Sept. 7, 1954 M. WALTHERT 2,688,683

REGULATOR FOR ELECTRICALLY HEATED HOT PLATES

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FIG. 1

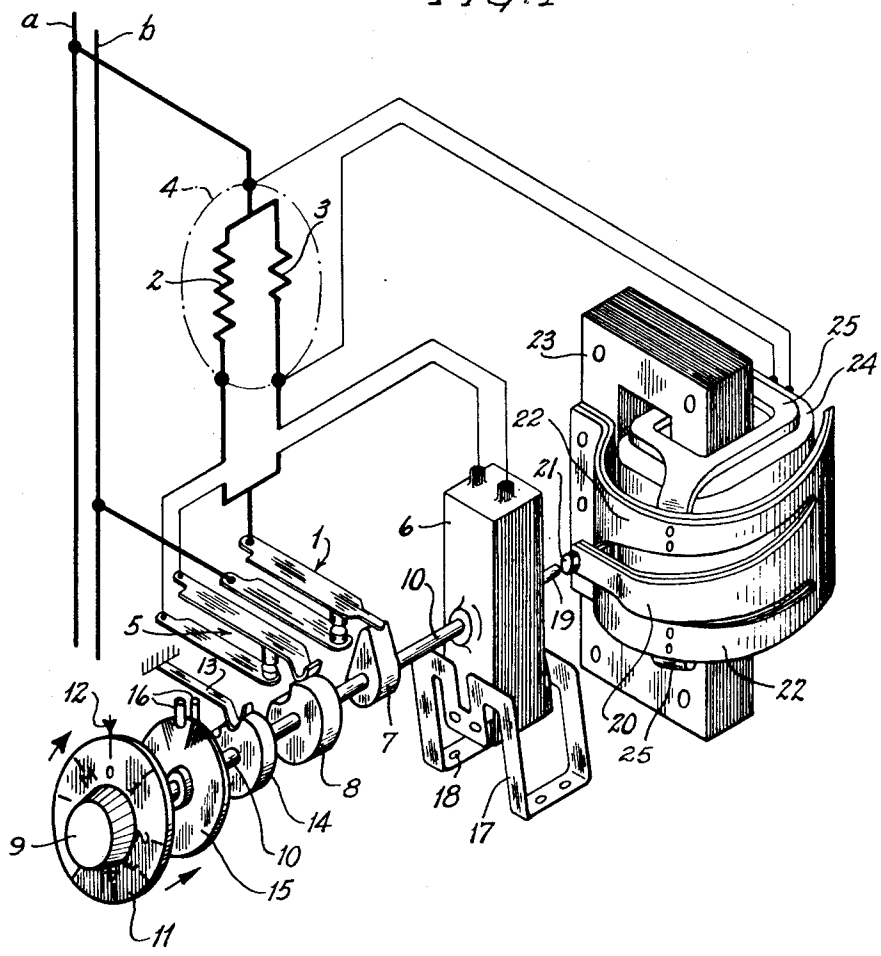
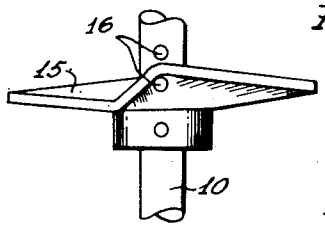


FIG. 2



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REGULATOR FOR ELECTRICALLY HEATED HOT PLATES

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5 Claims. (Cl. 219—20)

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This invention is directed to a novel cooking plate regulator.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

An object of this invention is to provide a novel cooking plate regulator whereby different stages of heating may be obtained by fixing in different positions a manually operable regulating knob.

A further object of my invention is to provide a novel cooking plate regulator whereby a continuous regulation of heating power is obtained by a unique combination of elements including a number of cooperating switches.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate an embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Figure 1 is a perspective view of an embodiment of my invention.

Figure 2 is a top view showing a circular disc having its upper portion bent to form a cam to effect longitudinal displacement of the operating shaft for the invention.

The invention in general is directed to a cooking plate regulator comprising two filament resistances connected in parallel, a hand actuated switch connected in the circuit of the first filament resistance, said switch being dependent on a regulating knob, and a tumbler switch connected in the circuit of the said filament resistance, said tumbler switch being controlled by a bimetal construction, said bimetal construction being opposite said tumbler switch and being heated by at least one secondary short circuit winding of a heating transformer, the primary winding of which is connected in parallel with the second filament resistance.

The tumbler switch in the above construction is operatively connected to the regulating knob. A stationary index cooperates with the regulating knob, which has a two position scale so that when the knob is in one position with respect to the stationary index, both of the filament resistances become effective, this stage being the parboiling stage; while when the regulating knob is turned to a second position, the first filament resistance is disconnected and the second filament resistance is switched on and off.

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In order to describe the invention more specifically, I now refer to Figure 1. Two conductors *a* and *b* of a high voltage line have been connected thereto, by means of a switch 1, two heating filament resistances 2 and 3, said resistances being connected in parallel for heating an electric boiling plate 4. A switch 5 is positioned in the circuit of the filament resistance 2, while a tumbler switch 6 is positioned in the circuit of the filament resistance 3, said tumbler switch being designed so that it is normally closed and open only during actuation.

The two switches 1 and 5 are actuated by cam discs 7 and 8 which are rigidly connected to a rotatable shaft 10 which is regulated by regulating knob 9. The regulating knob 9 is provided with a scale 11, the position of which may be read from a stationary index 12 arranged opposite it. A notched disc 14 cooperates with spring 13, said disc 14 being rigidly connected to the shaft 10 to permit one to establish the position of 0 and M of the scale 11.

The cam disc 7 is so designed that when shaft 10 is turned out of position 0, the switch 1 is closed but switch 5 is open. When the shaft is turned to position M, the cam 8 is so designed that switch 5 is closed which means that both switches 1 and 5 are closed and the filament resistances 2 and 3 heat the plate 4 to a parboiling stage.

A lifting cam 15 shown in plan view in Figure 2 is rigidly connected to the shaft 10 and is guided between two pins 16 connected to a part of regulator housing (not shown). The lifting cam as shown clearly in Figure 2 has corrugated edges so that when the shaft 10 is rotated clockwise from position 0 to position M by means of the knob 9, it engages an edge of the cam 15 and is moved longitudinally from right to left. Likewise, when the shaft is rotated counterclockwise from position M to 0, it is moved longitudinally from left to right. The right hand end of the

shaft 10 is rotatable in the housing of the tumbler switch 6 but cannot be displaced, which means that the tumbler switch 6 takes part in the longitudinal displacement of the shaft 10, said tumbler switch being guided by means of a parallel guide spring 17, said guide spring 17 being rigidly connected at the points 18 to the regulator housing (not shown). Even though the shaft 10 and tumbler switch 6 have been displaced to the right, the switches 1 and 5 are constructed so that they are still closed.

An actuating knob 19 of the tumbler switch 6 is positioned on the right hand side of it and is directly opposite an actuating pin 21 rigidly connected to the free end of a compensation bimetal wing 20. The compensation bimetal wing 20 is connected to two active bimetal arms 22 with the entire bimetal construction being fixed to a sheet stack 23 of a transformer, the primary winding 24 of which is connected in parallel to the filament resistance 3. Two short-circuit windings 25 are arranged as secondary windings and rigidly connected to the bimetal arms 22. When a current is passed through the primary winding 24, a short-circuit current is produced in each of the two short-circuit windings which heats the bimetal arms.

The two short-circuit windings 25 may be made in one part and connected to the wing 20, so that the wing 20 forms the active part of the bimetal construction, while the two bimetal arms 22 serve for compensation. Also, the displacement of the tumbler switch may be effected by the lifting cam 15 acting directly on the tumbler switch while the shaft 10 no longer executes a longitudinal displacement.

My invention operates as follows. In the zero position the shaft 10 is in its right hand terminal position and the switches 1, 5 and 6 are all open, said tumbler switch 6 being open by means of the actuating pin 21 pressing the actuating knob 19 of the tumbler switch. When the regulating knob is turned into position M, the shaft 10 moves into its left hand terminal position and the two switches 1 and 5 and the tumbler switch 6 close. A corresponding part current now flows across each of the two filament resistances 2 and 3 and the primary winding 24 of the heating transformer receives power line voltage. The short-circuit windings 25 become heated and the bimetal arrangement is deformed.

At this point, the actuating pin 21 cannot actuate the tumbler switch 6 so that the boiling plate is heated at a maximum for a period called par-boiling time. When the material being heated has been cooked sufficiently, the regulating knob 9 is turned in counterclockwise direction so that the shaft 10 by means of the lifting cam 15 is displaced to the right, which causes the actuating knob 19 to get into the effective range of the actuating pin 21 of the bimetal construction. At this point switch 1 is closed but switch 5 is open.

Current no longer flows through the filament resistance 2 while an impulse type current now flows through the filament resistance 3, the impulse duration depending on the distance set by means of the regulating knob 9 between the actuating knob 19 and the actuating pin 21, the intermittent or pulsating current being controlled by the opening and closing of the switch 6 under the influence of the bimetal member 20. The nearer the tumbler switch 6 is pressed to the bimetal arrangement, the longer will be its period of opening and the smaller will be the output fed to the boiling plate. If the regulating knob 9 is finally turned to the position 0 the tumbler switch 6 remains continuously open and simultaneously the switch 1 is also opened, which causes the boiling plate to be disconnected at all poles from the line *a, b*. The adjusted metering of energy remains constant even in the case of fluctuations of the line voltage, as the amount of energy supplied to the boiling plate is proportional to that needed by the bimetal in its adjusted connections.

The invention in its broader aspects is not limited to the specific mechanisms described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

I claim:

1. A cooking plate regulator adapted to provide continuous regulating of heating power by supplying electric energy by impulses comprising first and second filament resistances connected in parallel to each other, a normally rotatable shaft axially movable to different extents by rotation of the shaft, a first switch actuated by rotation of the shaft to supply power to one resistor, a second switch carried and moved by the axial movement of the shaft and opened and closed by movement in line with the shaft, a bimetal element movable toward and from the second switch to open and close the second switch, the amount of movement of the bimetal element needed to close the second position being determined by the axial position of the shaft, said bimetal element being heated by a secondary short-circuit winding of a heating transformer, the primary winding of said transformer being connected in parallel with the second filament resistance whereby said regulating knob may be turned to two operable positions, the first position being where both filament resistances are effective and the other operable position being where said first filament resistance is disconnected and said second filament resistance is continuously switched on and off.

2. A cooking plate regulator as defined in claim 1 in which the regulating knob is rigidly fixed to an operating shaft and said first switch is controlled by means of a cam fixed to said operating shaft whereby said first filament resistance is closed only when said regulating knob is in said first mentioned position.

3. A cooking plate regulator as defined in claim 2 in which a lifting cam is attached to said operating shaft, said lifting cam having a dome-shaped surface guided between guide members whereby said operating shaft is shifted longitudinally when said regulating knob is rotated so that said dome-shaped surface of the cam engages said guide members, the longitudinally shifting of said shaft controlling said second switch.

4. A cooking plate regulator adapted to provide continuous regulating of heating power by supplying electric energy by impulses comprising first and second filament resistances connected in parallel to each other, an axially movable shaft moved axially by rotation thereof, a switch actuated by rotation of the shaft for controlling power supplied to one of the resistances, a second switch axially moved with the shaft, a bimetal element moving axially of the shaft for actuating the second switch, said bimetal element including a wing which is operatively connected to the second switch and is deformed by

being heated by a secondary short-circuit winding of a heating transformer, the primary winding of said transformer being connected in parallel with the second filament resistance whereby said regulating knob may be turned to two operable positions, the first position being where both filament resistances are effective and the other operable position being where said first filament resistance is disconnected and said second filament resistance is continuously switched on and off.

5. A cooking plate regulator as defined in claim 4 in which the bimetal construction contains one short-circuit winding.

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