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(54) Cooking system with variable-duration initial phase

(57) In a food cooking appliance, the heat source (2), for example a gas burner, microwave generator, electrical resistance element, halogen lamp or the like, is operated at maximum power for a time preset by the user, to then pass automatically to a lower power, again preset by the user, on the basis of user cooking requirements. The system can be implemented with electronic microcontrollers or similar programmed control devices.

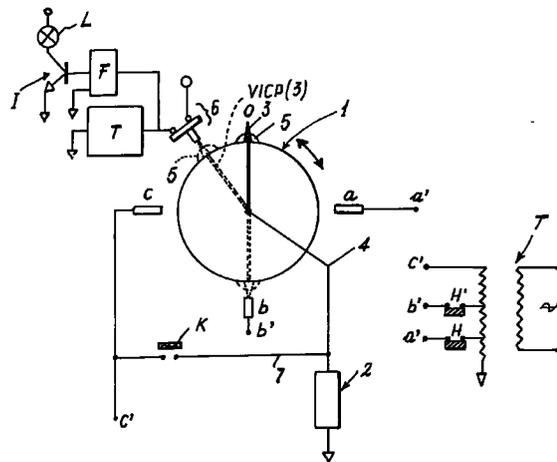


Fig. 1

Description

This invention relates to a system for controlling the power of a heat source on a food cooking appliance. The heat source can be a gas burner electronically controlled by pulse width modulation (PWM), a microwave generator (magnetron), one or more electrical resistance elements, one or more halogen lamps or the like, the heat source being controlled by an electronic control device.

The user of a food cooking appliance learns rapidly, in practice without truly realising it, how much time is required for cooking foods of most frequent and common use. He often however has to adjust the heat source during cooking, for example to prevent boiling-over of the cooking liquid during the cooking of pasta or rice.

An object of the present invention is to provide a system which enables the user to select the cooking phases and make passage from a given cooking phase to the next automatic.

This and further objects which will be more apparent from the detailed description given hereinafter are attained by a control system pre-selectable by the user, in accordance with the accompanying claims.

The invention will be more apparent from the detailed description of a preferred embodiment thereof given hereinafter by way of non-limited example and illustrated on the accompanying drawing, in which:

Figure 1 shows schematically the system of the invention applied to electrical resistance heating elements powered at different voltages via a knob for selecting the thermal power provided by them; Figure 2 is a flow diagram showing the operating logic in the case of implementation with a micro-processor or the like and applied to heat sources which may be different from the resistive source of Figure 1; and

Figure 3 shows schematically a modification of the system of Figure 1.

With initial reference to Figure 1, the reference numeral 1 indicates a knob shown in plan view, which the user rotates to change the thermal power of electrical resistance elements 2 (only one is shown in the figures) forming by way of example the heat source for cooking a food contained in a conventional utensil, not shown, positioned on it.

The knob 1 comprises a contact member 3 electrically connected in conventional manner to the resistance element 2 via a line 4. For simplicity of description and representation, the resistance element 2 is shown here connected to earth.

A series of fixed contacts a, b, c are positioned spaced angularly apart about the knob in such a manner as to be able to be alternately connected to the moving contact 3 carried by the knob.

The fixed contacts a, b, c are connected to points at different voltages on the secondary of a transformer T. The connection points are indicated by a', b' and c'.

As is apparent, when the moving contact 3 is in the position of Figure 1, ie in position 0, the resistance element 2 is not powered. It becomes powered at increasing voltage as the moving contact reaches the contacts a, b, c. The maximum feed voltage and hence the maximum thermal power of the resistance element 2 are achieved when the moving contact 3 cooperates with the fixed contact c.

The foregoing is known at least in its general lines.

Coinciding with the moving contact 3, the knob 1 comprises a cam 5 which, when the knob is rotated to move said contact into a position VICP(3), it acts on an electrical contactor 6 which closes to connect a timer means T (for example electronic) and a flasher means F (for example electronic), this latter intermittently powering a light source L (for example an LED) via a static switch I (for example a transistor).

The timer T controls three contacts H, H' and K. The contacts H and H' positioned in the lines which connect the fixed contacts a and b to the transformer respectively, are rest contacts, whereas the contact K, positioned in a by-pass 7 connecting the contact c to the resistance element 2, is a working contact.

Hence when in the position VICP(3), the timer T closes the contact K and opens the contacts H and H', with the result that the resistance element 2 operates at maximum power even if the moving contact 3 is not on the contact c but instead in position VICP(3).

In general terms a timer has a charge time, and a discharge time which is related to but different from the charge time. The charge time is substantially shorter than the discharge time. For example in the case under examination, if the charge time is 6 seconds the discharge time is 6 minutes. This means in practice that 1 second of charge corresponds to 1 minute of discharge.

The flashing frequency of the light source is chosen in the example to be 1 second, and corresponding to 1 second of charge of the timer and hence to 1 minute of discharge thereof. The result is that the number of ignitions of the light source corresponds to the duration of discharge of the timer and hence, neglecting the charge time because of its brevity, to the time during which the timer means maintains the resistance element 2 at its maximum thermal power.

The two devices T and F are hence operationally correlated with each other, this latter, by its flashing, enabling the user to select the duration of maximum power heating on the basis of the number of ignitions of the light source.

To fix the timer discharge time and hence the initial phase of maximum thermal power provided by the resistance element, to then pass to a subsequent phase of lesser thermal power provided by the resistance element, the user rotates the knob 1 to move its contact 3 into cooperation for example with the fixed contact b (if

he considers that for this further food cooking phase the thermal power provided thereby is adequate).

As a result of this the contact 6 opens, the flasher means F becomes inoperative and the timer T (no longer powered) ceases its charge time and begins its discharge time. During the discharge time the contact K remains closed and the contacts H and H' remain open so that the resistance element 2 is powered at maximum power, even if the moving contact 3 is on the fixed contact b. When the timer T is discharged, the contact K opens and the contacts H and H' close with the result that the resistance element 2 is powered at lower power via the contact H' (now closed), the fixed contact B and the moving contact 3 (positioned in contact with b).

An example will further clarify the operation of the system, the basis of which is the facility for the user to use the visual indication provided by the light source to set the duration of an initial phase of cooking a food at maximum thermal power provided by a heat source, to then continue cooking at a lower power.

It will be assumed that the user wishes to boil four potatoes in a litre of water 4. On the basis of his experience he knows that to bring the entire contents to boiling, for example 6 minutes are required at maximum power followed by 2 minutes to complete cooking at reduced power, such as that provided via the contact b.

The user places the utensil on the heat source 2 and sets the knob to position VICP(3). The light source L begins to flash at one flash per second. The user knows that each flash corresponds to 1 minute of application of maximum power, and begins to count the ignitions (flashes).

After six flashes the user rotates the knob into the position of the fixed contact b. By this means he sets the duration of the initial cooking phase at maximum power. On termination of this initial phase the heat source (for example a resistance element) switches to the (lesser) thermal power corresponding to the contact b with which the cooking is finished in the next two minutes.

The described system can be used with other heat sources, as initially stated, using microprocessors instead of the flasher means F, the timer T and relative contacts, and the contacts 3, a, b, c can be replaced by proximity switches, for example of Hall effect type. If control microprocessors are used, the flow diagram followed by the program can be as shown in Figure 2 which, because of its clarity, has no need of further description. By way of example, a modified embodiment of the invention shown in Figure 1 is shown in Figure 3, in which parts corresponding to those already described are indicated by the same reference numerals. In Figure 3, the knob 1 is connected to a microprocessor unit 30 which senses its rotated position on the cooking hob (by a connection between the knob and unit 30 indicated by 31 by way of example, using known means). The unit 30, in known manner, is able to command the operation of the heat source 2 by controlling a closure member 33 (such as a relay as shown or an electronic switch or the

like) in an electrical feed line 34 from said source 2. This control is achieved by operating another switch (electronic or other type) 35 positioned between the member 33 (connected to an electrical feed source) and earth.

As stated, the unit 30 operates in accordance with the flow diagram of Figure 2, and hence in the manner already described. Other arrangements are possible and are to be considered as falling within the scope of the present invention.

Claims

1. A system for cooking foods by controlling a heat source (2) of a cooking appliance therefor, characterised in that the food cooking comprises an initial phase, of duration established by the user on the basis of visual information (L), at maximum thermal power of said heat source (2).
2. A cooking system as claimed in claim 1, wherein the visual information is provided by a flashing light source (L) activated by arranging a selector means (1) in a predetermined initial position (VICP(3)).
3. A cooking system as claimed in the preceding claim, wherein the number of flashes of the light source (L) is related to the duration of application of maximum thermal power.
4. A system as claimed in one or more of the preceding claims, wherein setting the selector means (1) in the predetermined initial position (VICP(3)) results in the charging of a timer member (T) whereas passage of said selector means into another predetermined position (a, b) corresponding to a lower thermal power causes the timer member (T) to commence discharge, passage to this lower power occurring on termination of this discharge.
5. A system as claimed in the preceding claims, wherein the heat source is a resistive source, a halogen source, or an electronically controlled gas burner.
6. A system as claimed in the preceding claims, wherein the selector means is a knob (1).

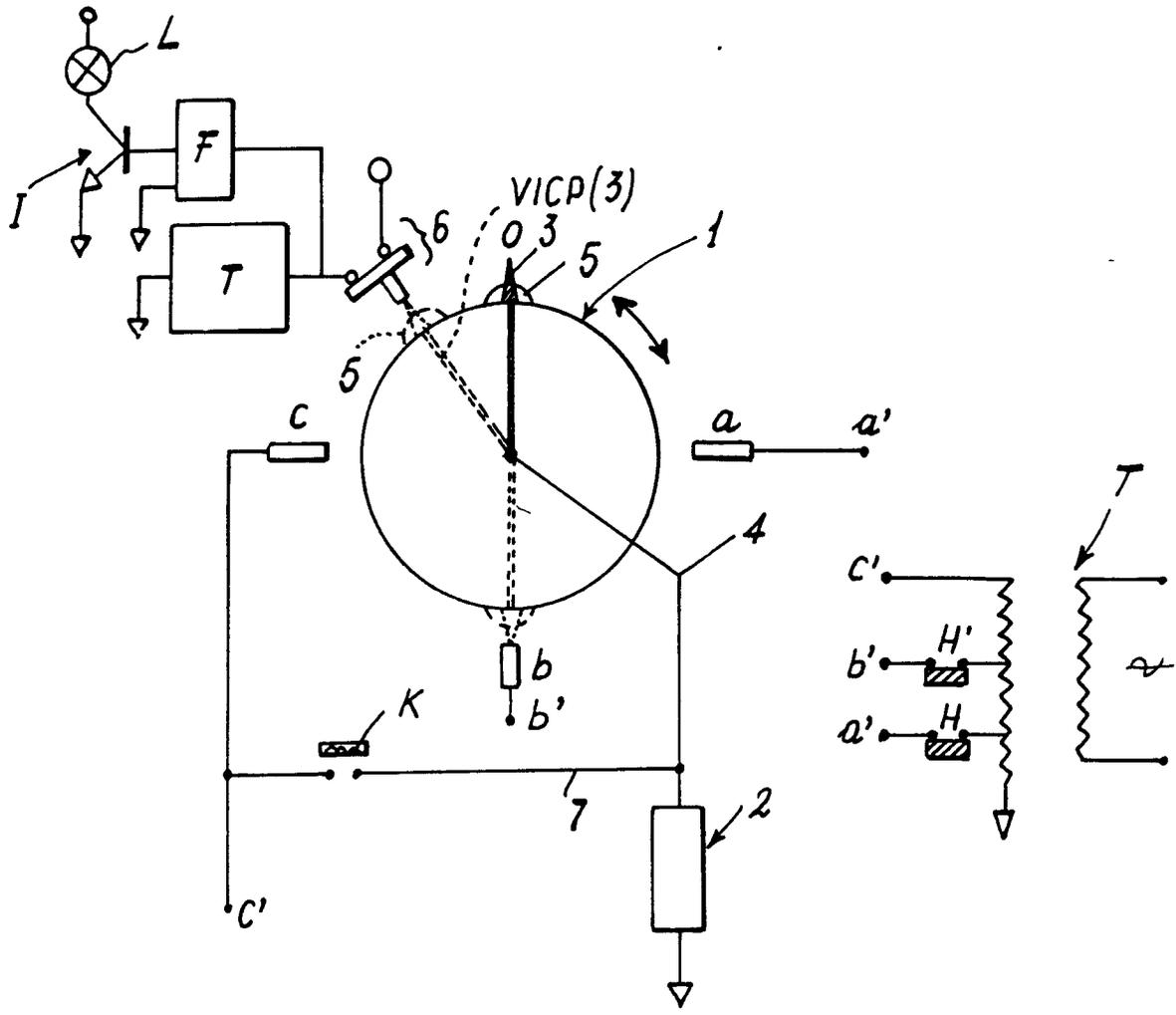


Fig. 1

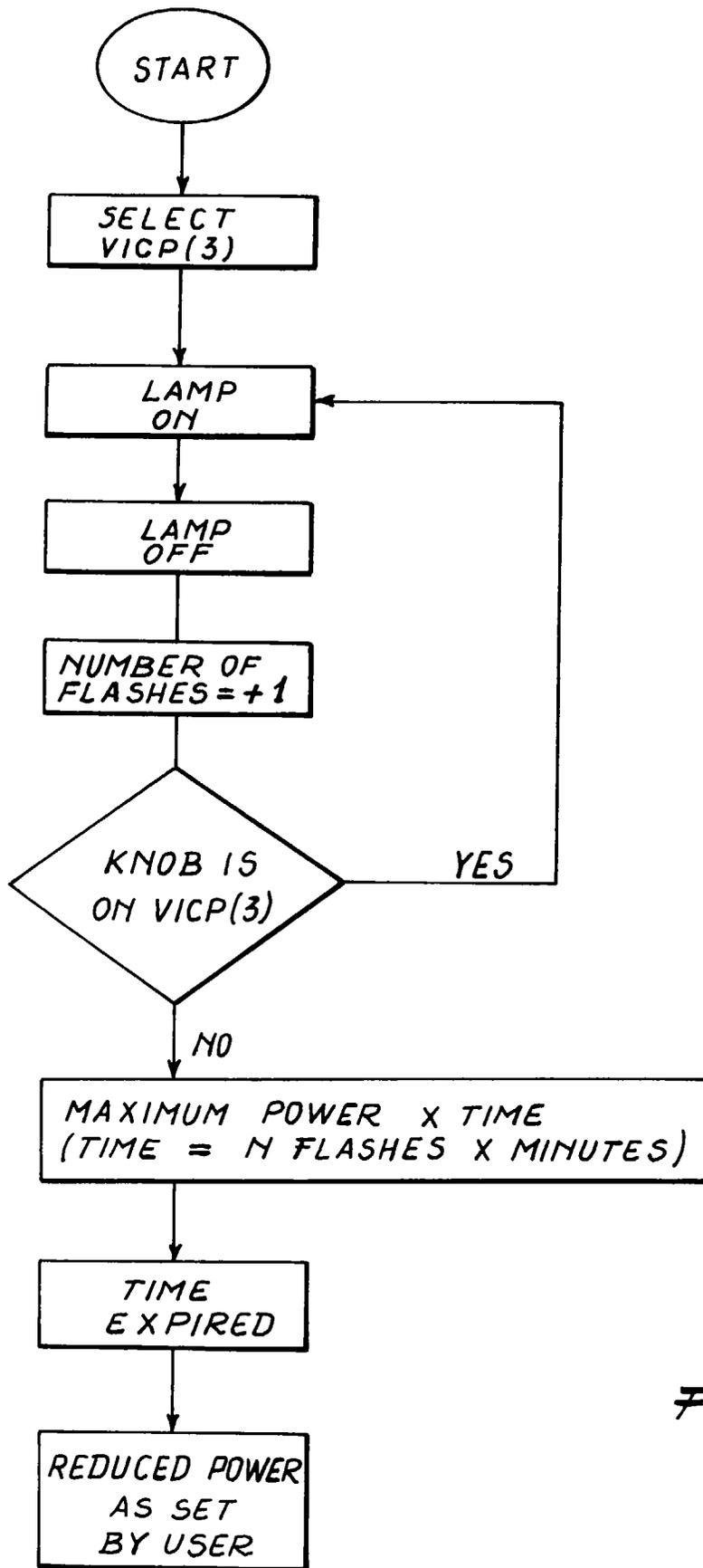


Fig. 2

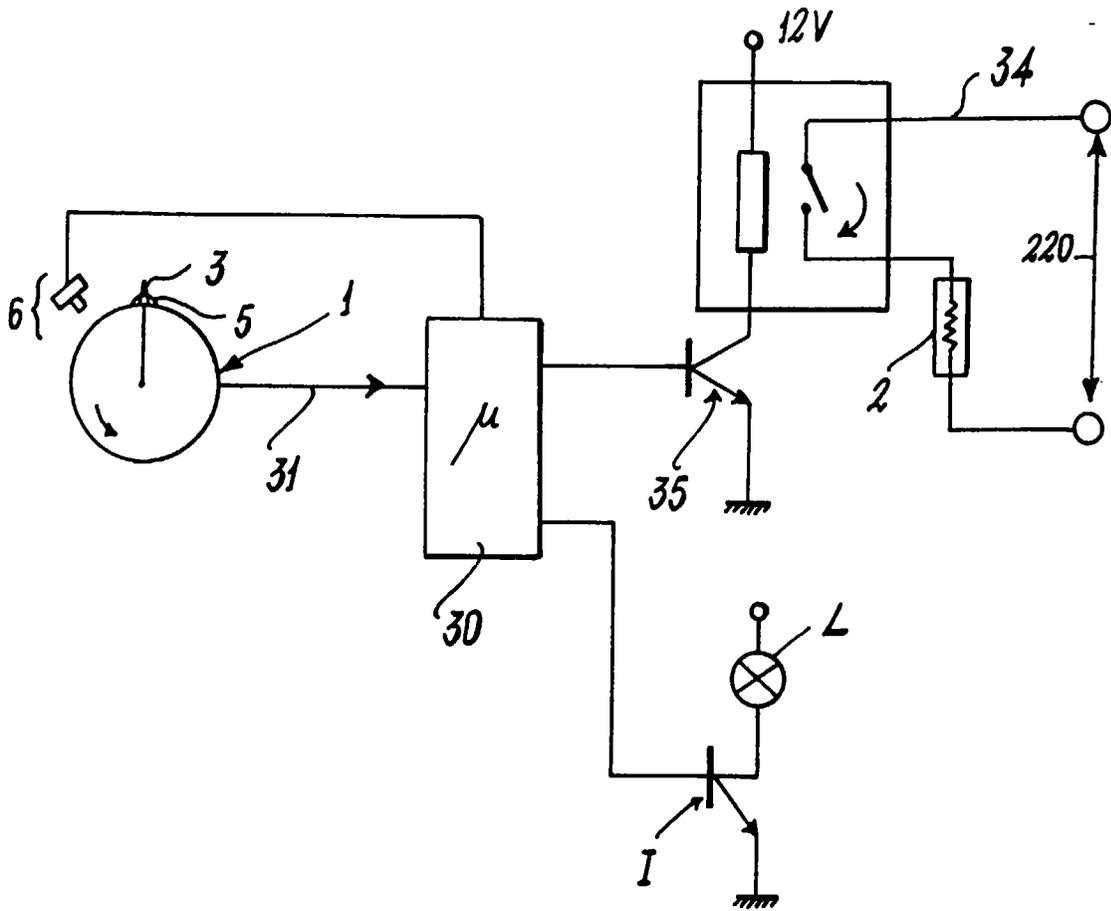


Fig. 3