. 6 is a perspective view of the rocker frame whereby the thermostatic arm is mounted.

Fig. 7 is a perspective view of the main frame of the switch.

Fig. 8 is a perspective view of the movable switch plate.

Fig. 9 is a view, diagrammatically illustrating the switch controlled circuit.

Fig. 10 is a plan view showing the markings on a housing adjacent the switch knob.

Referring more in detail to the drawings—

In its present preferred form of construction, the switch is designed for use in connection with the electrical heating circuit of a waffle and cake

cooking appliance such as that disclosed in my copending application for patent, filed on May 16, 1940, under Serial No. 335,539. For that particular use, the switch comprises a rigid frame plate 1, shown in perspective view in Fig. 7, and which is formed at one end with laterally and oppositely extending arms 2 and 2' whereby the switch is to be fixedly mounted in the housing or frame of the appliance with which it is used. To facilitate the mounting of the switch, the arms 2 and 2' are formed with holes 3 to receive attaching screws or rivets. It is to be understood, however, that the character and design of means for mounting the switch plate would be determined to a great extent by the design or type of device in which the switch is to be used.

At the end of plate 1, opposite that from which the arms 2 and 2' extend, the plate 1 is bent in such manner as to provide a transverse channel portion 4. Seated in this channel is the base or cross bar 5' of a permanent horse shoe magnet 5. The magnet is secured in place by means of ears 6 that extend from the end of the plate 1 and which are turned back over the top of the base bar of the magnet, as shown in Figs. 1 and 2. The two legs of the magnet, designated by numerals 5a and 5b, extend downwardly to an equal extent as noted by reference to Fig. 4.

Formed integrally with the plate 1, at opposite sides thereof and near the lateral arms provided for mounting the switch, are down-turned wings, or flanges 8 and 8', as shown best in Figs. 1 and 7. Disposed longitudinally of and below the plate 1 is a switch plate 10 which, as noted best in Figs. 1 and 8, is formed at one end, at opposite sides, with upturned ears 11 and 11', which overlie the flanges 8 and 8'. A cross-pin 12 extends horizontally through the flanges 8 and 8' and the overlying ears 11 and 11', and thus pivotally attaches the switch plate 10 to the plate 1 in a manner permitting the plate 10 to be oscillated vertically at its outer end. The pin 12, in this instance, extends pivotally through holes 13 and 13' provided in the flanges 8 and 8', see Fig. 8, and has its ends extended through holes 14 and 14' in the ears 11 and 11' and riveted in the latter.

At its outer or oscillating end, the plate 10 is formed with a cross head 15 that directly underlies the magnet and operates as an armature which is attracted by the magnet to draw, or lift, the outer end of the plate 10 upwardly, thus to close the switch controlled circuit, as presently will be explained.

Mounted on the plate 1 is a binding post 16,

and likewise mounted on plate 10 is a binding post 17 with which circuit wires such as shown in Fig. 9 at 18 and 18a, are connected. The posts 16 and 17 are mounted in alinement in their respective plates and have contact heads 16' and 17' at their adjacent ends adapted to be moved into circuit closing contact. The posts also are suitably insulated from their respective plates and are equipped at their outer ends with nuts 19 for the securement of the circuit wires thereto.

The opening and closing of the switch, as well as the setting of the thermostatic arm presently to be described, is under control of a switch knob 20 that is fixed to the upper, or outer end of a shaft 21 that is threaded through a bearing portion 22 located centrally in the mounting end portion of plate 1. The shaft has a pin 23 fixed therein and extending radially therefrom, and thus is adapted to engage with a downwardly directed stop 25 to limit the extent of rotation of the shaft to substantially one turn.

In the present instance, the stop 25 depends from a plate 26 that is fixed to plate 1. Plate 26 serves to mount a small plate 27 of red glass, beneath which an incandescent lamp 28, connected in the circuit, is supported to indicate that the circuit is closed.

Supported pivotally from the plate 1 is a rocker frame 30. This frame, as seen in Fig. 6, has opposite side members 31—31' overlying the opposite side wings 8—8' of plate 1, and pivotally attached thereto by a cross shaft 32 that extends through these parts. The parts 31 and 31' are joined across their lower ends by a cross bar 35, and this bar has a central, rearwardly extending member 36 that is slotted as at 37. Fitted pivotally in the slot 37 is a collar 38 through which the shaft 21 extends and the collar is held yieldingly against a shoulder 39 on the shaft by means of a coiled spring 40 that surrounds the lower end portion of the shaft and bears against a nut 41 on the shaft. Thus, incident to rotation of the shaft 21 by means of the knob 20, the shaft will be shifted lengthwise and this, through the connections described, will cause a rocking action of the frame 30.

Across their upper ends, the side members 31 and 31' of frame 30, are joined by a cross plate 45, and secured to this at one end, and extending forwardly over and along the plate, is an arm or lever 46 of thermostatic metal adapted to warp downwardly at its outer end with the increase of temperature. This lever extends slightly beyond the end of plate 1 and is adapted to coact with an upwardly extending leg or arm 47 at the outer end of plate 10 to control the action of the plate.

There is also provided on the cross plate 45, a forwardly extending arm 48 adapted, on rocking action of the frame 30 under action of the knob 20, to engage with the upper end of a set screw 50 that is adjustably fixed in plate 10, thus to provide a means through which the plate 10 may be actuated downwardly against the pull of the magnet, to disengage the contacts 16' and 17', and thus to manually open the circuit. The downward action of the plate 10 is limited by means of a screw 51 that is adjustably mounted in plate 1 and extends downwardly therefrom through a hole 52 in plate 10 and has a head 51' to be engaged by the plate.

In Fig. 9, wherein the circuit is diagrammatically shown, a heating element is designated at 53 and a source of electricity at 54. Wire 18a leads from the source of current to binding post 17 and wire 18 leads from binding post 16 to the

side of the element, and a circuit wire 55 leads from the other side of the element to the source of current.

The arrangement of the circuit in combination with the switch control parts and the thermostatic arm, as above described, are such that upon turning the knob 20 to "off" position; that is, upon turning it to its limit in a counter-clockwise direction, as noted in Fig. 10, the shaft 21 will, by reason of its threaded connection with plate 1, be shifted upwardly, thereby rocking the frame 30 to such position that the lever arm 48 will engage the upper end of screw 50 and thus actuate the plate 10 downwardly to disengage the two contacts 16' and 17', thus to open the heating circuit.

Upon turning the knob 20 in a clockwise direction, to position for opening the circuit at any designated heat, the initial action disengages the lever arm 48 from screw 50 and permits the upward rocking of the frame 30, and the incident closing of the circuit by reason of the magnet drawing the plate 10 upwardly and thus engaging the contact 17' with the contact 16'. The farther the knob 20 is turned in the clockwise direction, the more will the frame 30 be rocked and the higher will the outer end of the thermostatic arm 46 be lifted above the upper end of the leg 47 of plate 10. Thus, the higher will be the heat required in order that the arm will be warped downwardly into contact with leg 47 to push the plate 10 downwardly for breaking the circuit.

A quick break of the circuit will be effected by reason of the fact that the magnet 5 has a holding effect on the armature portion 15 of plate 10 and power to overcome this magnetic pull must be built up in the thermostatic arm. In building this up, the resilient arm springs and finally when sufficient tension has been produced therein, it breaks the hold of the magnet and the plate 10 is actuated instantly to its downward limit to quickly open the circuit.

The provision of screw 50 as shown, provides for an adjustment in the circuit closing and opening position of the knob 20, and permits it to be used not only for setting the thermostatic arm, but also as a switch control.

In the wiring diagram of Fig. 9, I have shown that the pilot lamp 28 is connected in the circuit through suitable resistance R in such manner that the light is on whenever the circuit is closed. It is to be understood also that this lamp might be so connected as to come on when the predetermined temperature for which the device is set is reached.

Switches of this character are especially useful in waffle irons, and the like, where it is desired to keep the elements at a predetermined degree of heat. The device is extremely sensitive and the life of the contacts is considerably lengthened by reason of the provision for the quick break of the circuit.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. A switch of the character described comprising a main frame, a switch plate pivotally mounted thereon for oscillating action, switch contacts mounted by the frame and plate respectively for connection in the electric circuit that is to be controlled by the switch and adapted to be engaged and disengaged by movement of the said plate to close and open the circuit, a magnet disposed in position to magnetically resist movement of the plate for open-

ing of the closed circuit, a rocker frame pivoted on the main frame, a rigid arm thereon for engaging the switch plate to open the circuit, a thermostatic arm fixed on the rocker frame for engaging the switch plate and adapted to be raised and lowered relative thereto by adjustment of the rocker frame, and a control member for adjusting the rocker frame in one direction for positive opening of the switch and in the other direction to first close the switch and then determine the position of the thermostatic arm for its actuation of the switch frame to open position at a predetermined temperature.

2. A switch of the character described comprising a main frame, a switch plate pivotally mounted thereon for oscillating action, coacting contacts mounted on the frame and plate for connection in an electric circuit and adapted to be engaged and disengaged by oscillating movement of the plate to close and open the circuit, a magnet mounted by the frame, an armature for the magnet formed as a part of the switch plate and adapted to be magnetically attracted for closing the circuit and to resist movement of the plate for opening the circuit, a rocker frame pivotally mounted on the main frame, a control member for rocking the rocker frame, means on the rocker frame for actuating the switch plate to open the circuit when the frame is rocked in one direction, and adapted to release the switch plate when moved in the opposite direction, for closing under the action of the magnet, and a thermostatic lever mounted on the rocker frame and adjustable to different positions thereby and operable to engage the switch plate to move it to disengage the contacts at a predetermined temperature.

3. A switch as recited in claim 2 wherein means is provided for limiting the opening action of the switch plate to retain the armature within the magnetic field.

4. A switch of the character described comprising a main frame member, a switch plate

pivotally attached thereto, coacting contacts on the frame and plate adapted to be connected in the circuit that is to be controlled by the switch and to be engaged and disengaged by movement of the plate to close and open the circuit, a magnet mounted by the frame, an armature for the magnet formed as a part of the switch plate, means for limiting the opening movement of the switch plate to retain the armature within the influence of the magnet, a rocker frame pivoted on the main frame, a switch arm on the rocker frame, a thermostatic lever fixed on the rocker frame for actuation of the switch plate, a switch control means comprising a shaft threaded in the main frame and having operative connection with the rocker frame whereby rotation of the shaft in one direction will tilt the rocker frame to cause said arm thereon to actuate the switch plate to open the circuit, and rotation of the shaft in the other direction will tilt the frame in an opposite direction to allow the closing of the switch, and effect an adjustment of the thermostatic lever for actuation of the switch plate to open the circuit at a predetermined temperature.

5. In a switch of the character described, a stationary member, a movable switch plate, contacts mounted by the said member and plate for connection in an electric circuit and adapted to be engaged and disengaged by movement of the plate, a magnet operable to magnetically urge the plate to circuit closing engagement of the contacts, a thermostatic lever disposed for actuating the switch plate to open the circuit, a movable support for the lever and for positive actuation of the switch plate, and a setting means operable to adjust the support to effect the closing of the switch and for the subsequent positioning of the thermostatic arm whereby it will effect the opening of the switch at a predetermined temperature for which the adjustment is made.

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