May 22, 1934. H. E. RUBENS 1,959,387

CIRCUIT CONTROLLER

Filed July 23, 1926

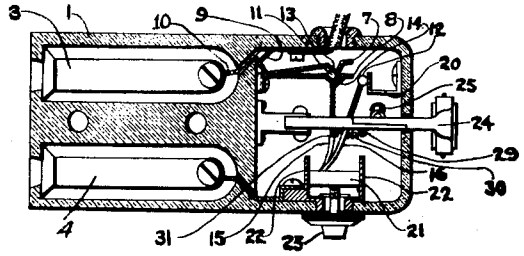


Fig. 1.

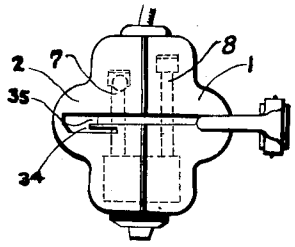


Fig. 3.



Fig. 4.

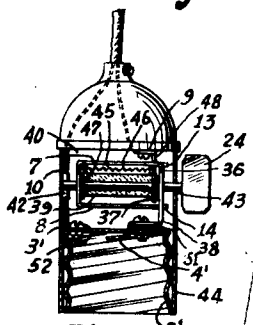


Fig. 5.

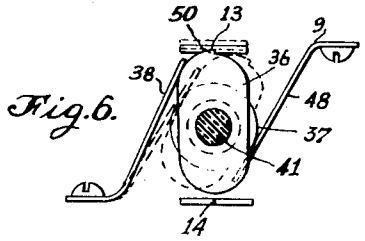


Fig. 6.

Fig. 2.

Witness:
Anto. Frank

Inventor:
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Patented May 22, 1934

1,959,387

UNITED STATES PATENT OFFICE

1,959,387

CIRCUIT CONTROLLER

Harry Ernest Rubens, Chicago, Ill.

Application July 23, 1926, Serial No. 124,406

21 Claims. (Cl. 200—122)

My invention relates to improvements in current-controllers and more particularly to that class of thermostatic-controllers used in connection with electrically heated devices, and has for one of its objects, to provide a relatively simple and inexpensive current-limiting and circuit-interrupting means for an electrically heated iron.

Other objects of my invention are, to provide a device of the above indicated character which will occupy a relatively small space and may be mounted in a similar type of terminal plug characteristic of most heating devices; to provide means for automatically interrupting the circuit after a predetermined period; to provide means for manually resetting the switch in an operative condition immediately after a circuit interruption; to provide a thermostatic switch capable of responding immediately after a circuit interruption, to provide means for varying the periods of current consumption; to provide means where the device is in continuous use, for automatically reducing the effective periods of the thermostats.

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

According to the preferred form of my invention, I provide a circuit-controlling switch as distinguished from a connection plug for making and breaking the circuit of the heater, and provide in conjunction therewith a thermostatic device responsive at the completion of a predetermined period to cause the control switch to interrupt the circuit. Also I prefer to provide a manually operated interlock to make and if necessary to break the circuit.

In order to more fully disclose the nature and the novel features of my invention, I shall describe the device illustrated in the accompanying drawing, an 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 is applicable to various other kinds of devices.

In the accompanying drawing, Figure 1 is a sectional plan view of the device revealing terminal clamps ordinarily used in iron plugs. Figure 2 is a longitudinal sectional view thru the plug, part of the body portion removed to show the mechanical features, the plug itself located at the rear of an iron shown in an upright position. Figure 3 is a rear elevation, certain parts being dotted in. Figure 4 is a perspective view of a modified form of a thermostatic bar. Figure 5 indicates a circuit-interrupting means inclosed in a casing similar to the ordinary electric light socket. Figure 6 is a sectional view of the circuit-interrupting means shown in Figure 5.

Briefly described the general structure of the circuit controller is as follows: The body portion is formed in two sections, 1 and 2. The sections composed of suitable insulating material are moulded so as to permit the insertion of the iron terminals into the clamps 3 and 4 and at the opposite end is the chamber containing the circuit-interrupting means. The sections are illustrated as being held together by the bolts 5 and 6. Within the body portion is a plurality of thermostatic elements 7 and 8 arranged in parallel and electrically connected to one of the supply wires 9. These bars are each composed of two dissimilar metals having different expansion characteristics so arranged that an application of heat will cause them to move away from the switch contacts 11 and 12. These contacts are held into place by the formed nibs 13 and 14 which hold the contacts in the closed circuit condition against the tension of the flexible springs 15 and 16. It can therefore be seen that when the aforementioned bars are actuated either by the heat dissipated by the current passing thru them, or by the heat liberated by properly designed resistance coils encompassing each individual bar as shown in the modified form illustrated in Figure 4 where the coil is shown insulated from the bar with one end soldered to the bar and the other connected to the supply wire 9, that the bars will leave their normal positions causing the nibs to release the contacts and open the circuit.

These two bars are used alternately thus allowing each bar to cool and resume its normal position while the other is functioning, as shown in Figure 1 where one bar is shown in the normal position and the other bar 7 is in the process of outward expansion and about to release the contact 11 and open the circuit. These two bars however serve another purpose and this is intimately connected with the position in which the iron has been placed by the operator.

The various positions I have provided for are two in number, one, which I shall term the active position and which occurs when the iron is being manually propelled by the operator; and two, the inactive position which is determined when the iron has been returned to the stand or has taken the upright position illustrated in Figure 2. Although the present application assumes the upright position, I do not wish to be limited there-

by inasmuch as a stand may be constructed incorporating the described mechanism, the engaging member functioning when the iron has been deposited on the stand.

The alternate movement of the switch points 11 and 12 is accomplished by the lever 17 pivotally connected at the pin 18 which is supported by the member 19 which in turn is attached to the body wall. The switch points 11 and 12 are integrally fastened to the flexible springs 15 and 16 and when released by the movement of the nibs 13 and 14 will strike the stop 20 which will produce an audible metallic note informing the operator of the completion of each predetermined period or interruption thereof. The flexible springs 15 and 16 pass thru their respective slots in the lever 17 and terminate in the lug 21 which may be propelled within the guides 22 by a movement of the circular indicator 23 which is marked to indicate the predetermined period desired. This will permit the contacts 11 and 12 to ride a variable point on the nibs 13 and 14 thus giving the switch a predetermined period which can be varied by the operator within the limits of the nib. However the lug 21 may be permanently set during manufacture for definite predetermined periods which have been found by experiment to be satisfactory for general use. The lug 21 is electrically connected to the terminal 4 which leads to the iron. The current returns at the terminal 3 which is directly connected to the remaining branch of the source of supply.

In the upright position of the iron the operating member 24 is engaged against the action of the spring 25. In the upward movement of the operating member, the pin 26 which is firmly set therein engages the tooth 27, part of the lever 17, until the progressive movement of the lever is terminated by a portion of the body wall of the casing 28. Before this occurs however the contact 11 is propelled by the lever 17 past the nib 13 thereby closing the circuit for the upright position and opening the circuit for the active position if the predetermined period for the active position has not been completed inasmuch as the action of the lever will permit only one circuit to remain closed at the same instant. That portion of the body wall which terminates the movement of the lever 17 is undercut to permit the operating member 24 to advance a trifle thus enabling the pin 26 to ride the tooth 27 in a cam movement. This is accomplished by pivoting the operating member 24 on the pin 29, integral with it and normally kept in position by the spring 30 which is attached to the pin 31 embedded in the lever 17. The pin 29 on which the operating member pivots is guided by the perforation 32 in the lever 17 thru which the pin 29 protrudes. At the instant the pin 26 passes the tooth 27 the greater portion of the weight of the iron carried by the operating member is along the vertical axis so that the operating member at this point acts as a column and allows very little of the weight to act at the pivot 29. This is an important factor where the iron itself possesses no means of retaining itself in an upright position, inasmuch as a provision must be made for the return of the spring 15 at the completion of the predetermined period. This is taken care of by the perforation at the upper portion of the cam tooth 27 which permits the lever 17 to take up the play in the perforation until the pin 26 prevents a further movement. Thus it can be seen that all excess pressure should be removed from the pivot pin 29 as this might hinder the bar 7 from functioning properly inasmuch as the spring 15 would be hindered in its movements.

When the iron is returned to the active position, the pressure is released from the operating member which permits it to resume the lower position thru the action of the spring 25 to which it is fastened. In doing so the pin 26 will again engage the tooth 27 operating the lever 17 releasing the contact 11 if the predetermined period has not elapsed, and engaging the bar 8 thru the nib 14 by the contact 12 in an action identical to the movement corresponding to the upright position, the difference being the actuating means which in this case is the return action of the spring 25.

It can therefore be seen that for each change in position of the iron the current will flow for a definite predetermined period: However should the iron be used over the predetermined period and it becomes desirable to continue the flow of the current for another period, the operating member may be manually inserted in the slot 34 by slightly springing the lever 17. This will permit the operator to utilize that portion of the circuit normally allocated to the upright position of the iron. Moreover when the iron has finally been returned to the inactive or upright position the weight of the iron will force the operating member out of the slot 34 into the normal path 35 thus allowing the operating member to function as usual without further attention by the operator.

Where it is desired to use the periodic timing action, as for instance in an electric toaster where it is contemplated to operate the device for a definite interval, such as the time required to toast a slice of bread, the indicator may be set to the desired interval and the operating member inserted in the slot 34 as previously described. The operating member may be removed from the slot at the completion of the interval and allowed to be drawn to its opposite position by the spring 25.

The mechanism may be enclosed in a casing similar to the ordinary electric light socket and the circuit-interrupting means may be taken advantage of for any electrically operated device where it is desired to use the current for a predetermined interval. Such a socket is illustrated in Figs. 5 and 6, where the circuit interrupting means is enclosed in the upper insulated chamber 40. The thermostats 7 and 8 forming a U-like structure are supported on the rotatable shaft 41, composed of insulating material, and are held in position on said shaft and prevented from rotating thereon by the insulated walls of the chamber 40 which are recessed at the shoulders of the thermostats. The shaft is supported by the clip 42 at one end and protrudes at the other end through the aperture 43 of the casing 44 where it is formed into the key 24. Integral with the shaft and directly below each thermostat when it is rotated into this position is the heating chamber 39 recessed at 45. Longitudinally extending through this recess is a suitable resistance 46, the heat of which actuates whichever thermostat is adjacent to it. One end of the resistance is electrically connected to the metal washer 47 mounted between the shaft and the thermostats so that contact is continually made between said resistance and said thermostats. The other end of the resistance is similarly connected to a metal washer or slip ring 37 on which the spring 48 continually makes contact. The spring is connected to one branch 9

If the metal salts are those of the volatile acids, such as acetic or formic, good results can be obtained by driving off the acid by heating at a sufficiently high temperature; but better results are obtained by washing with the boiling water solution of ammonia as above described.

If the metal salts employed in the solutions are those of mineral acids, such as sulphuric or hydrochloric acid, the addition thereto of a buffer or protective agent is desirable to inhibit or prevent excessive tendering of cellulosic fibres, such as cotton, linen, or rayon. Examples of such agents are ammonium acetate or ammonium formate, or a compound selected from the class of acid amides, such as carbamide, acetamid or formamide.

The following is an illustrative example of a typical binder solution containing a metal salt of a mineral acid together with a buffer or inhibiting agent:

Dissolve in fifty (50) gallons of water

	Pounds
Zirconyl chloride $ZrOCl_2 \cdot 8H_2O$	22
Formamide	22

This solution may be applied to and dried into cotton, rayon, or linen at a relatively high temperature without causing tendering of the cellulosic fibre.

Having thus described various embodiments of my invention both as to process and as to product, and having given specific illustrative examples thereof, I desire it to be understood that specific terms and illustratons so employed are used in a descriptive sense only, and not for purposes of limitation, the scope of the invention being defined and limited only by the terms of the appended claims.

I claim:

1. A process of treating a fibrous material with a water repellent agent to produce a water repellent material substantially free from metallic soaps whereby the water repellent effect produced on said material has improved durability and resistance to the action of strong alkaline detergents, comprising the steps of impregnating the fibers of said material with an aqueous solution of a salt of a metal selected from the group consisting of aluminum, zirconium, cerium, thorium, chromium, nickel, lead, barium, and titanium, drying said material after impregnation, treating the dried material with an alkaline solution to form a metal hydroxide on the fibers thereof, and depositing a coating consisting of wax on the fibers of said material to render said material water repellent.

2. A process of treating a fibrous material with a water repellent agent to produce a water repellent material substantially free from metallic soaps whereby the water repellent effect produced on said material has improved durability and resistance to the action of strong alkaline detergents, comprising the steps of impregnating the fibers of said material with an aqueous solution of a salt of a metal selected from the group consisting of aluminum, zirconium, cerium, thorium, chromium, nickel, lead, barium, and titanium, drying said material after impregnation, treating the dried material with ammonium hydroxide to form a metal hydroxide on said fibers, and depositing paraffin on the fibers of said material to produce a water repellent effect thereon.

OSCAR EDELSTEIN.

CERTIFICATE OF CORRECTION.

Patent No. 2,323,387. July 6, 1943.

OSCAR EDELSTEIN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 33, after the word "improved" insert --water repellent--; page 2, first column, line 11, after "quantity of" insert --repellent material as--; line 39, for "containing" read --and--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of September, A. D. 1943.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

DISCLAIMER

1,959,387.—*Harry Ernest Rubens*, Chicago, Ill. CIRCUIT CONTROLLER. Patent dated May 22, 1934. Disclaimer filed October 23, 1937, by the patentee. Hereby enters this disclaimer to claims 18 and 19 of said Letters Patent.
[*Official Gazette November 23, 1937.*]