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PLUG FOR ELECTRIC CONNECTIONS

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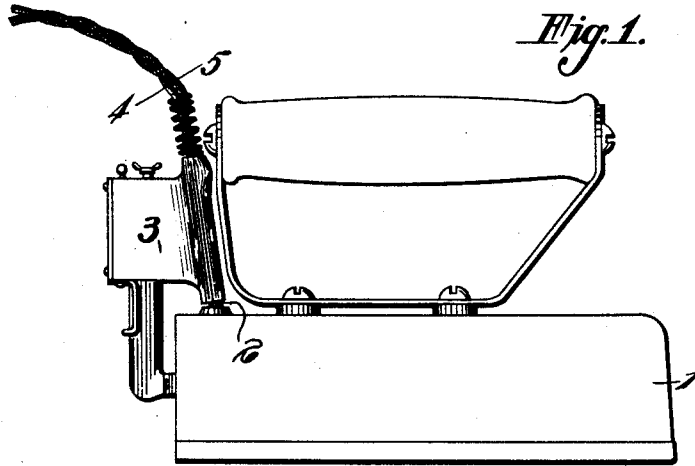


Fig. 1.

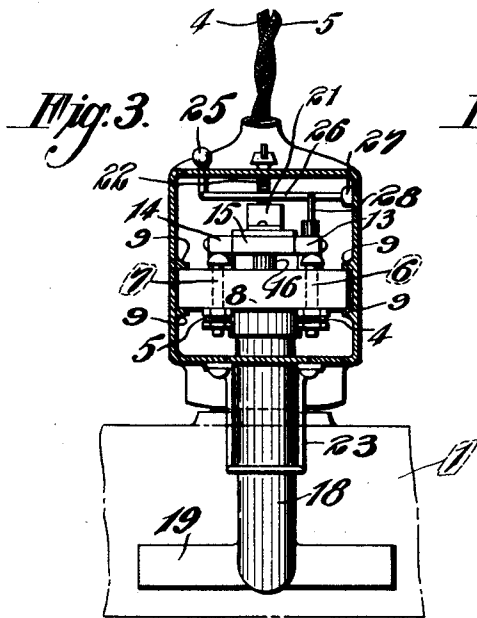


Fig. 3.

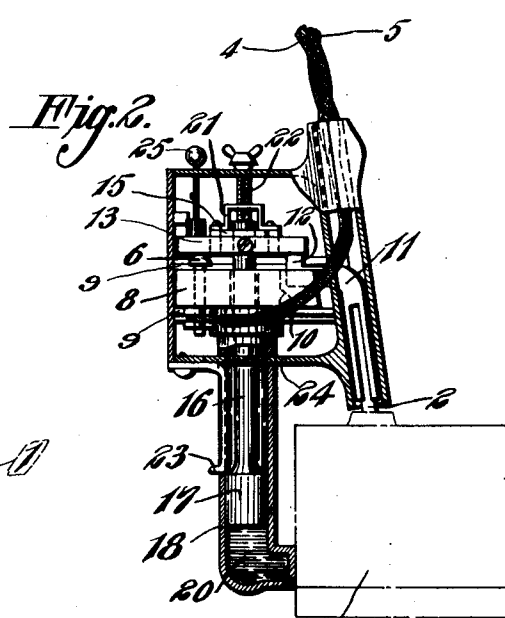


Fig. 2.

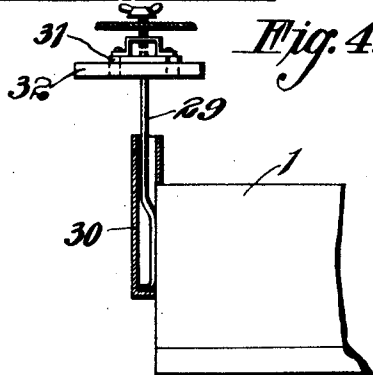


Fig. 4.

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PLUG FOR ELECTRIC CONNECTIONS.

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Our invention relates to connections for electrical apparatus, and is especially adapted for heating appliances in domestic use, such as electric irons, toasters, water heaters, etc., and consists in a thermostatically controlled connection plug.

The object of our invention is to provide a plug containing a switch operated by variations in the temperature of a member attached to and forming a part of the plug, which variations may result from an intentional or an accidental heating or overheating of the appliance which receives its power through the plug.

We are aware that various appliances have been manufactured which include automatic thermostatic regulation, but our invention contemplates the production of a plug which is adapted to be used with an appliance which does not contain a thermostatic device of the kind referred to.

In the accompanying drawings, which illustrate a selected embodiment of our invention, we have shown the same as applied to the plug of an electric iron of ordinary type, and in these drawings,—

Figure 1 is a side elevation of such an iron with the plug connected thereto.

Figure 2 is a longitudinal section through the plug, the adjacent portion of the iron being indicated in dot and dash lines.

Figure 3 is a transverse section and elevation of the plug.

Figure 4 illustrates a modified construction of the thermostatic element of our improved plug.

The iron 1 indicated in Figure 2 is provided with the usual posts 2 extending upwardly from its rear portion. The plug 3, by means of which the iron is connected to the current switch, is adapted to fit over posts 2 as the ordinary plug does, but the wires 4 and 5 leading from the current switch do not connect directly to the post engaging portions of the plug but lead to the lower ends of switch terminals 6 and 7, respectively. Terminals 6 and 7 are secured to a block 8 slidably mounted between lugs 9 formed on the inner wall of the plug casing and having recesses 10 at its forward end to receive the rearwardly projecting portions of post-engaging contact elements 11. The upper surface of terminals 6 and terminal portions 12 of elements 11

are all the same height and are adapted to support bars 13 and 14 of a movable switch member.

These bars are attached to opposite sides of a non-conductive strip 15 which is mounted upon the stem 16 of a piston 17 extending outwardly from the lower wall of the plug casing and into a tube 18.

Tube 18 is secured to block 8 and extends towards the lower portion of the iron and is provided with an enlargement 19 at its lower portion adapted to provide a substantial area in contact with the heated portion of the iron. The enlargement 19 is filled with a thermoactive material 20, such as mercury, which extends partially up tube 18 and supports piston 17.

It will be noted that the current flows through wire 4, terminal 6, bar 13, one of the elements 11, one of the posts 2, and the heating element of the iron; and the return is through the other post 2 of the iron, the other element 11, bar 14, terminal 7, and wire 5. Obviously, the presence of heat sufficient to expand the mercury in enlargement 19 and tube 18 will cause the mercury to raise piston 17, stem 16, strip 15, and bars 13 and 14, thus opening the circuit until such time as the level of the mercury falls and contact between bars 13 and 14 and terminals 6 and 7 is restored.

The mounting of strip 15 upon stem 16 is through a U-shaped bracket 21, and a screw 22 threaded into the bracket with its lower end resting upon the upper end of stem 16. By rotating the nut on the end of screw 22 the distance from the bottom of the bars 13 and 14 to the bottom of the piston 17 may be varied and the temperature at which the switch will be opened will be changed accordingly.

Assuming the iron to be cold with the parts positioned as shown in Figures 2 and 3, any expansion of mercury 20 will break the contact, but if screw 22 be rotated to the left so as to raise its point above stem 16, then, obviously, the mercury would expand an appreciable amount before piston 17 raised high enough for its stem to engage screw 22 and lift bracket 21, strip 15 and bars 13 and 14.

A spring 23 is secured to the lower portion of plug 3 and bears against tube 18 so as to thrust the latter towards the front

of the plug. This tends to maintain contact between the enlargement 19 and the rear wall of the iron. It also provides for a reasonable adjustment of the device for different irons in which the posts 2 may be at different distances from the rear wall of the iron. The lower wall of plug 3 is slotted at 24 to accommodate such adjusting movement of tube 18.

We prefer to provide an indicator for the plug so that the user of the iron, or other apparatus, may determine at a glance whether the current is on or off. A simple form of indicator is shown as consisting of a ball 25 mounted on the outer end of a lever 26 fulcrumed to the side wall of the plug at 27 and adapted to be raised by bar 13 through a weighted connection 28 which is heavy enough to pull the lever and indicating ball down when the bar drops. When the indicating ball is near the top of the plug, it will be apparent that the switch is closed. When the ball is raised a substantial distance above the top of the plug, the user will understand that the switch is open. Instructions to this effect, as well as instructions as to the operation of the nut on screw 22 to obtain a higher or lower temperature setting for the iron may be stamped on the switch housing.

In the modification shown in Figure 4, the thermostatic member consists of a rod 29 of any material having a comparatively high coefficient of expansion. The lower end of rod 29 rests upon the lower wall of tube 30 having a comparatively low coefficient of expansion and mounted upon a block corresponding to block 8 of Figures 2 and 3. The upper end of rod 29 supports a strip 31 having bars 32 corresponding to bars 13 and 14 of Figures 2 and 3. Other arrangements of the thermostatic element of the plug may be made according to the apparatus to which they are to be attached.

By the use of a plug comprising our invention, the scorching of clothes or other articles ironed may be avoided and by eliminating unnecessarily high temperatures a substantial saving in current consumed is effected.

As is well known, heating devices are the most expensive of domestic electrical appliances to operate, and a device such as shown which tends to reduce the cost of using such devices will be welcomed.

Although we have shown our device as applied to an electric iron, it will be understood that the plug may be used for similar devices by adjusting the mercury tube or rod 29 or their equivalents, to contact with a heated portion of the article. Our plug is not only adapted for regulating the temperature of heating devices but for controlling the running of any current operated device. For instance, the thermostatic member of the plug may be in contact with the bearing or bearings of any piece of machinery driven by

an electric motor which is connected to the supply line through a plug containing the other elements shown in our drawings and referred to in this specification. If the bearing should be overheated, long before burning out of the bearing would take place the plug switch would operate to shut off the motor. Similarly the thermostatic portion of the plug could be arranged in contact with a resistance element adapted to be heated by an overload on the motor and, by breaking the circuit, avoid serious damage to the motor. Changes in the relative positions of the plug-contacting elements and the heat-receiving chamber may be made as are required, and various other modifications in the details of our invention may be made without departing from the spirit thereof as expressed in the appended claims.

We claim:

1. In a connection plug for electrical apparatus, a switch including spaced contacts, and a movable rigid bar connecting them, an extension on said plug adapted to contact with a portion of the apparatus subject to being heated, and thermo-responsive means in said extension connected to said bar so as to positively move the latter if said material is heated to a predetermined degree.
2. In a connection plug for electrical heating apparatus, a switch including spaced contacts and a movable rigid bar connecting them, a thermostatic extension on said plug adapted to contact with a heated portion of the apparatus and connected to said bar so as to positively move the latter when heated to a predetermined degree.
3. In a connection plug for electrical apparatus, a switch, a member adjustably mounted on the plug body so as to be moved into contact with a surface of the apparatus to which the plug is attached, and a thermostatic substance in said member, the expansion and contraction of which operates said switch.
4. In a connection plug for electrical heating apparatus, a sliding block, a member carried by said block and adapted to be moved towards and away from an apparatus to which the plug is attached, switch poles on said block, a thermostatic element carried by said member and a pole connecting bar mounted on said thermostatic element.
5. In a connection plug for electric heating apparatus, a switch including spaced poles, a sliding block, means yieldingly thrusting said block in a direction parallel to the faces of said poles, a member carried by said block and including a thermostatic element adapted to be heated by the apparatus to which the plug is attached, and a switch pole connecting bar mounted on said thermostatic element.
6. In a connection plug for electrical heating apparatus, a housing formed on the

plug, a switch in said housing, including terminals and a terminal connecting element, a tube having a chamber adapted to present a substantial apparatus engaging surface and being rigidly connected to a terminal of said switch, a plunger slidably mounted in said tube and rigidly connected to the terminal connecting element, and a thermoactive fluid in said chamber which supports said plunger.

7. In a connection plug for electrical apparatus, a switch, a thermostatic member mounted on said plug with one end operably connected to a movable element of said switch and its other end extending exteriorly of the plug and movable independently of operation of said switch into various positions to contact with a surface of the apparatus to which the plug is attached.

8. In an electrical connection plug, a housing formed on the plug, a thermostatic switch in said housing, means for adjusting said switch to cause it to open or close automatically at different temperatures, an element on the exterior of said housing for indicating the functioning of said switch, said element being unaffected by the adjustment of said switch.

9. In a connection plug for electrical apparatus, a switch, a thermostatic device adapted when heated to open said switch and having a portion projecting from the plug adapted to be moved to different positions to contact with a surface of an apparatus to which the plug is attached, such movement being made independently of operation of said switch.

10. In a connection plug for electrical apparatus, a switch including a terminal connecting bar, thermostatic means for moving said bar to open the switch, a fulcrumed lever, a connection between said lever and said bar near the lever fulcrum, and an indicator on said lever at such distance therefrom that slight movement of said bar pro-

duces a substantial movement of said indicator.

11. In a connection plug for electrical apparatus, a housing, a switch including terminals movable relative to each other and a terminal connecting bar and thermostatic means for operating said bar adapted to contact with a surface of the apparatus to which the plug is attached and shiftable with one of said terminals to accommodate variations in such apparatus surface.

12. In a connection plug for electrical apparatus, a switch including terminals and a terminal connecting bar, a tube containing a thermostatic fluid and projecting from the plug so as to contact with a surface of the article to which the plug is attached, a piston in said tube positioned by said fluid, and a connection between said piston and said bar whereby expansion or contraction of said fluid opens or closes said switch.

13. In a connection plug for electrically heated apparatus, a switch, a thermostatic element carried by the plug and connected to said switch and adapted to contact with a heated surface of said apparatus and operating when heated and cooled to open and close said switch respectively, and electric wiring leading to and from respective portions of said switch independently of said element.

14. In a connection plug for electrical apparatus, a switch and a thermostatic element both carried by the plug, said element being operably connected to said switch and adapted to contact with a surface of an electrically operated apparatus to which the plug is attached, and electric wiring to and from respective portions of said switch and plug independent of said element.

In testimony whereof we hereunto affix our signatures this 22nd day of September, 1922.

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