July 21, 1936. J. W. MYERS 2,048,614

FLATIRON THERMOSTAT

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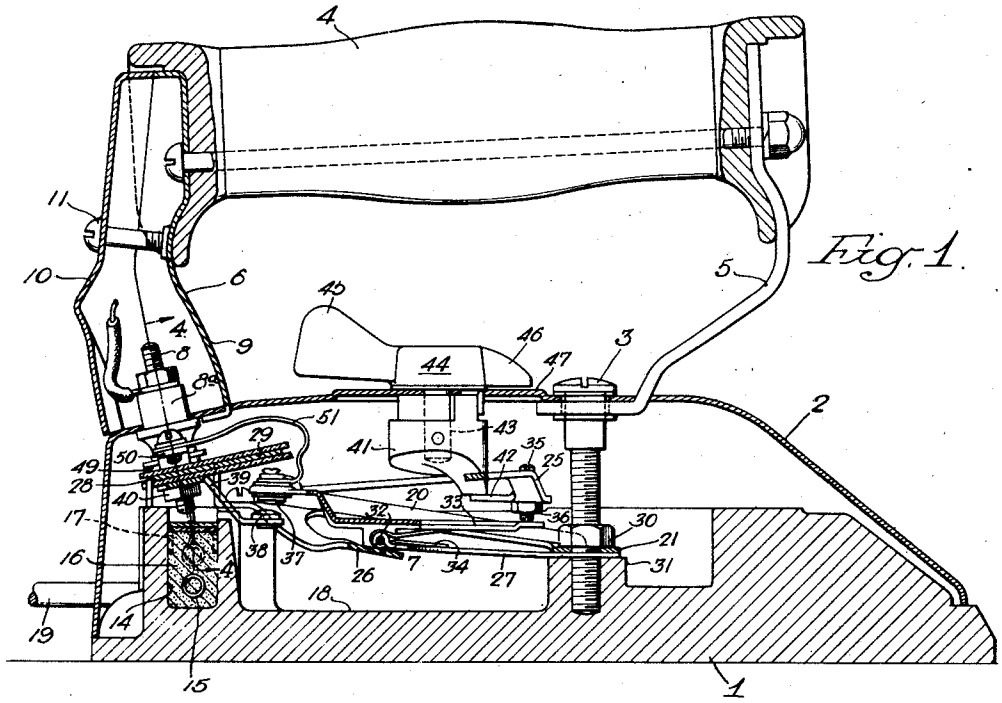

Fig. 1.

Fig. 2.

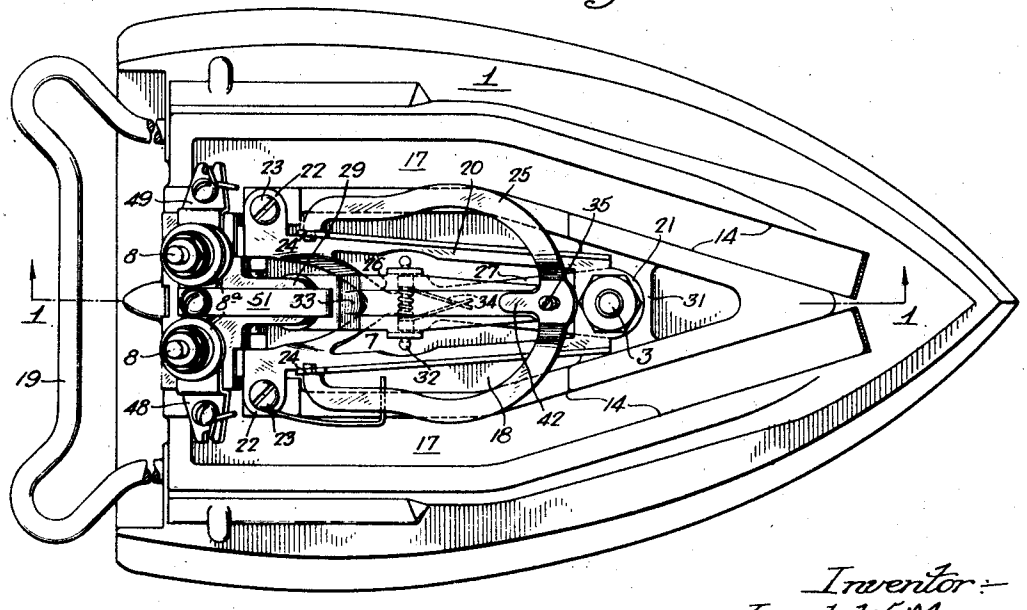

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Fig. 3.

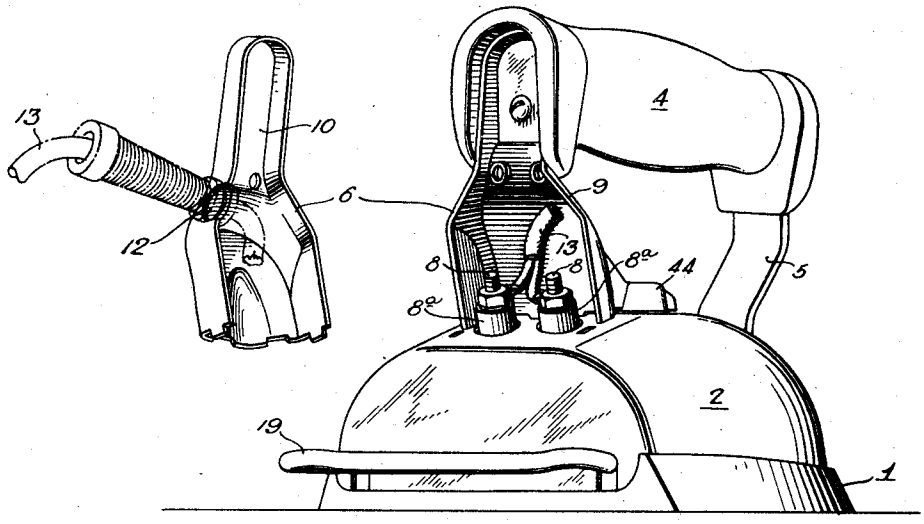

Fig. 4.

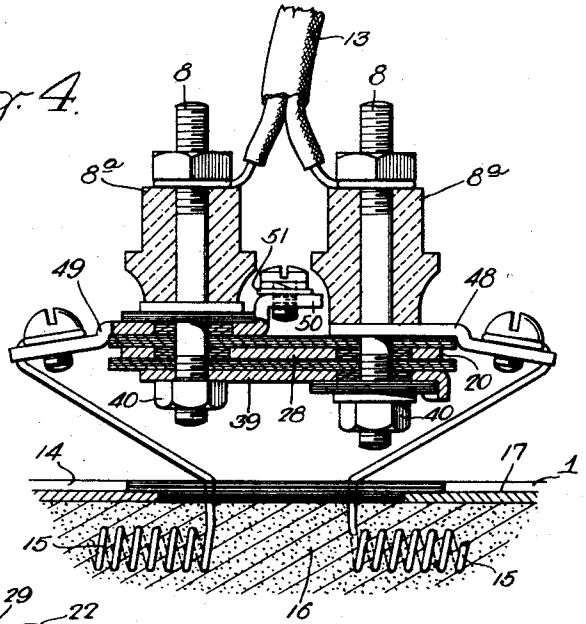

Fig. 5.

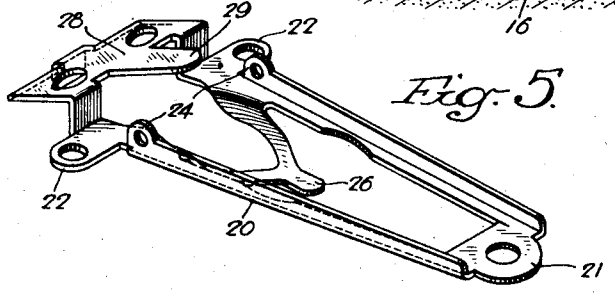

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Fig. 6.

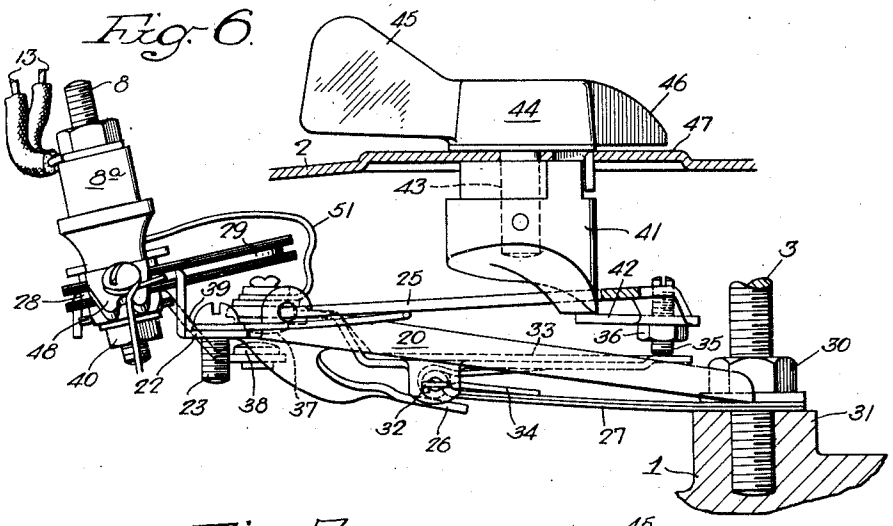


Fig. 7.

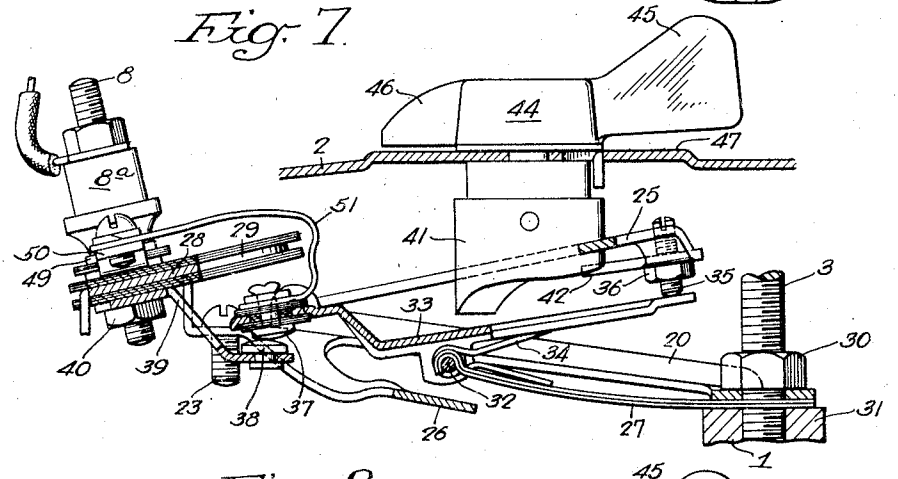
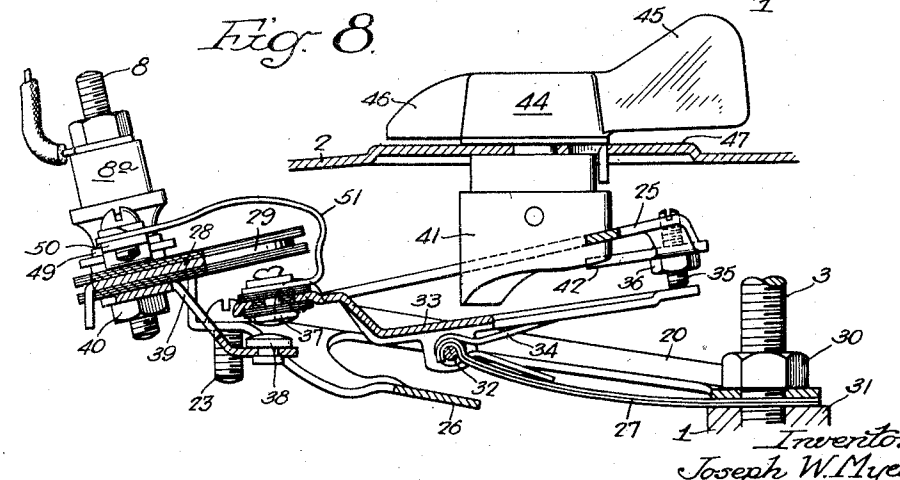


Fig. 8.



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Patented July 21, 1936

2,048,614

UNITED STATES PATENT OFFICE

2,048,614

FLATIRON THERMOSTAT

Joseph W. Myers, Philadelphia, Pa., assignor, by mesne assignments, to Proctor & Schwartz, Inc., Philadelphia, Pa., a corporation of Pennsylvania

Application March 22, 1934, Serial No. 716,873

11 Claims. (Cl. 219—25)

This invention relates to electric flatirons and, more particularly, to thermostatic means for controlling such irons. The invention embodies certain novel features which mutually contribute toward maximum efficiency, simplicity and economy of manufacture.

The salient features of the invention are:—the thermostat responds quickly to the changing temperatures of the sole plate of the iron; the thermostatic switch is constructed as a removable unit which may be removed entirely from the sole plate while still maintaining its integrity; the heat responsive element or bimetallic strip of the thermostat is not stressed to any great degree while the iron is not in use; the bimetallic strip does not carry current; adjustment of the thermostatic switch may be made without heating to the operating point; and the terminal posts for the iron are carried by the thermostat unit and all the electrical connections are rugged and minimized. These features are embodied in the iron in a way which permits of economic and easy manufacture.

The general object of the invention is to incorporate these and other novel features in a flatiron to the end that a generally improved iron will result. In my novel flatiron, the thermostatic switch is mounted as a removable unit in a central recess of the sole plate. The bimetallic strip is relatively short and is secured to the iron at its hottest point and in direct heat-conducting relation to the sole plate. By a short strip, I mean one whose free length is about three times its width at the butt. By the hottest part of the iron, I refer to any point forward of the center of mass of the sole plate, since flatirons are always designed to have the forward part of the iron hotter than the heel. Due to the shortness of the bimetallic strip, the flexing thereof is not very great. The movement is amplified sufficiently for operation of switch contacts by means of a resiliently mounted extension arm carried at the free end of the bimetallic strip. A movable contact carried by the extension arm or lever cooperates with a stationary contact to give the desired circuit making and breaking action. Operation of the switch is effected by an adjustable stop which engages an end of the extension arm, the stop being adjustable from outside the iron.

The above and other features and objects will be more clearly understood by reference to the preferred device illustrated on the accompanying drawings and described in detail hereinafter.

In the drawings:

Fig. 1 is a sectional elevation of the iron taken along line 1—1 of Fig. 2;

Fig. 2 is a plan view of the iron with the handle and cover removed;

Fig. 3 is a perspective view illustrating the terminal construction of the iron;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 1;

Fig. 5 is a perspective view of the supporting frame of the thermostat unit; and

Figs. 6 to 8 are detail views illustrating the thermostatic switch in various positions of operation.

Referring particularly to Figs. 1 to 3 of the drawings, the iron comprises a sole plate 1, a cover 2 secured to the sole plate by screw 3, and a handle 4 secured to the cover by a front leg 5 and a rear hollow leg 6. The cover 2 encloses the thermostatic switch unit designated generally by numeral 7. This unit carries terminal posts 8 having insulating bushings 8a which extend upward through the cover at the rear thereof, as illustrated clearly in Figs. 1 and 3, and project into the hollow leg 6. This leg comprises a part 9 which is permanently attached to the handle and the cover, as illustrated, and a removable part 10 which is secured to part 9 by screws 11. Part 10 is provided with an opening at 12 through which the conductor cord 13 may extend to the terminal posts 8.

The thermostatic switch operates more efficiently when used in conjunction with a heating unit that is embedded in the sole plate and for that reason such an embedded heating unit is preferred, although it is to be understood that the thermostatic switch is not limited to use with any particular heating unit. Preferably, a heating unit such as that disclosed and claimed in my copending application, Serial No. 716,874, filed March 22, 1934, is used, as illustrated in the drawings. The sole plate is provided with a narrow channel or slot 14 which extends along the sides and across the back of the plate, as shown in Figs. 1 and 2. Within this slot, the heating element 15 is supported by means of refractory cement 16. A sheet metal cover 17 closes the slot. It is unnecessary to describe this heating unit in further detail in this application as, in itself, it forms no part of the present invention. It will be seen that the heating unit defines a central area of the sole plate and this area is recessed, as at 18, to seat the thermostatic unit.

As also disclosed and claimed in the said copending application, there is preferably provided

a tilting support 19 in the form of a bent rod having its ends embedded in the sole plate. This support extends from the rear of the iron, as shown in Figs. 1 to 3, and is adapted to tiltably support the iron during periods of non-use, particularly when the iron is heated.

The thermostat unit, which forms the main feature of this invention, comprises a frame 20 which is illustrated clearly in Fig. 5. This frame is adapted to support and carry the essential elements of the thermostatic switch and the terminal posts 8 as well. The frame is provided with a forward apertured ear 21 by which it may be attached to the sole plate by screw 3. A pair of laterally extending ears 22 are provided at the rear portion of the frame for attachment of that portion to the sole plate by screws 23 (see Fig. 2). A pair of upwardly extending apertured ears 24 are also provided on the frame for the pivotal support of a floating U arm 25 to be further described hereinafter. A forwardly extending stop 26 serves as a seat for and to limit the downward movement of the heat responsive bimetallic strip 27 (see Figs. 1 and 6).

The supporting frame is formed at the rear thereof to provide a seat 28 for the terminal posts. A stop 29 extends forwardly from seat 28 and serves to limit the movement of the movable switch contact, as will be more clearly understood hereinafter.

The bimetallic strip 27, which is of relatively short length, as above mentioned, is secured at one end to the sole plate by screw 3 and the lock nut 30, which also secures the forward part of the supporting frame 20. Preferably, the bimetallic strip is spot welded to the supporting frame at 21 to integrally attach the strip to the frame. The sole plate is formed to provide a seat portion 31 for the bimetallic strip at the hottest part of the sole plate, that is, at a point forward of the center of mass of the plate. The free end of strip 27 carries a pivot pin 32 upon which an extension arm or lever 33 is pivotally mounted. A spring 34 is arranged to urge the pivotally mounted arm in counterclockwise direction, as viewed in Figs. 1 and 6 to 8.

The forward end of arm 33 is adapted for engagement with an adjustable stop screw 35 carried by the floating U arm 25. A lock nut 36 is provided to fix the position of screw 35. The essential purpose of having screw 35 adjustable is to enable the making of factory adjustments and to compensate for any variations in the uniformity of the parts. The other end of arm 33 carries a switch contact 37 which is adapted to cooperate with a stationary contact 38 carried by bracket 39 which, in turn, is secured to the supporting frame 20 by the lower nuts 40 of the binding posts. It will now be seen that when the bimetallic strip 27 flexes upward in response to increase in heat of the sole plate, the extension arm 33 is also carried upward but the switch contacts are maintained in engagement by the action of spring 34. When, however, the free end of arm 33 engages stop 35, the arm is rocked about its pivot against the action of spring 34 and the switch contacts are opened. Thus the position of stop 35 determines the time of opening of the switch contacts.

To enable adjustment of the thermostatic switch from outside the iron, there is provided a cam 41 which engages an extension 42 formed on the floating U arm 25. The operating face of the cam is adapted to position stop 35 at various positions depending upon the rotary position of the cam. The U arm 25 swings about its pivot point under the influence of the cam as will be apparent. The cam is carried by a rotatable shaft or pin 43 which extends through cover 2 and to which there is attached a rotatable operating knob 44. The knob is preferably provided with an actuating handle 45 and an indicator portion 46 which moves over suitable indicia or legends inscribed or marked on the raised face portion 47 of the cover. For example, the proper position of the knob for setting the thermostatic switch for best operation while ironing various materials, such as silk, wool, cotton, linen, etc., may be indicated on face 47. It will be noted that the cam may be designed to effect opening of the switch contacts when stop 35 is moved to the lowermost position, in which case, the device will function as a manually controlled switch in addition to its function as an adjustable heat responsive switch.

Figs. 6 to 8 show clearly the the operation of the thermostatic switch. In Fig. 6, the cam is shown in a position such that stop 35 is in its lowermost position and it will be seen that the lever arm 33 has been moved to open the switch contacts. The heat responsive strip 27 is in its lowermost position and the device has been operated as a manually operated switch. In Fig. 7, the cam has been adjusted for a certain thermostatic action of the device and strip 27 has flexed upward to a point where arm 33 has just engaged stop 35 and further movement of strip 27 will cause opening of the switch contacts. In Fig. 8, the strip 27 has flexed further, causing opening of the contacts. It will be seen that the pivoted U arm 25 serves as a variable length idler link between the lever arm 33 and cam 41. During movement of the lever arm 33, while it is in engagement with stop 35, there is a slight sliding movement of the stop over the surface of arm 33. In other words, the arrangement corresponds somewhat to a lost-motion connection between arm 33 and the cam, the U arm 25 serving as the connecting link. Moreover, since adjustment of cam 41 causes arm 25 to rock about its fixed pivot point, the cam slides over extension 42 giving varying effective lengths of arm 25 for different adjustments of the cam.

Considering now the structural mounting of the terminal posts 8 and the circuit connections of the device and referring particularly to Fig. 4, the right-hand lead-in conductor shown in Fig. 4 is connected to the right-hand terminal post at the top thereof and is electrically connected through the post to a connector arm 48, which, in turn, is connected to one terminal of the heating unit, as clearly shown. Insulating spacers, which may be formed of mica or other suitable material, serve to insulate the post from the other metallic elements. The other terminal of the heating unit is connected to a connector 49 which is insulated from the left-hand terminal post and from all other metallic elements and has a raised extension 50 to which a flexible conductor element 51 is attached (see Figs. 7 and 8). This element may consist simply of a strip of silver foil. As shown clearly in Figs. 1 and 6 to 8, the strip 51 passes forwardly around the stop 29 and is connected to the movable switch contact 37. Stop 29 is covered on both sides with insulating sheets to prevent contact with strip 51. The stationary contact 38 is electrically connected to its conductive supporting bracket 39 which, in turn, is electrically connected to the left-hand terminal post shown in Fig. 4. The other lead-in conductor is connected to the top of that post. It will be seen that the circuit ar-

rangement is a simple series circuit including the heating unit and the thermostatic switch so that the switch controls the operation of the heating unit.

From the foregoing description, it will be apparent that the device embodies the various novel features previously mentioned and the advantages incident thereto. The novel construction of the thermostatic switch gives very efficient operation, particularly when it is arranged with the bimetallic strip in thermal conducting relation with the hottest part of the sole plate and when it is used in conjunction with an embedded heating unit, as illustrated. The construction of the thermostat unit also makes it possible to remove entirely everything but the heating unit by simply removing the cover and then removing the screws 23. It will be noted that there are only three screws holding the parts together and one of these serves to hold the cover in place. The entire thermostat unit is integral and may be removed bodily for any purpose.

Although the preferred form of the device has been illustrated and described, it will be understood that various modifications are possible without departing from the invention as defined by the appended claims.

I claim:

1. In a flatiron, a recessed sole plate, an electrical heating unit embedded in the sole plate, a supporting frame having attachment portions, seating portions on said sole plate for seating said attachment portions when said frame is disposed in the recess of the sole plate, a heat-responsive element seated on one of said seating portions and held in thermal conducting relation therewith by the corresponding attachment portion of said frame, and electric switch means carried by said frame and operable by said heat-responsive element to control said heating unit.

2. In a flatiron, an electrical heating unit, a heat-responsive element mounted in thermal transfer relation with a heated part of the iron, an arm movably mounted on said element, an electrical contact carried by said arm, a stationary electrical contact in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, and means comprising a stop arranged in cooperative relation with said arm for moving said arm in a direction to open said contacts when said element responds to a certain degree of heating.

3. In a flatiron, an electrical heating unit, a heat-responsive element mounted in thermal transfer relation with a heated part of the iron, an arm movably mounted on said element, an electrical contact carried by said arm, a stationary electrical contact in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, and means operable from outside the iron for moving said arm in a direction to open said contacts.

4. In a flatiron, an electrical heating unit, a removable unit comprising a supporting member adapted for attachment to the iron, a heat-responsive element attachable to the iron in cooperative relation with said member, an arm movably mounted on said element, an electrical contact carried by said arm, a stationary electrical contact carried by said member in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, and a stop carried by said member in cooperative relation with said arm so as to move said arm relative to said element in a direction to open said contacts when said element responds to a certain degree of heating.

5. In a flatiron, an electrical heating unit, a removable unit comprising a supporting member adapted for attachment to the iron, a heat-responsive element attachable to the iron in cooperative relation with said member, an arm movably mounted on said element, an electrical contact carried by said arm, a stationary electrical contact carried by said member in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, an adjustable stop carried by said member in cooperative relation with said arm so as to move said arm relative to said element in a direction to open said contacts when said element responds to a certain degree of heating, and means for adjusting said stop from outside the iron.

6. In a flatiron, a sole plate, an electrical heating unit embedded in the sole plate, a short heat-responsive element having one end thereof mounted in thermal conducting relation with the sole plate at a point forward of the center of mass of the sole plate, the other end of said element being free for flexing movement, means for amplifying the movement of said element comprising an extension arm resiliently mounted on the free end of said element for movement relative thereto, an electrical contact carried by the extension arm, a stationary electrical contact arranged in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, and means for effecting movement of said extension arm relative to said element in a direction to open said contacts when said element has reached a predetermined point in its flexing movement.

7. In a flatiron, a sole plate, an electrical heating unit therefor, a heat-responsive element mounted in thermal conducting relation with the sole plate and having a portion free for flexing movement, an extension lever resiliently mounted on the free portion of said element for movement relative thereto, an electrical contact carried by the extension lever, a stationary electrical contact arranged in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, and an adjustable stop engageable by said lever to effect movement thereof relative to said element in a direction to open said contacts when said element has reached a predetermined point in its flexing movement.

8. In a flatiron, a sole plate, an electrical heating unit therefor, a heat-responsive element mounted in thermal conducting relation with the sole plate and having a portion free for flexing movement, an extension lever resiliently mounted on the free portion of said element for movement relative thereto, an electrical contact carried by the extension lever, a stationary electrical contact arranged in cooperative relation with said first contact, said contacts being connected in the electrical circuit of said heating unit. an adjustable stop engageable by said lever to effect movement thereof relative to said element in a direction to open said contacts when said element has reached a predetermined point in its flexing movement, and means for adjusting said stop from outside the iron.

9. In a flatiron, a sole plate, an electrical heating unit therefor, a heat-responsive element mounted in thermal conducting relation with the sole plate and having a portion free for flexing

movement, an extension lever resiliently mounted on the free portion of said element for movement relative thereto, an electrical contact carried by the extension lever, a stationary electrical contact arranged in cooperative relation with said first contact, said contacts being connected in the electrical circuit of said heating unit, an adjustable stop engageable by said lever to effect movement thereof relative to said element in a direction to open said contacts when said element has reached a predetermined point in its flexing movement, and means including an adjustable cam for adjusting said stop from outside the iron.

10. In a flatiron, a sole plate, an electrical heating unit therefor, a heat-responsive element mounted in thermal conducting relation with the sole plate and having a portion free for flexing movement, an extension lever resiliently mounted on the free portion of said element for movement relative thereto, an electrical contact carried by the extension lever, a stationary electrical contact arranged in cooperative relation with said first contact, said contacts being connected in the electrical circuit of said heating unit, an adjustable stop engageable by said lever to effect movement thereof relative to said element in a direction to open said contacts when said element has reached a predetermined point in its flexing movement, and means including a variable length idler link for adjusting said stop from outside the iron.

11. In a flatiron, an electrical heating unit, a heat-responsive element mounted in thermal transfer relation with a heated part of the iron, an arm movably mounted on said element, an electrical contact carried by said arm, a stationary electrical contact in cooperative relation with said first contact, said contacts being connected in the electric circuit of said heating unit, means urging said arm in a direction to maintain engagement of said contacts as said element moves in response to heat, and means comprising a stop arranged in cooperative relation with said arm for moving said arm in a direction to open said contacts when said element responds to a certain degree of heating.

JOSEPH W. MYERS.