

1,143,572.

Patented June 15, 1915.

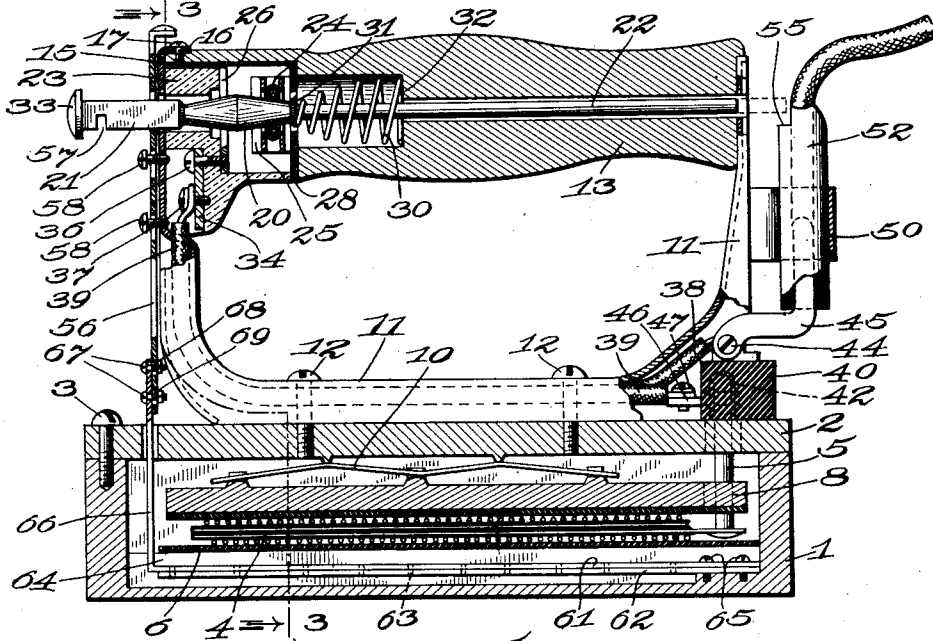


Fig. 1.

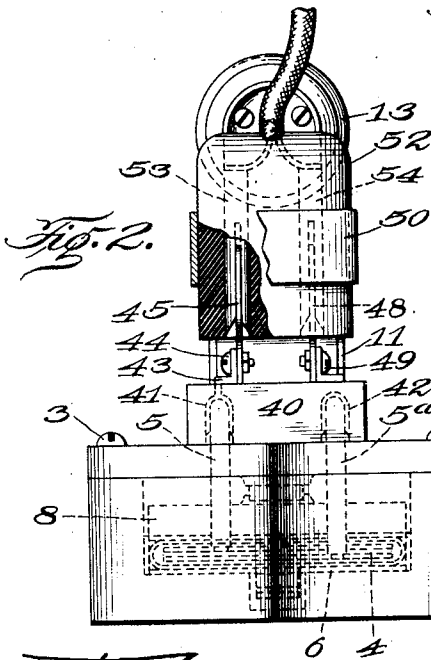


Fig. 2.

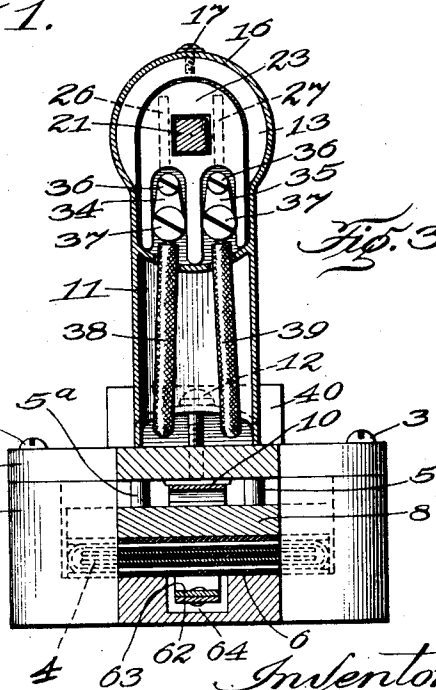


Fig. 3.

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UNITED STATES PATENT OFFICE.

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ELECTRIC HEATER.

1,143,572.

Specification of Letters Patent. Patented June 15, 1915.

Application filed August 31, 1910. Serial No. 579,845.

To all whom it may concern:

Be it known that I, HARRY W. DENHARD, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electric Heaters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in electrically heated devices and more particularly to circuit controlling means therefor.

One object of my invention is to provide means for automatically disconnecting the device from circuit when the temperature of said device or a part thereof has attained a predetermined maximum.

Various other objects and advantages of my invention will be hereinafter clearly and fully set forth.

My invention is applicable to various kinds of electrically heated devices and is particularly applicable to electrically heated flat irons.

According to the preferred form of my invention, I provide on the device a circuit controlling switch, as distinguished from the connection plug, for making and breaking the circuit of the device, and provide in conjunction therewith a thermostatic device responsive at a predetermined temperature to cause the control switch to break circuit. Also, I prefer to provide a mechanical interlock between the control switch and the connection plug, necessitating operation of the control switch to disconnect the device from circuit prior to the detachment of the connection plug.

In order to more fully disclose the nature and characteristic features of my invention, I shall describe the device illustrated in the accompanying drawing, a flat iron being chosen for the purpose of illustration. It should be understood, however, that my invention is not limited to the particular structure illustrated, but is susceptible of various modifications and applicable to various other kinds of devices.

In the accompanying drawings, Figure 1 is a longitudinal sectional view through the iron. Fig. 2 is a rear elevation of Fig. 1, certain parts being shown in section, and Fig. 3 is a front section on line 3—3 Fig. 1,

Briefly described the general structure of the iron is as follows: The body portion is formed in two sections, 1 and 2. The section 1 is hollow and forms the bottom and sides, while the section 2 forms the top. The sections are illustrated as being secured together by screws 3. Within the body portion is arranged a resistance unit 4 having terminal lugs 5 and 5* projecting upwardly through the section 2. The resistance unit is arranged to rest upon one or more layers of insulating material 6, preferably comprising sheets of mica, which insulate the same from the bottom of section 1. Upon the resistance unit is placed a weighted metallic plate 8, one or more layers of insulating material being interposed between said plate and said unit. The resistance unit 4 and the plate 8 are pressed toward the bottom of the iron by a resilient strip bent in a zigzag manner and interposed between said plate 8 and the top section 2 of the iron.

The parts above mentioned have only been briefly described herein, inasmuch as the specific structure thereof is not essential to my present invention and because they have been fully and clearly described in previously issued United States Letters Patent, granted me.

The handle and handle frame may be of any preferred construction. As illustrated, the handle frame 11 is formed of sheet metal and secured to the body portion by screws 12. The handle frame 11 is preferably curved in cross section for strengthening purposes and also for concealing certain electrical conductors, as will be hereinafter described. The handle 13 is supported by the extremities of the frame 11. As will be hereinafter seen, the forward end of the handle contains a switch mechanism, which renders it impractical to secure the supporting frame to the end face thereof. Accordingly, I prefer to provide the forward end of the supporting frame 11 with an enlarged portion 15, substantially covering the forward end face of the handle, and to provide the portion 15 with a flange or lug 16 adapted to be secured to the handle by screws 17. It should be understood, however, that the handle may be secured to a supporting frame in any preferred manner.

The control switch which I have provided

is mounted directly in the handle 13 and is operable from the forward end thereof. In practice, the control switch might assume various different forms. As illustrated, this switch comprises a double inclined operative member 20 preferably circular in cross section throughout its entire length and having extensions 21 and 22 for slidably supporting the same. The extension 22 is arranged to work in a longitudinally extending opening in the handle 13 and for a purpose hereinafter described, the extension 22 is preferably of such length as to protrude from the end of the handle when the member 20 is operated. The extension 21 is arranged to slide longitudinally in a bearing block 23 of insulating material, said block being secured in place in any preferred manner. Surrounding the member 20 and arranged to move longitudinally thereof, is a circular expansible member 24 preferably formed of a helical spring having its ends secured together. The spring 24 is arranged within a suitable contact member 25 also adapted to move longitudinally of the member 20. The contact 25 cooperates with stationary contacts 26 and 27 which may conveniently be attached to the portion 23. At the rear of the contact 24 is provided a stop plate 28. Briefly described the operation of the switch is as follows: When the member 20 is pressed to the right the spring 24 is expanded until the crest of the operating member is forced through the same, whereupon the spring will rapidly move down the oppositely inclined surface of the member 20 and thereby move the contact 25 into engagement with the contacts 26 and 27 to electrically connect the same. Upon the movement of the member 20 in the opposite direction, the contact 25 will be held in engagement with the contacts 26 and 27 until the crest of the member 20 again passes through the spring 24, whereby the spring will have been expanded. Then the spring will contract and quickly move down the oppositely inclined portion of the member 20, thereby quickly moving the contact 25 out of engagement with contacts 26 and 27. For a purpose hereinafter set forth, I prefer to bias the member 20 in a direction to move the contact 25 out of engagement with contacts 26 and 27. A convenient means for accomplishing this, comprises a spiral spring 30 surrounding the extension 22 and interposed between a flange 31 on the member 20 and a shoulder 32 provided within the handle 13. For facilitating the operation of the switch, I have provided a suitable push button 33 on the end of the extension 21 of the member 20. Set in suitable recesses provided in the insulating block 23 are terminal plates 34 and 35 electrically connected to contacts 26 and 27 respectively by screws 36. Each of these terminal plates is pro-

vided with a binding screw 37. To the binding screw of terminal plate 34 is connected a conductor 38 and to the binding screw of the plate 35 is connected a conductor 39. The conductors 38 and 39 extend from the terminal plates to the rear end of the body portion of the iron, said conductors being inclosed within the sheet metal support 11 for the handle 13. The extremities of the conductors 38 and 39 are adapted to be connected to parts of the connection plug, which I shall now describe.

The terminal lugs of the resistance element of the iron project into an insulating block 40, which may be secured to the plate 2 of the iron in a suitable manner. Within the insulating block 40, (as best illustrated in Fig. 2) are conducting sleeves 41 and 42 arranged to surround and make electrical contact with the terminal lugs 5 and 5^a respectively of the resistance element. The sleeve 41 is provided with an extension 43 projecting through the top of the insulating block 40 and having secured thereto as by means of a screw 44 a lug 45. The sleeve 42 has an extension 46, best illustrated in Fig. 1, which projects through the front of the block 40 and carries a binding post 47. Suitably secured to the top of the block 40 and arranged parallel to the lug 45 is another lug 48 having a binding screw 49. It will thus be seen that the lug 45 is electrically connected to the terminal lug 5 of the resistance unit and thus in effect forms an extension thereof, while the lug 48 is electrically independent of the terminal lug 5^a of the resistance unit. The conductor 39, however, is electrically connected by binding screw 47 to the extension of sleeve 42, contacting with terminal lug 5^a of the resistance unit, while conductor 38 is connected by binding screw 49 to the lug 48. Hence, when the control switch is operated to electrically connect contacts 26 and 27, the lug 48 will be electrically connected to the terminal lug 5^a of the resistance unit. On the other hand, when the control switch is opened the circuit will be broken between the lug 48 and the terminal lug 5^a. The lugs 45 and 48 are substantially L-shaped, the perpendicular portions thereof projecting into a suitable casing 50 secured to the rear end of the handle frame 11 in any suitable manner. The casing 50 is adapted to receive a suitable plug 52 having therein suitable contact clips 53 and 54 arranged to engage and make electrical contact with the lugs 45 and 48 respectively. The contact clips 53 and 54 of the plug 52 are electrically connected to the supply wires. Accordingly, when the plug 52 is inserted in place and the control switch closed, current will flow from one of the supply wires to the contact clip 54, lug 48, conductor 38, through the control switch by conductor 39

to terminal 5^a of the resistance unit, thence through said unit to terminal lugs 5 thereof, thence to lug 45 and contact clip 53 of the plug 52 to the other supply wire. Circuit through the resistance unit may thus be controlled at will by operation of the control switch located in the handle of the iron.

It is well recognized that a quick make and break of an electrical circuit is always preferable. The control switch, which I have provided, insures such a make and break of the circuit, while a very slow make and break would result upon the insertion and withdraw of the connection plug 52. I, therefore, desire to provide an interlock between the connection plug 52 and the control switch, which will prevent insertion or withdrawal of the connection plug, except when the control switch is in open position. This will insure the circuit being always made and broken by the control switch. Various means might be provided for accomplishing this result. The means which I have illustrated comprises the extension 22 on the operating member of the control switch. As previously set forth when the operating member is moved to close the control switch, the extension 22 is caused to project from the rear end of the handle. I have, therefore, provided on the connection plug 52 a shoulder 55, into the path of which the extension 22 is adapted to project as illustrated in dotted line, Fig. 1, when the control switch is closed. The plug 52 can only be inserted and withdrawn by a vertical movement thereof and hence so long as the extension 22 remains in the dotted line position, it prevents withdrawal of the plug 52. Likewise, it prevents insertion of the plug 52, if an attempt is made to insert the plug while the control switch is closed.

The control switch as previously described is biased to open position. For holding the control switch in closed position, I have provided a sliding plate 56 adapted to enter a notch 57 in the operating member of said switch. This plate may be conveniently attached to the portion 15 of the handle frame 11 by screws 58 passing through slots in said plate, said slots permitting the desired longitudinal movement of said plate. The plate 56 is preferably provided with an extension projecting slightly above the top of the handle 13 to facilitate movement of said plate to release the switch at will. The plate 56 is connected to the thermostatic device which I shall now describe.

While in practice, the thermostatic device may be of any preferred construction, I have illustrated the same as merely comprising two metallic strips 61 and 62 having different expansion characteristics. Of course, various materials may be used in practice. Very satisfactory results can be

obtained by forming one strip of brass and the other of steel. These strips are preferably secured together by rivets 63 at numerous points throughout their length. The inner face of the base of the iron is preferably provided with a longitudinal recess 64 for accommodating the strips 61 and 62 to relieve the same from all pressure of the resistance unit and to permit freedom of movement of the strips under the influence of heat. In practice, I prefer to secure the extremities of the strips to the iron adjacent to its rear end as by screws 65 and to so superimpose one strip upon the other that upon predetermined rise in heat the free ends thereof will be drawn downwardly. One of the strips 61 or 62 is provided with an extension 66 projecting upwardly through the top of the iron and secured as by means of screws or bolts 67 to the end of the plate 56. Thus, when the thermostatic strips are effected by heat, they will move the plate 56. Accordingly, if the strips are so arranged as to buckle downwardly when the heat of the iron rises to a predetermined degree, they will draw the plate 56 downwardly, thereby releasing the control switch which will then move to open the circuit through the iron.

I desire to so design the thermostatic device that under normal temperature conditions, it will exert a sufficient upward pressure on the plate 56 to retain said plate in the notch 57 and thus insure retention of the control switch in closed position. In practice, the thermostatic device may be arranged in different locations. In electric irons, however, I deem it preferable to locate the same as illustrated, inasmuch as it will be subjected directly to the heat of the working face of the iron. In other words, it is the temperature of the working face of the iron that it is desired to regulate and the thermostat will naturally function with the greatest efficiency when located contiguous to the working face as illustrated.

In actual use it may be desired to vary the maximum temperature of the iron and accordingly, I desire to make the thermostatic device adjustable to meet the different requirements. The desired adjustment may be secured in various ways. With the particular thermostatic device illustrated, the desired adjustment can readily be obtained by providing slots 68 and 69 in the extension 66 of the thermostatic device through which the screws or bolts 67 extend. With such an arrangement it will be seen that the plate 56 may be adjusted relatively to the thermostatic device, thereby varying the distance which the plate projects into the notch 57 under normal temperature conditions. Thus the thermostatic device could be made to withdraw the plate 56 from the notch 57 upon different predetermined movements

thereof. For instance, if it be desired to cause the release of the control switch upon a slight rise in temperature of the iron, then the plate should be adjusted relatively to the thermostatic device so that it will only project a slight distance into the notch 57 under normal temperature conditions. On the other hand, if it be desired to allow the temperature of the iron to rise to a higher degree, the plate 56 should be adjusted to project farther into the notch 57 under normal temperature conditions.

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

1. The combination with an electrically heated device having a handle, of a control switch for said device biased in a direction to disconnect the same from circuit, said switch having means for retaining the same in circuit-closing position and having an operating member and a tripping member adjacent to said handle.

2. In combination, an electric iron, a quick acting control switch arranged within the handle thereof and operable at will and thermostatic means having its temperature responsive portion in proximity to the working face of the iron for controlling said switch.

3. In combination, an electrically heated iron provided with connection terminals, a quick acting control switch therefor mechanically independent of said connection terminals and a thermostatic device arranged within said iron and responsive to the thermic conditions of the working face thereof, said thermostatic device controlling said switch to automatically disconnect said iron from circuit under predetermined thermic conditions.

4. In combination, an electric iron, a thermostatic device arranged within said iron in close proximity to the working face thereof, and an inherently quick make and break switch controlled by said thermostatic device to disconnect the iron from circuit under predetermined thermic conditions, said thermostatic device comprising an elongated member formed of strips of different materials secured together at a plurality of points, said member extending substantially the entire length of the working face of the iron.

5. In combination, an electrically heated iron, a detachable connection plug carried thereby, a quick acting control switch operable at will to make and break the circuit of said iron, and means necessitating operation of said switch to disconnect said iron from circuit prior to the removal of said connection plug.

6. In combination, an electrically heated iron, a detachable connection plug carried thereby, a switch carried by said iron for controlling the circuit therethrough, and a mechanical interlock between said switch and said connection plug for preventing detachment of the latter until said switch has been operated to open the circuit of said iron.

7. In combination, an electrically heated iron, a detachable connection plug carried thereby, a switch carried by the handle of said iron for controlling the circuit thereof, and a mechanical interlock between said switch and said connection plug for preventing detachment of the latter until said switch has been operated to disconnect the iron from circuit.

8. An electrical heating device having a handle, a switch in said handle for controlling the circuit of said device and temperature responsive means for controlling the operation of the switch.

9. An electric heating device having a handle, a switch in said handle normally biased in one direction, temperature responsive means normally adapted to restrain said switch against the biasing means and operable to release said switch under predetermined temperature conditions.

10. An electric heating device having a switch normally biased to open position, means for holding said switch in closed position, a thermostatic device for controlling said means to release said switch, a connector plug and means whereby the plug can be removed only when the switch is open.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

HARRY W. DENHARD.

Witnesses:

FRANK H. HUBBARD,
GEORGE HAYNES.