March 15, 1932. P. DE LANGIE ET AL 1,849,481

CONTROL MECHANISM

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Fig. 1.

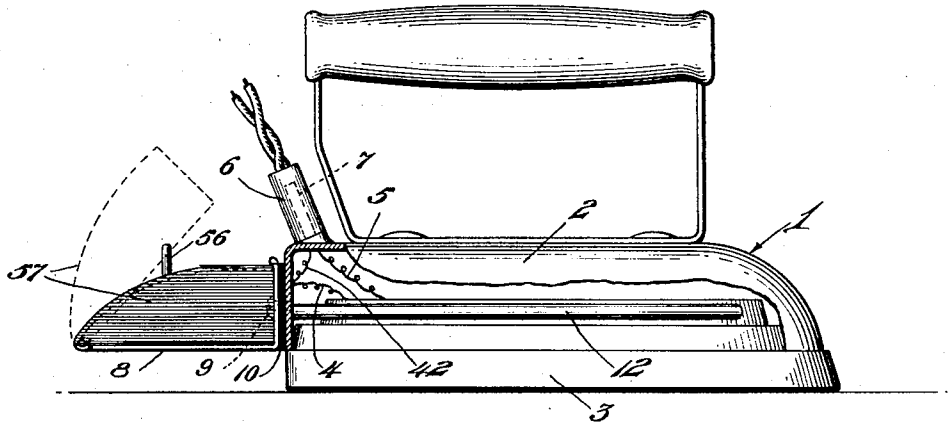


Fig. 2.

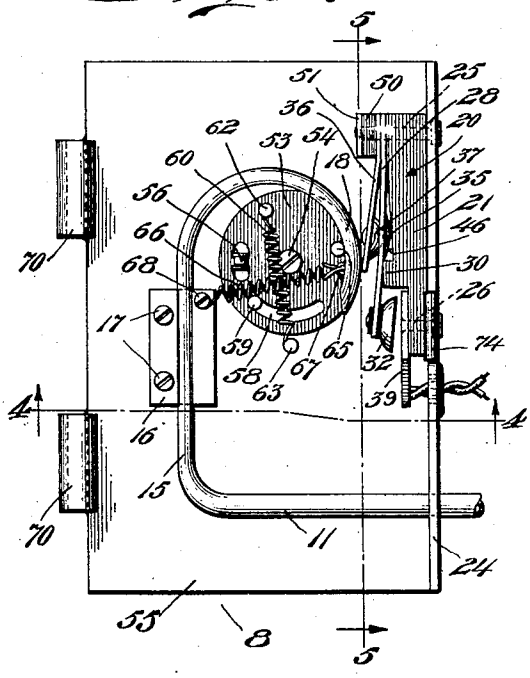
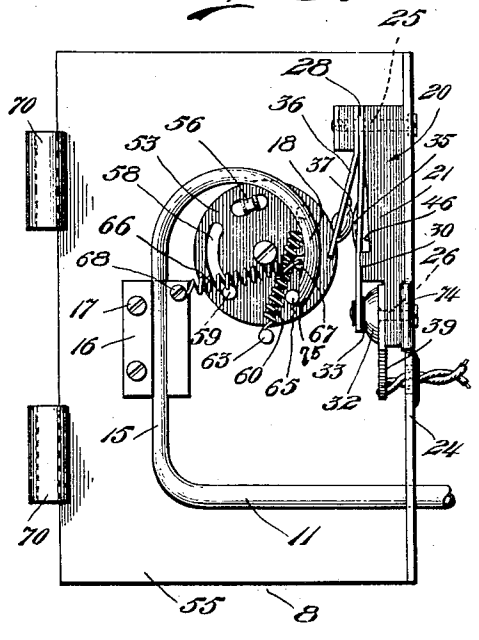


Fig. 3.



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Fig. 4.

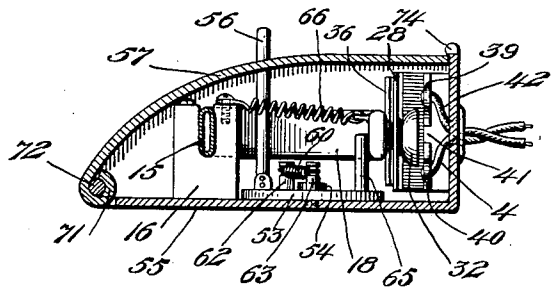


Fig. 5.

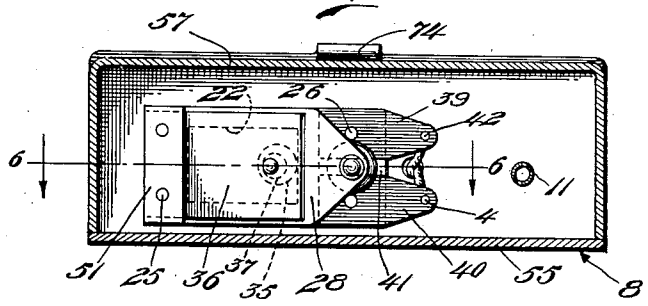
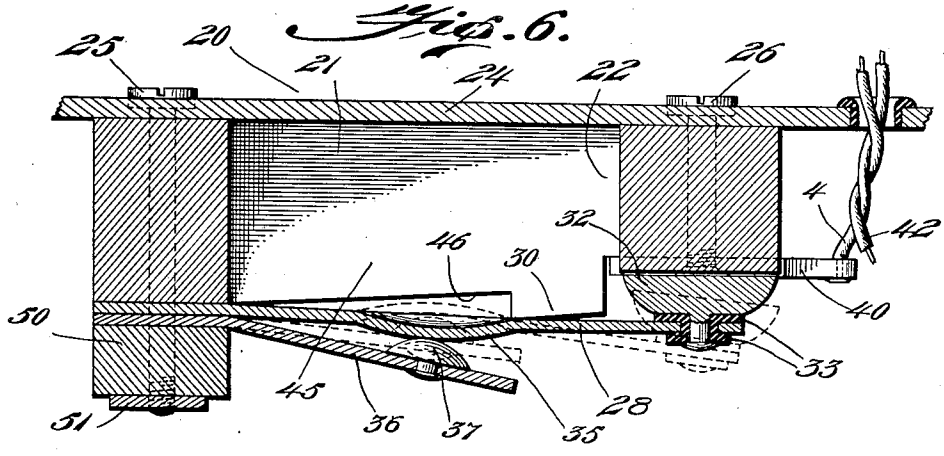


Fig. 6.



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1,849,481

UNITED STATES PATENT OFFICE

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CONTROL MECHANISM

Application filed May 1, 1926. Serial No. 106,035.

This invention relates to an improved control mechanism for electrically heated devices and more particularly devices of the character wherein the electric circuit is automatically broken when the temperature reaches a predetermined point.

One object of the present invention is to provide a device of this character which is capable of operating automatically to break the electric circuit when the temperature reaches such a point as to render further heating inadvisable, as well as manual means for breaking the circuit when desired.

Another object of the invention is to provide a quick action means for making or breaking the circuit to prevent arcing of the current across the terminals.

A further object of the invention is to provide a quick action means for making or breaking the circuit and a heat responsive means adapted to operate the said means whereby the circuit breaking means will be operated to prevent excessive heating.

Other objects and advantages of the invention relate to certain improved details of construction and methods of operation as will be more fully set forth in the following detailed description to which reference is made for a more specific exposition of the advantages of the invention.

Referring to the drawings:

Fig. 1 is a side elevational view of a conventional form of sad-iron, a portion of which is broken away to show the position of a thermostatic member located adjacent to the heating element, and illustrating the position of our improved structure relative to said iron.

Fig. 2 is a top plan view of the operating parts of the control mechanism, the parts being shown in position for breaking the electric circuit.

Fig. 3 is a view similar to Fig. 2 with the parts shown in the position which they occupy when the electric circuit is closed.

Fig. 4 is a vertical sectional view of the control mechanism, taken along the line 4—4 of Fig. 2.

Fig. 5 is a vertical sectional view showing a portion of the control mechanism, taken along the line 5—5 of Fig. 2, and,

Fig. 6 is a detail sectional view of a portion of the mechanism, taken along the line 6—6 of Fig. 5.

In the accompanying drawings we have illustrated our invention in connection with a sad-iron of more or less conventional type although the improved structure is capable of use in connection with sterilizers, hair curling devices, and electrically heated devices generally.

The improved structure which we have described herein may be incorporated in the electrically heated device as forming an integral part thereof, or may be provided in the form of an attachment capable of ready application to certain conventional forms of electrically heated devices now in common use. As illustrated in Fig. 1 of the drawings the structure is shown as an attachment capable of application to a conventional type of sad-iron with only minor changes therein, such as, the arrangements of the electric circuits, etc.

Referring to the drawings; the sad-iron is designated by the numeral 1, and is provided with the usual outer casing 2 within which is located the base 3 and a conventional heating coil (not shown) to which is connected the wires 4 and 5 for making an electric circuit through the coil. The cord plug 6 is of the usual construction, and is connected to the terminals 7 in the usual manner.

A separate housing 8 is secured to the rear of the iron 1 by means of screws or other suitable fastening devices 9 and a layer of asbestos or other suitable heat insulating material 10 may be interposed between the iron 1 and the housing 8 to prevent excessive heat being transmitted to the mechanism in the housing.

A hollow tube 11 provided with closed ends and containing a small amount of expansible fluid capable of expanding and contracting with increase or decrease of temperature, is positioned within the housing and provided with an end portion 12 which extends from the housing 8 into the casing 2 and is posi-

tioned therein adjacent the heating element or coil and base 3 of the iron where it will be quickly affected by changes of temperature in the heating coil. The end portion of the hollow tube which extends within the iron is substantially circular in cross section but the opposite end thereof is preferably flattened to give the same an oval cross section from about the point indicated by the numeral 15.

The closed hollow tube 11 is firmly secured in a supporting block 16 which is in turn attached to the housing by screws or similar fastening devices 17, thus firmly anchoring the hollow tube so that the end 18 of the tube will be free to move uninfluenced by the position of the end 12 thereof. The end 18 of the closed tube is curved as shown in Figs. 2 and 3, and as the ends thereof are closed the curved end 18 move into the position in Fig. 2 as the fluid in the tube expands under the influence of increased temperature or move into the position shown in Fig. 3 as the fluid in the tube contracts by reason of a decrease in temperature. In this way the curved end 18 of the tube will move into engagement with the switch mechanism 20 or out of engagement therewith as the heat of the iron increases or diminishes. The extent of movement of the curved end 18 of the tube and its responsiveness to greater or less variations in temperature may be varied and controlled by varying the size of the parts and the quantity and character of the expansible fluid.

The switch mechanism designated generally by the numeral 20, comprises a base 21, internally recessed as at 22, and which may be formed of fibre, vulcanite or other insulating material, the base being secured to the vertical wall 24 of the housing by rivets 25, 26 or any other suitable and desired fastening means. A switch plate 28 is firmly secured at one end to the base 21 by the rivets 25 and extends forwardly over the recess 22 and a bearing 30 formed upon the base, the forward end portion of said plate carrying a contact member 32 which is entirely insulated therefrom by insulating material 33. The switch plate 28 is provided intermediate its ends and directly above the recess 22 with a rounded depression or concavo-convex portion 35, the convex side of which normally extends upwardly or on the opposite side of the switch from the base 21. A thin flexible metal plate 36 is positioned above the switch plate 28 and is provided upon the face adjacent to the switch plate with a button 37 which is located directly opposite to the concavo-convex portion 35 of the switch plate and is normally in contact therewith. A pair of contact plates 39 and 40 are secured to the base 21 by the rivets 26, these contacts being spaced from each other and having a portion 41 of the base located therebetween to prevent the contacts from moving relative to each other. The contact 40 has the wire 4 connected thereto, and the wire 42 is connected with the contact 39 and one of the contacts 7 of the iron. In this way one of the contacts 7 of the iron is connected directly with the heating coil and the other contact 7 is connected through the contact plates 39 and 40 and the contact point 32 when the parts are in the position shown in Fig. 3. The switch plate 28 is made of thin spring metal and the concavo-convex portion 35 is adapted to reverse itself by a quick movement in response to pressure upon the convex face thereof whereby it assumes the position shown in Fig. 2, and the contact point 32 is lifted by a quick movement to break the circuit through the contact plates 39 and 40. When the pressure upon the convex face of the concavo-convex portion 35 of the switch plate is released the switch plate immediately snaps back into the position shown in Fig. 3 thus closing the circuit by a quick movement of the contact point 32. The quick movement of the contact member 32 in opening and closing the circuits prevents arcing during the opening and closing of the switch. The base 21 has the central portion thereof cut away to form a central recess 22 as is most clearly shown in Figs. 5 and 6, and the sides 45 of the base are each cut away slightly to provide a slight forwardly extending incline 46 which terminates just short of the bearing 30. By this construction the concavo-convex portion of the switch plate 28 is located over the recess 22 so that the recess 22 and the cut away portions of the sides 45 permit the switch plate 28 to bend downwardly slightly as the concavo-convex portion thereof is reversed by pressure exerted thereon, and the bearing 30 serves as a fulcrum for the switch plate in raising the contact member 32. The positions of the switch plate 28, metal plate 36 and contact member 32 when the contact is in position to close the circuit are shown in full lines in Fig. 6, and the positions of these parts when the circuit is open are shown in dotted lines on that figure. As illustrated herein, a block 50 is positioned above the plates 28 and 36, and the screws 25 pass through the plates and block and are threaded into a plate 51 to hold the parts securely in position. From the above it will be seen that the spring switch plate 28 is provided with a pressure responsive portion and is inherently movable or capable of distortion upon the exertion of pressure on the pressure responsive portion to move the contact 32 quickly out of engagement with the contact plates 39 and 40.

A disk 53 is rotatably supported by a pivot screw 54 on the base 55 of the housing 8 and carries a vertical arm 56 which normally extends upwardly through the cover 57 of the

housing where it may be grasped by the operator for rotating the disk 53. The disk 53 is also provided with an arcuate slot 58, and a pin 59 secured to the base 55 of the housing projects within the slot 58 to limit rotation of the disk 53 in either of two directions. A coiled spring 60 is secured at one end to the disk 53 as at 62 and the opposite end of said spring is attached to a stud 63 carried by the base 55, the spring being so arranged that it is located upon opposite sides of the pivot 54 when the disk is rotated to its limit, as determined by the pin and slot connection, in opposite directions.

The coiled spring 60 thus tends to retain the disk 53 in either of its extreme positions of movement, and prevent its movement from either of such positions until the disk is rotated manually through actuation by means of the arm 56. The disk 53 carries a pin 65 projecting upwardly therefrom a sufficient distance to engage the curved end 18 of the hollow tube 11. A second coiled spring 66 has one end thereof attached to the curved end of the closed hollow tube as at 67 while the opposite end thereof is secured to the block 16 by an anchoring screw or similar means 68. The coiled spring 66 serves to supplement the tendency of the curved end 18 of the closed hollow tube to return to the position shown in Fig. 3 when the temperature of the iron falls below a predetermined point. The base 55 of the housing is provided with hinge members 70 cooperating with similar hinge members 71 carried by the cover 57 and a pintle 72 to pivotally secure the cover to the base in such a manner that it may be raised when desired to give access to the mechanism enclosed in the housing. The front edge of the cover is adapted to engage beneath a suitable clip 74 to retain the cover in closed position, or if desired, the cover may be provided with suitable screws or other means for releasably securing the same to the housing and thereby render the interior of the housing less readily accessible by the usual operative while permitting the same to be opened for the purpose of making repairs.

The extreme end of the closed hollow tube 11 is beveled as at 75 to enable the pin 65 to slide readily thereover when the disk 53 is manually operated to break the circuit.

The curved end portion 18 of the closed hollow tube 11 which is free to move in response to variations in temperature possesses a certain amount of resiliency, and the resilient character of the curved end 18 is supplemented in its tendency to return to its normal position by the coiled spring 66. The resiliency of the temperature responsive portion of the closed tube acts in conjunction with the resilient character of the switch member or plate 28 to insure a quick and automatic return of the switch plate into position to close the circuit after actuation of the switch plate by the movable portion of the closed tube to break the circuit.

In the operation of one improved control mechanism the curved end 18 of the closed hollow tube moves outwardly from the position shown in Fig. 3 to the position shown in Fig. 2 as the temperature of the iron and heating coil rises, and when the heat of the iron reaches a predetermined point the curved end 18 engages the plate 36 and forces the button 37 against the convex face of the concavo-convex portion 35 of the plate 28 with sufficient force to cause the concavo-convex portion to move into the dotted line position shown in Fig. 6 whereby the contact point 32 is raised by a quick movement to open the circuit. As the temperature of the iron decreases after breaking the circuit the iron cools and the curved end 18 tends to resume its original position as shown in Fig. 3. When the temperature has fallen a sufficient amount to require additional heating the curved end 18 releases the plate 36 to permit the concavo-convex section of the plate 28 to return to its original position which it does by a quick movement thus reengaging the contact 32 with the plates 39 and 40 to again complete the circuit through the heating coil, when the operation may be repeated as long as the iron is in use and accidental overheating entirely avoided.

If it is found desirable to turn off the current from the iron without removing the plug 6 and when the temperature is below the point where the circuit is broken automatically, this may be accomplished by manually operating the arm 56 to rotate the disk 53 from the position shown in Fig. 3 to the position shown in Fig. 2 when the pin 65 will slide over the beveled tip of the curved end 18 of the hollow closed elongated member and thus force the curved end outwardly against the plate 36 and cause the contact 32 to assume the position shown in Fig. 2 by a quick movement and thus break the circuit. In this way both manual and automatic means are provided for breaking the circuit, and after the circuit has been broken by manual operation of the disk, the arm 56 may be returned to its original position by the operator and the curved end 18 of the tube released whereby the switch is permitted to close the circuit provided that the temperature of the iron has fallen below the point at which the automatic means is effective to break the circuit.

While we have illustrated certain specific means for supporting and actuating the switch, and a certain form of thermostat for controlling the operation of the same, these elements are capable of wide variations in arrangement, and well known equivalents may be substituted for the particular elements shown without departing from the spirit and scope of our invention, when

broadly construed in connection with the appended claims.

What we claim is:

1. In a control mechanism for an electrically heated device, the combination of a hollow tubular member having a portion thereof firmly held against movement and an end portion free to move in response to variations in temperature, resilient means tending to return the movable portion of said member to its initial position after movement due to increase in temperature, a switch member provided with a distortable portion and having a movable contact portion, and means for exerting pressure upon the distortable portion of said switch member upon movement of the free portion of said tubular member to effect quick movement of said contact portion and break an electric circuit.

2. In a control mechanism for an electrically heated device, the combination of a heat responsive member having a resilient portion free to move in response to variations in temperature, a snap switch having a distortable portion actuatable upon movement of the free portion of said heat responsive member to break an electric circuit, resilient means for returning the freely movable portion of the heat responsive member to its normal position, and manually operable means for moving the free portion of said heat responsive member and said snap switch into position to break the electric circuit.

3. In a control mechanism for an electrically heated device, the combination with an elongated heat responsive member having one end portion thereof held against movement and the opposite end portion free to move in response to variations in temperature, of a snap switch having one end portion thereof fixed and the remaining portion of said switch free to move and provided with a sensitive area located intermediate its ends and adapted upon the application of pressure thereto to effect quick movement of the free end portion of said switch member in a direction opposite to the direction of the applied pressure, and means for applying pressure to the sensitive area of said switch member upon movement of the free end portion of said heat responsive member in response to an increase in temperature.

In testimony whereof we have affixed our signatures.

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GODFREY A. DE LANGIE.